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Fifty years of capital markets research in accounting: Achievements so far and opportunities ahead

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ABSTRACT

This paper reviews the literature on capital markets research in accounting over the last 50 years. Rather than trying to be comprehensive, the review focuses on selected areas, and strives to be forward-looking. The first major takeaway is that the literature has made great progress, especially on the technical side. The second takeaway is that great opportunities remain, especially in using Big Data, looking more closely into the accrual process, and in issues related to standard setting.

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1. Some caveats

I would like to start with some caveats. The first caveat is that this review is not meant to be comprehensive. The existing capital markets literature is simply too large, and so it is nearly impossible to cover everything. To use an analogy from music, what I am going to do here is to present the Selected Hits, rather than the Complete Collection. And since it is the Selected Hits, the choice of what to include is largely driven by personal choice and personal expertise. The idea is to provide a breezy and punchy overview rather than an exhaustive analysis of everything that has been done. Second, I will be attempting to "give an opinion" rather than just "listing what has been done". In other words, the review will take more of a position on certain things. Note that my opinion could be biased or wrong but I feel that this is the right occasion to say something more pointed rather than keep to the safety of just listing accomplishments. Third, the review aims to be big-picture and forward-looking. The important thing is not only what we have done so far but where we go from here. Accordingly, I will try to provide some ideas for future research.

For those who want a more complete coverage, there are some existing reviews of the capital market literature that are helpful. Kothari (2001) is a comprehensive review of capital markets research; it is widely read and cited but it does not reflect more recent findings. Richardson et al. (2010) is more recent but covers mostly

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accounting anomalies and fundamental analysis. Dechow et al. (2014) is also recent and more compact, concentrating mostly on the relation between stock prices and earnings. The most recent review I have seen is Kothari and Wasley (2019), a fairly comprehensive review with a particular emphasis on how the literature evolves from Ball and Brown (1968).

2. Is the earnings number useful?

2.1. An updated replication of Ball and Brown (1968)

Ball and Brown (1968) is widely considered foundational for the capital market literature, tracking the stock returns for separate portfolios of positive and negative earnings surprises. The idea is that the stock market is an efficient aggregator of information, and therefore we can use stock prices and returns as a benchmark for the information content in earnings. Fig. 1 shows an updated replication of Ball and Brown (1968), reproduced from Dechow et al. (2014). An examination of Fig. 1 reveals pretty much the same message as the original Ball and Brown (1968) paper, showing that stock returns correctly anticipate the sign of future earnings surprises up to 12 months in advance. If anything, the spread between the positive and negative portfolio is wider here, exceeding 30% over the full 18-month window. Thus, the original message of Ball and Brown (1968) is emphatically confirmed in more recent samples, showing the continued relevance of their groundbreaking research. The other big takeaway is that there appears to be a market underreaction to earnings information, as the two portfolios continue to drift in the direction of the earnings surprises even after earnings are announced in month 0. This phenomenon was heavily studied in later research, and became known as the Post-Earnings-Announcements-Drift (PEAD).

2.2. Are earnings announcements useful?

The other major study from the early years is Beaver (1968), which shows pronounced spikes in trading volume and stock returns in narrow windows around earnings announcements. This evidence indicates that earnings announcements contain new information, and that the stock market reacts to this new information. Fig. 2 presents the Dechow et al. (2014) replication of Beaver (1968) for several sample periods over time. What is interesting here is that both the trading volume and the stock return reaction have become more pronounced over time. So, it seems that earnings announcements have become a source of increasing information content, although more recent studies find that this information content is due to items beyond earnings (Beaver et al., 2020).

Summing up, early studies like Ball and Brown (1968) and Beaver (1968) marked an exciting start to capital market research in accounting. Earnings especially, and the outputs of the accounting system more generally,

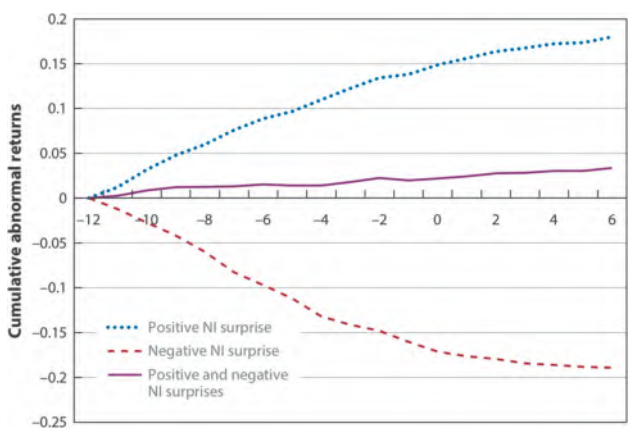

Fig. 1. Month relative to annual earnings announcement.

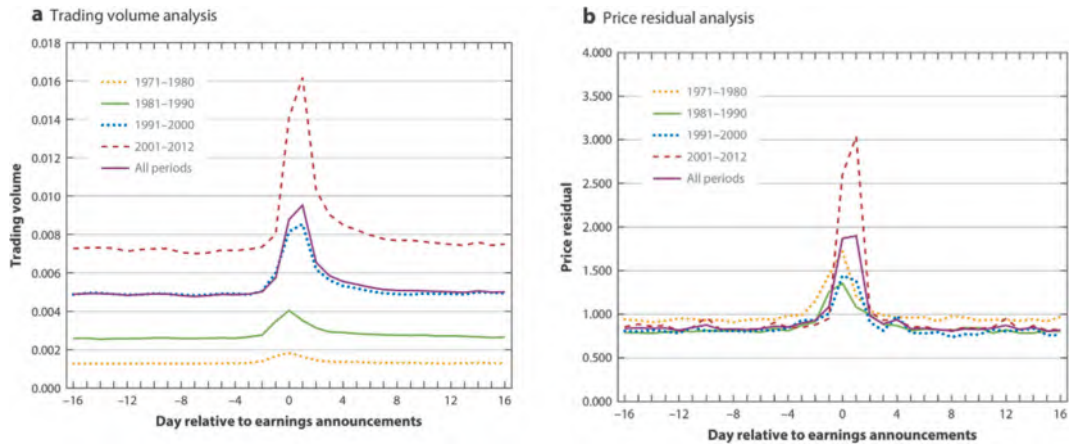

Fig. 2. Day relative to earnings announcements.

seemed to be a powerful source of information for capital markets. Accordingly, this early excitement and promise attracted many researchers, and capital markets quickly became perhaps the dominant area in all accounting research.

2.3. After Ball and Brown (1968) and Beaver (1968)

I use the framework and the language of *The Structure of Scientific Revolutions* by Thomas Kuhn to describe what followed the initial successes in capital markets research, as the comparison is apt. Basically, the early studies marked the rise of a new paradigm which captured the minds of accounting academics, and the whole idea and practice of accounting research shifted in a decisive manner. While previous research relied mostly on "armchair" arguments and speculations, the new paradigm brought empirical tests and evidence to the fore, with corresponding attention to data, statistical tests, and borrowing theories and methods from economics and finance. There were some interesting sociological angles as well, with many from the older generations displaced or sidelined by the new way of doing research.

Using the language of the Kuhn book, a great volume of "normal" research on the price/earnings relation appeared after the initial foundational studies. "Normal" research means "mopping up operations", basically studies that explore and advance the new paradigm but do not aim for radical novelty. The basic point of Ball and Brown (1968) and Beaver (1968) is that prices react to earnings, and earnings have information content. But there was a lot that could be done with these initial findings, they could be expanded to new samples, improve the test methodology, and so on. For example, the normal research on the price/earnings relation includes multiple studies on the specification of earnings surprises, such as using time-series models vs. analysts forecasts. Researchers explored event return windows that varied from a few days to several years, and used various definitions of earnings, such as net income, income before non-recurring items, and cash flows.

One useful way to summarize the first two decades of capital market research is provided by Lev's (1989) influential review. Looking at the big picture, Lev (1989) finds that the whole exercise has been somewhat disappointing, especially compared to the enormous effort invested in this literature. His main point is that if we look at the magnitudes of the R^2 of the associations between earnings numbers and returns, they are fairly small, with typical magnitudes of 2–7%. There are, of course, good reasons for this, a major one being that stock returns are very noisy. Thus, the question is how much R^2 can we expect, especially on a firm-level basis where the noise is much higher as compared to portfolio specifications. Lev (1989) also suggests that GAAP rules are probably at fault as well, and perhaps we need to think of ways to improve the accounting to better capture the value of firm operations.

Perhaps even more importantly, around the end of the 1980s and the beginning of the 1990s, the profession came to the critical realization that the basic premise of using formulations like $R_t = a + b^*\Delta E_t + e$ is quite

limiting (Lee, 2001). Notice that we are using market prices or returns as the benchmark, and we judge information content in earnings by the degree to which the right-hand side maps into this benchmark. The problem is that if we always put contemporaneous returns on the left-hand side in these models, we are assuming that the market has already perfectly impounded all available information. But if the market perfectly knows everything already, what is the use of accounting? Where is our value-added then? Does it matter at all how we do the accounting?

3. The rise of fundamentals-based research

There was another new wave of research that soon arose in response to these disquieting questions, and I do think it was very good for accounting. This is the rise of what we can call fundamentals-based research. The critical difference from before is that instead of immediately going to the market for validation of accounting information, we now first study the accounting system itself, and try to understand how it captures the value created in real company operation, including the production of key value metrics like earnings and book value. And it is only after we internalize this knowledge that we turn to the market to see if the fundamentals-based metrics map into observable market prices. It was a very definite and large shift in the way that we think about these things. Perhaps most prominently, James Ohlson and Stephen Penman led the way here in a series of theoretical papers, developing these ideas more formally, see Ohlson (1995) for example. Basically, the idea is to derive equity value as a function of firm fundamentals, especially earnings and book value of equity. And soon after, there was a stream of empirical papers implementing these ideas, prominent examples include Frankel and Lee (1998) and Dechow et al. (1999).

This shift in thinking opened the doors to asking entirely new questions, and addressing new audiences. For example, if we find that fundamental values and observable stock prices differ, now we are not going to necessarily assume that prices are better, and accounting inputs are deficient. Now we may allow for the possibility that prices are deficient, and we may investigate whether prices catch up with fundamental value at some point, consistent with how value investors like Warren Buffett approach the analysis of financial information and make investments. Correspondingly, such research has natural synergies with our teaching, where a lot of our undergraduate and MBA students have an interest not so much in accounting itself but more in how accounting can be used to find hidden value, and lead to better investing decisions. In other words, this new thinking marked a radical shift where market efficiency is now an examined hypothesis rather than just a maintained hypothesis.

Perhaps the biggest single positive from the rise of fundamentals-based research is that this new approach sparked renewed interest in how accounting actually works. I view this as a strong positive because it naturally plays to our expertise in accounting, and allows us to offer insights which would otherwise not be possible for our colleagues in finance and economics who study similar questions. It basically brought us back to such classic questions as "What makes good accounting?" and "What makes earnings useful?".

4. What makes earnings useful?

4.1. Accrual accounting

Dechow (1994) is the paper that both signaled and catalyzed the rebirth of interest in how accrual accounting actually works. It is remarkable that Dechow (1994) appeared a full 26 years after Ball and Brown (1968), while it asks the most basic questions about accrual accounting. Most prominently, is earnings or cash flows better at measuring firm performance? The story in Dechow (1994) is that cash flow accounting is simple and objective: income is just cash flows coming in, while expenses are cash flows going out. But the weakness of cash flow accounting is that there are timing and mismatching problems, which question the use of net cash flow as a measure of firm performance. For example, consider a firm that sells Christmas trinkets. Before the Christmas season, the firm spends a lot of money on inventory, and then the money from the Christmas sales comes much later. So, if we look at the performance of this firm in terms of net cash flow, it looks like it has a lot of losses first and then it makes big profits later on. This does not make much sense because the "early losses" are clearly related to the "late profits" by the logic of the business.

Accrual accounting alleviates such timing and mismatching problems through the use of accruals. Using accruals, the Christmas trinkets firm above will capitalize the cost of inventory, and expense it in Cost of Goods Sold when the inventory is sold. Thus, accrual accounting aligns the cost of Inventory with Sales, consistent with the logic of the business, and so we get a much better measure of firm performance. But the cost of using accrual accounting is that accruals are essentially estimates made by management, which opens the door to estimation errors and subjectivity, and even willful manipulation. For example, capitalizing the cost of inventory at the time of purchase in anticipation of realizing it as Cost of Goods Sold at the time of sale may turn out to be problematic because we may need to write off the inventory before selling it. Thus, recording accruals involves a trade-off of benefits and costs, and it is an empirical question whether the sophistication of accrual accounting is better than the simplicity and objectivity of cash flow accounting.

Using stock prices as the benchmark for value-relevance, Dechow (1994) finds that accrual earnings are more strongly associated with stock returns than cash flows. In other words, the findings of Dechow (1994) indicate that accrual accounting is indeed resolving timing and mismatching problems, and that the stock market understands and endorses the use of accrual accounting. Thus, Dechow (1994) is foundational in terms of establishing the utility of accrual accounting.

A continuation of this line of inquiry is Dechow and Dichev (2002), delving further into the structure of the accrual process. The first message of Dechow and Dichev (2002) is captured in Eq. (1) below, where accounting earnings is expressed as a sum of past, present, and future cash flows, and the origination and reversals of accrual estimation errors. In Eq. (1), the first three terms are the cash flows, where the subscripts indicate when the cash flow occurs, and the superscripts indicate when the cash flow is recognized in earnings. The intuition is that accruals resolve the timing and mismatching problems in the underlying cash flows by moving their recognition in earnings across time, e.g., the revenue from a sale is recognized in earnings at the time of the sale by recording an accounts receivable rather than waiting for sales proceeds to be collected later on. Thus, the benefit of accrual accounting is captured in the first and third cash flow terms, whose recognition in earnings has been shifted across time. However, the benefit of recording accruals comes at the cost of incurring accrual estimation errors, e.g., the recorded Accounts Receivable estimate may be less than the actual cash collections later on. The consequence is that recording an overstated receivable first and writing it off later introduces noise in earnings, creating a false boost in earnings first, and a false decline in earnings later on. In sum, the cash flow terms capture the benefit of accrual accounting, while the error terms capture the cost. For accounting to be "good", we hope that the cash flow terms are large, and the error terms are relatively small.

$$Earnings_t = CF^t_{t-1} + CF^t_t + CF^t_{t+1} + \varepsilon^t_{t+1} - \varepsilon^{t-1}_t \quad (1)$$

Since moving the recognition of cash flows into earnings across time is accomplished by recording accruals, Dechow and Dichev (2002) also show how accruals can be expressed in terms of the underlying cash flows. Unfortunately, the current accounting system does not provide the theoretically required cash flow variables, and instead the empirical version of Dechow and Dichev's model is based on observable variables. Since the model is based on working capital accruals, not surprisingly the empirical version employs cash flow from operations (see Dechow and Dichev, 2002 for further detail):

$$Accrual_t = b_0 + b_1 CFO_{t-1} + b_2 CFO_t + b_3 CFO_{t+1} + \boldsymbol{e} \quad (2)$$

Intuitively, Eq. (2) says that accruals that do not map into their corresponding cash flows represent the accrual estimation errors, e.g., the portion of receivables not eventually collected represents the initial overstatement of the receivable. The empirical tests in Dechow and Dichev (2002) show that the estimates of the accrual estimation errors derived from Eq. (2) are indeed helpful in capturing the quality of accruals and earnings, e.g., high levels of estimation errors are related to low earnings persistence.

While the Dechow and Dichev (2002) model has been widely used, it also has some limitations. So, how can we improve on it? Useful extensions and re-formulations include McNichols (2002), Francis et al. (2004, 2005), Ball and Shivakumar (2006), and others. For example, McNichols (2002) combines the Dechow and Dichev (DD) model with the Jones (1991) model, and that combination has been popular empirically, although it is more questionable on theoretical grounds. I would argue that further work is possible here. Most importantly, notice that the DD model only captures the discretion/estimation of anticipatory accruals mapping into future

cash flows (like Accounts Receivable). But there is a lot of other discretion/estimation in accounting, including depreciable and useful lives, salvage values, interest rates, sales returns, percentage of completion, etc.

The good news is that the basic DD intuition applies to these other estimates as well. The spirit of the DD model is that accounting makes estimates, and the resulting estimation errors represent the cost of using accruals, manifesting as noise in earnings. The very same intuition applies to all other estimates as well, and so it can be used to measure the accrual estimation error noise as well. If you have the estimates, and if you have the realizations, the difference between them will give you the estimation errors. For example, if initial estimates of severance costs are too high and are low at realization, earnings will be initially understated and then overstated at realization. The bad news is that in most cases the accrual estimates and their realizations are not available to outside users of financial information.

But perhaps there could be some workarounds in implementing this intuition. For an idea what is possible, notice that the error term in Eq. (1) has a very specific form. If you re-write Eq. (1) as of time t − 1, and also as of time t + 1, and compare that to the expression as of time t, you would see that the error term is very strongly negatively correlated across time. This negative relation is, of course, not accidental. The error terms in (1) are negatively autocorrelated because the accrual process is self-correcting - if you make an accrual error in some period, it has to be corrected in some future period with an accrual with the opposite sign. The DD model is on working capital, so the errors and their corrections happen within one period, e.g., if at time t the initial estimate of the Accounts Receivable is too optimistic, the uncollected receivable is written off at time t + 1. The initial overestimation has a positive effect on earnings, and the write-off has a negative effect on earnings, so the accrual estimation errors are negatively autocorrelated over time. The same intuition applies to all other estimates. If we make an accrual estimation error, we have to correct it at some point after that with an accrual with the opposite sign. Thus, the signature of accrual estimation errors is that they reverse over time, and thus they induce a negative autocorrelation in earnings. The challenge will be to formalize this intuition, and to distinguish the reversals of all accruals (since all accruals have to reverse at some point) from the reversals of accrual estimation errors. To my knowledge, Dechow et al. (2012) is the only existing study that uses this intuition but I believe that we can get a lot more mileage out of it.

There are many other worthy studies on the properties of accruals but for the purposes of this review, I will limit the discussion to just two more widely influential examples. Sloan (1996) examines Eq. (3) below, and finds that the coefficient b_1 is greater than b_2, indicating that the cash flow component of earnings is more persistent than its accrual component. In other words, the results in Sloan (1996) indicate that firms with high accruals have low earnings persistence, and low earnings quality.

$$E_t + 1 = b_0 + b_1 * CFO_t + b_2 * Accruals_t + e \tag{3}$$

In addition, investors do not seem to understand this property, so portfolios long on stocks with low accruals and short on stocks with high accruals earn abnormal returns on the magnitude of 10% a year. This phenomenon has become known as the "accrual anomaly," and is one of the most widely known and researched stock market anomalies during the last 25 years.

Richardson et al. (2005) extends Sloan (1996), and investigates for differential persistence *within* accruals. The idea is that looking closer at the properties of the accrual process allows one to identify accruals that are more problematic than other accruals. Indeed, Richardson et al. (2005) identify a taxonomy of accruals that is helpful in predicting earnings quality, and also find that the stock market does not seem to fully appreciate these more subtle properties of accruals. But the most important contribution of Richardson et al. (2005) really is that they provide a comprehensive definition of accruals, namely, for a given period accruals can be defined as the changes in all non-cash assets and liabilities during that period. To me at least, the fairly-recent arrival of Richardson et al. (2005) is totally fascinating. Accruals represent the value-added of accrual accounting in the world, the bread and butter of what we do. Yet it took almost 40 years of research after Ball and Brown (1968) to finally have a comprehensive definition of accruals! While there could be a pessimistic read on this fact, I prefer the more positive interpretation. If the Richardson et al. (2005) experience is any guide – and I think it is – it implies that there are a lot of fundamental discoveries still to be made, and it is only our own limitations that prevent us from seeing what they are. What are we going to do in the next 50 years? The good news is there seems to be a lot that can be done, and I try to provide some pointers further below.

4.2. Conservatism

Another major strand of the literature on what makes earnings useful is conservatism, starting with Basu (1997). The story there is that accounting reacts asymmetrically to good and bad news. Specifically, accounting immediately impounds the full effect of bad news, capitalizing the present value of all future implications. For example, on finding that the depreciable life of some asset turns out to be shorter than originally expected, accounting will immediately write down the asset for the full effect of this shortening. In contrast, the book values of assets are not written up under favorable circumstances, and the gain on value is delayed until the asset is sold.

The literature on conservatism has seen rapid growth, finding a number of beneficial effects of more conservative accounting, especially for contracting outcomes. Indeed, the sheer volume of the conservatism literature warrants a separate review in itself, and such reviews actually already exist (Basu, 2009). So, instead of attempting to survey this literature, I would like to make one limited but crucial point. The Basu (1997) measure of conservatism uses stock returns as the benchmark for information content, and stock returns reflect many things, including possibly other explanations for the hypothesized asymmetric relations with earnings. Correspondingly, the Basu measure has been subject to a number of criticisms, and then rebuttals, see for example, Ball, Kothari, and Nikolaev (2013) and references thereof. Personally, I think a possible way forward in this literature is to derive a measure of conservatism which is independent of market prices, essentially a fundamentals-based measure of conservatism.

4.3. The dark side of discretion – earnings management

Earnings management can be defined as intentional adjustments to reported earnings to achieve desirable outcomes such as beating earnings benchmarks. By its very nature, earnings management is harmful to the role of earnings as a measure of firm performance and, correspondingly, research in this area has been a major focus for accounting academics for many years. By now, earnings management represents a very large, and rather mature literature, comprising dozens and perhaps even hundreds of studies.[1] Without getting into detail, I think the weight of the evidence leaves little doubt that earnings management exists. The extent of it, though, is more debatable, and partly depends on definition. It seems that more innocuous forms of earnings management within GAAP rules are widespread, affecting about 20% of U.S. firms in recent years (Dichev et al., 2013). More serious and extreme forms of earning management crossing into fraud seem to be much less prevalent, perhaps on the magnitude of 1–2% of firms, as reflected in studies of formal SEC actions and investor lawsuits (Dechow et al., 2011).

Is there room for more work in this literature? Given the sheer number of existing studies, it has become more difficult to make a meaningful contribution. On a personal level, I think two areas offer room for improvement. First, we need more earnings management studies where the null hypothesis is defined in a much sharper way as compared to that for most existing research. The null hypothesis is a statement of what earnings would be without earnings management. And this is really the key weakness of the majority of studies here: it is not quite clear whether the null is sharply defined enough to offer a powerful test. For example, suppose that there is a study which finds that in bad times managers cut R&D, apparently to hit earnings benchmarks. The question, though, is whether such a finding is truly indicative of earnings management - because in bad times prudent managers would cut R&D down anyway, as they should. So, what is the key to a sharp null hypothesis? There could be different approaches here but basically the key is identifying a setting where the null of no earnings management is very clear and convincing.

Second, it would be good to have more big-picture evidence on the economic prevalence of earnings management. By now there are scores of studies that offer evidence of earnings management in certain settings like equity offerings or for certain earnings components like special items or accruals. But there is less evidence on the broad prevalence of earnings management in the economy. Some authors opine that earnings management

[1] In fact, this literature has been such a major preoccupation of accounting research that one can argue that we have been more successful at identifying the problems of accounting (of which earnings management is a major one) rather than building up the case for what is good in accounting.

is likely confined to isolated pockets of rogue managers and firms, while others suggest that it is a rather pervasive phenomenon affecting perhaps the majority of firms in one way or another. More research could help to narrow down these rather divergent views.

4.4. Fair value

The research on fair values is another significant stream of the literature that investigates what makes accounting numbers useful. The reason is that the U.S. and international standard setting has adopted a balance sheet view of accounting, which emphasizes the valuation of assets and liabilities as the primary role of accounting. An integral part of this view is a broad push for various forms of fair value accounting, especially for financial assets and liabilities. Accordingly, there have been a number of studies that investigate the information content of fair values, usually benchmarking them against stock prices. Barth (1994) finds that the fair values of investment securities of banks provide significant information content beyond that of historical costs. For bank loans, Barth et al. (1996) also documents significant information content for fair values but Eccher et al. (1996) and Nelson (1996) arrive at the opposite result.

Some studies investigate the value relevance of fair values stratified by their reliability. Specifically, existing GAAP establishes the fair value hierarchy of using the so-called Levels 1, 2, and 3 inputs, where Level 1 includes the most cleanly measured assets like regularly traded shares on organized exchanges, and Level 3 includes the most problematic assets such as mortgage-backed securities and private equity shares. The prediction is that assets which are measured more cleanly will likely have more value relevance. This prediction seems intuitive, and is confirmed in the research findings (Choi et al.; Kallapur and Kwan, 2004; Song et al., 2010). The European setting provides some decisive advantages for research in fair values, specifically IFRS allows some PPE-type assets to be revalued up, which is not allowed under U.S. GAAP. The main finding in the European setting is that such upward asset revaluations do map into stock prices, which suggests that they have value relevance (Aboody et al., 1999).

Overall, it seems that fair values are reliably informative for financial assets and liabilities but the picture is more complicated and contentious for operating assets and liabilities. Of course, a key explanation for this difference is that financial assets typically have exchange value independent of the value of the firm and its operations, while operating assets are by definition mostly for synergistic use within the firm.

4.5. The big picture on the usefulness of accounting

In trying to make sense of the accumulated evidence, it is useful to step back and think about the big picture on the usefulness of accounting. The key question here is: what do investors think about the key outputs of accounting? Overall, there is some very good news here. Crucially, investors still consider earnings the single most important number in making their decisions (Graham et al., 2005). So, we can take some comfort in the fact that, despite all problems like earnings management and complicated accounting rules, we still produce the number that is the most used by investors.

But there's also some not-so-good news. There is solid evidence that earnings volatility has doubled or tripled over the last 30–40 years, and earnings persistence is way down, from a near-random-walk of 0.90 down to 0.60 (Givoly and Hayn, 2000; Dichev and Tang, 2008), and perhaps even lower today. These findings are troubling because they question the traditional role of current earnings as a guide to future earnings. Given these results, it is probably not surprising that studies have also shown a sharp deterioration of the relation between stock returns and earnings over time (Collins et al., 1997). In addition, we see a proliferation in non-GAAP definitions of earnings, which suggests that investors are dissatisfied with GAAP earnings, and are looking for alternative and better measures of performance.

Is this deterioration of the information content of GAAP earnings due to changes in the GAAP rules or changes in the real economy? And what can be done about it? Dichev and Tang (2008) point to the increasing balance sheet orientation of GAAP rules as a possible explanation. The story is that this orientation produces frequent asset/liability revaluations, which appear as one-time items on the income statement, and reduce the otherwise high persistence of regular ongoing income. Donelson et al. (2011) confirm the importance of one-time items but find that it is mostly due to economic factors, while Srivastava (2014) points to the confounding

effect of newly listed firms with lots of intangibles. Overall, this is an ongoing debate, and the difficulty is that the accounting and the economics are entangled with each other, so it is hard to cleanly separate their effects. Finally, more research in this area seems highly desirable because of its potential to inform GAAP standard setting.

5. A note on research methodology

In addition to discussing topics and areas of research, I would like to make a brief note on research methodology, using the earlier discussion of the post-earnings announcement drift as an illustration. The big positive is that when you look over the last 30 to 40 to 50 years, the general level of research proficiency is way up, there is just no doubt about it. The younger generations are much more tooled up in terms of statistics and research methodologies, the PhD programs do a better job, the computer equipment is way better, the databases are also better. So, there is no doubt that the technical level is not just a little but significantly better over time. This is all a tremendous achievement, and a great portent for the future.

What, then, are the challenges? In short, a lot of research designs tend to be quite bland. The typical research paper today has some story and hypotheses, and basically what the test boils down to is a prediction that the coefficient on some variable is different from zero, say positive. And in the typical case, the coefficient does turn out to be significantly positive. Such results, however, are rather bland and unconvincing, or "do not change the priors much" if you want to use the scientific jargon. Why? For one thing, samples tend to be quite large nowadays, and that means that most variables show up as statistically significant at conventional levels. In addition, there are growing concerns about various forms of p-hacking and cherry-picking of the results. So, what can be done about this? At the very minimum, we have to be more proactive about establishing economic significance, in addition to statistical significance. That implies, for example, looking at incremental R^2 from including the relevant variable or not, and looking at the change in the dependent variable for a typical change in the independent variable. Formulating hypotheses on the magnitudes of the coefficient rather than just the sign is also a great way to go, while it is close to non-existent today.

I also think that the effort to avoid "accidental significance" should be broader than the minimums identified above. I would use one of my very favorite studies, Bernard and Thomas (1990), to illustrate what I am trying to say. Bernard and Thomas (1990) is a study on PEAD, so the basic story is that stock returns continue to drift in the direction of the earnings surprise for many months after the earnings announcement. So, a bland study in this space will be some kind of regression of the abnormal stock returns on the magnitude of the earnings surprises. But the Bernard and Thomas (1990) study is a lot more interesting, and consequently a lot stronger, than that. By advancing some sharper assumptions, Bernard and Thomas are able to make detailed and intricate predictions about the pattern of abnormal stock returns, including their ordered signs (three positives in a row, one negative), their relative magnitudes, and with the effects manifesting in narrow windows around subsequent earnings announcements. The bottom line is that at the end of that paper one is left with the strong impression that the documented pattern of results is highly unlikely to happen by chance. So, ideally, it would be great to see a lot more of that, sharper and more specific predictions about not just the sign of a coefficient but also about its magnitude, predictions on the pattern of results as opposed to just one result, the timing of the hypothesized effect, and so on. These are the kinds of characteristics that make for a convincing paper, and memorable results.

6. Some possible areas of future research

As Yogi Berra famously said "It's tough to make predictions, especially about the future." So, consider the following as partly a prediction of what is likely to happen, and partly as a personal wish list for what I would like to see happen.

6.1. Prediction of long-term earnings

The literature on valuation leaves little doubt that forecasting of long-term earnings is the key to deriving better estimates of value (Ohlson, 1995). And those who derive better estimates of value can then make better

investing decisions, and earn positive abnormal returns. Given such indications of importance, surprisingly little has been actually done in this space. Most studies that use long-term earnings projections source them from analyst forecasts despite reliable evidence that such forecasts suffer from extreme optimism (McInnis, 2010). Perhaps the best explanation for this state of affairs is also the simplest - long-term prediction of earnings is just difficult. But the case for the value of long-term forecasting of earnings remains unchanged. Perhaps new data and new techniques can re-energize this line of inquiry (e.g., using machine learning).

6.2. Using big data, especially in fundamental analysis and valuation

Using Big Data in fundamental analysis and valuation is already happening, and will not only continue for a while but is almost surely here to stay. There are already a number of papers using various kinds of new and big data, including Glassdoor data on opinions from employees, online customer reviews, cellphone location data, crowdfunding data, photo, speech, and video data on managers, satellite images of parking lots and so on (Huang, 2018; Huang et al., 2020; Katona et al., 2018; Mayew and Venkatachalam, 2012). Further developments along these lines are basically unavoidable, and my guess is that they will happen sooner rather than later.

For those who are looking to get involved in this area, the basic template for research is fairly clear. You look for some new data like employee satisfaction or satellite data on whether parking lots are full. Based on this data, you try to establish some links to future fundamentals (especially earnings), and then you try to see whether this fundamental relation is priced correctly in the capital markets. In other words, at least conceptually, the basic template is fairly straightforward. The challenge is more on the technical side, in learning to program and to manipulate very large datasets or unusual and ill-behaved data. The upshot is that those who are willing and able to make the sizable investment to operate in this area are likely to be well-positioned for the future.

6.3. Paying more attention to the accrual process

The accrual process is our value-added to the world. We need to thoroughly understand and own this space to make a meaningful contribution to knowledge and practice. Some progress has been made, as discussed above. But we still do not quite understand (or at least we have not fully internalized) fairly basic things about the accrual process. For example, consider the following situation: a mature firm has no growth, and so its assets and liabilities stay roughly the same. For such a firm, can the quality of accruals deteriorate over time? Intuitively, the answer must be yes. But in the current literature (Richardson et al. 2005), the definition of accruals is the change in non-cash assets and liabilities. So, for a firm like this which has no change in non-cash assets and liabilities, the accruals are zero, which means there are no accruals. But that sounds strange then, how can you talk about the properties of something when that something doesn't even exist?! So, what is the answer to this puzzle?

To clarify the logic, let's make the question more specific. For a mature firm with zero growth, how can the quality of accounts receivable change? The answer is that for such a firm the *net* receivable accrual is zero (the change in the Accounts Receivable account is zero for the year) but you still have *gross* receivable accruals during the year. Specifically, the firm collects the old receivables, and originates new receivables. And the point is that the new receivables can have entirely different properties from the old receivables, for example they can be from more marginal customers. So yes, the quality of receivables can go down during the year, even though the net receivable accrual is zero for the year. When you think about this question the right way, the answer is obvious.

What I am trying to say here is that the great paper on the difference between net and gross accruals has not been written yet, while I think there will be a paper on that at some point. It does seem to be a key and consequential difference. To illustrate, let's develop this idea further, and say that we are going to regress accruals on cash flows. This is the most basic regression in this kind of research, with variations of it appearing in countless studies. What kind of accruals should we put on the left-hand side of this regression? And to be clear what we are doing, let's make this more specific, let's say that this is about revenue accruals, and we have only accounts receivable and no deferred revenues. So, that implies that we will be putting the accounts receivable

accrual on the left-hand side, while the corresponding cash flows go on the right-hand side, and for revenues that will be cash collections from customers. So, what kind of accruals should we put on the left-hand side? Using the Richardson et al. (2005) definition, it should be the change in accounts receivable because that is the definition of the receivables accrual. However, this answer does not seem quite right. What would make more sense is that we need the accounts receivable to be matched with the cash flows which were collected from these same receivables, which implies that we need some kind of gross accruals on the left-hand side, not net accruals. So, who is putting the gross accruals on the left-hand side for such regressions? Pretty much nobody at this point. The implication is that there needs to be some re-assessment of the very basics of what we do in accrual research. Needless to say, there will be a significant premium attached to the work that can solve such fundamental problems.

Another example of the danger of misunderstandings of the basic properties of accruals is the interpretation of the empirical relation between contemporaneous cash flows and accruals. For example, some studies interpret the high negative correlation between concurrent cash flows and accruals (or equivalently, a high ratio of cash flow to earnings volatility) as indicative of opportunistic earnings smoothing. In addition, Bushman, Lerman, and Zhang (2016) show that the negative correlation between contemporaneous operating cash flows and working capital accruals has declined to just about zero in recent years. These are both fine points, and are well-taken. However, what I'm really concerned about is not so much these studies per se but about a possible misinterpretation and confusion about their results. Even before looking at the empirical results, it would help to be clear that the negative correlation between cash flows and accruals is an *unavoidable* property of accrual accounting, it happens any time the recognition of a cash flow is shifted over time. In fact, this correlation is −100% between properly specified accruals and their associated contemporaneous cash flows (Dichev and Owens, 2020). If you bought Inventory for $200 cash, that is a debit to Inventory of $200 (a positive accrual) and a credit to Cash of $200 (a negative cash flow), a perfect negative correlation of −100%. Of course, things look much messier on the empirical side because in any given period you also have the other side of the Inventory accrual – expensing to COGS which is not related to the Inventory cash flows - and various one-time items and revaluation accruals that weaken the negative association to something less than −100%. But the basic point remains. Having a firm grasp of the unavoidable strong negative correlation between concurrent associated accruals and cash flows helps in the interpretation and calibration of empirical results.

6.4. More attention on standard setting and "what is good accounting?"

Standard setting matters. It sets the tone in financial reporting practices, and whether and how the world sees the value-added of accounting. And to be completely honest, what worries me is that I think standard setting today is going in the wrong direction, for both U.S. GAAP and IFRS (Dichev, 2017). Standard setters espouse a balance sheet orientation of financial reporting, emphasizing the valuation of assets and liabilities, and with little care for the income statement, and the paramount importance of earnings. This balance sheet orientation is at odds with how most companies conduct their operations, and think about value creation. For most companies, assets and liabilities are just the necessary props to ensure the success of operations, and the emphasis is on making various operational bets, essentially advancing expenses to earn revenue and profit. In other words, operations inherently follow an income statement logic for most companies, and the balance sheet orientation of standard setting is at odds with that.

Whether you agree with the above assessment or not, it is probably safe to say that there is relatively little engagement between accounting academia and standard setters today. Standard setters have trouble finding value in the academic literature, and the decisions on standards are rarely driven by research findings. In turn, standard setting-oriented work seems to garner little respect from the research journals, and the research community in general. This situation seems puzzling given the importance of standard setting. The scant engagement of accounting academics in rule-making, and practice in general, also seems at odds with what our sister disciplines do in their fields. For example, economics has a keen interest in policy questions, and there is considerable interaction between practitioners and academics at all levels, including many academics serving in top policy jobs like Chairman of the Federal Reserve and Chairman of the Council of Economic Advisors.

So, what can be done to improve standard setting? This is a subject for a much longer conversation but in a nutshell, I suggest three things. First, we need a clear articulation of the fundamental relation between cash

flows and accruals across the financial statements (complemented by disclosure). For example, we should have clear articulation between "Revenue" on the Income Statement, "Accounts Receivable" and "Deferred Revenues" on the Balance Sheet, and "Cash Collections from Customers" on the Statement of Cash Flows. The idea is that we need a clear link and articulation for all major accruals and their corresponding cash flows across the major financial statements. Right now, this articulation is greatly muddled to impossible depending on the item. Second, and partly related to the first point above, we need clear disclosure about the estimates and their realizations for the most important accounting estimates. Current GAAP already requires firms to make Critical Accounting Policies disclosure in their financial reports. And so the idea is to make this disclosure much more specific, where for each critical accounting policy firms present their estimates and realizations for the current period. Such disclosure already exists for some items, e.g., some firms reconcile their beginning and ending warranty liability with their warranty expense and warranty claims paid for the current period. The point is to extend such disclosure to all important accruals. As one immediate benefit, it will be much harder to manage earnings if this information is readily available. Third, we need a clear separation of the results of operating and financing activities since they have quite different functions and implications for firm value.

7. Conclusion

Fifty years of capital markets research in accounting is really not such a long time considering the centuries of research tradition in older fields of science. So, we can be proud of the enormous progress made in this literature, from fairly humble beginnings to the great sophistication today, especially on the technical side. And yet, I feel that we have only scratched the surface, and that there are great opportunities ahead. Ideally, future accounting research will retain its rigor but move closer to practice, including standard setting.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Economic sharing of honors: Equal or Exclusive?

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ABSTRACT

The objective of this study is to examine whether and how non-financial performances, specifically the awards achieved by the corporates, are associated with the distribution of the compensation of the managers and other employees within the corporations. Through an investigation of the correlation between corporate awards and compensation, we find that corporate awards as collective honors raise managers' compensation but significantly reduce non-managerial compensation, thus widening the pay gap within the company. Our empirical evidence also shows that these correlations are more significant in state-owned enterprises than non-state-owned enterprises. In addition, our evidence reveals that although corporate awards increase the stickiness of managers' compensation but not that of other employees, the corporate awards can still stimulate better financial performance and market value by motivating both managers and other employees. Our empirical evidence implies that because only managers are responsible for and evaluated by comprehensive corporate performance, the issues of fairness and efficiency are not raised when the economic benefits provided by corporate awards are unequally shared.
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1. Introduction

In China, the disclosure of information on corporate awards plays an important role in annual reports, because it provides a concentrated presentation of positive social recognition of the corporation's historical non-financial performance. Although an increasing number of studies focus on the motivational effect of awards, they mainly focus on awards given by a group to individuals, overlooking those given by a group to another group (Huberman et al., 2004; Moldovanu et al., 2007; Besley and Ghatak, 2008; Angrist and Lavy, 2009;

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Ashraf et al., 2014; Chan et al., 2014; Ager et al., 2016; Shi et al., 2017). The cultures of East Asian countries such as China emphasize collectivism rather than individualism; thus, annual reports in these countries disclose more corporate awards than managers' personal awards. These awards are generally granted to groups by groups. Why are there so many kinds of corporate awards in China? These awards are granted by governments or industry associations to encourage corporations to pursue specific goals and standards. The awards are usually non-monetary, but they occasionally include monetary rewards, which can be directly included in non-operating income. The awards help governments and industry associations guide corporations to comply with industrial policies, laws, and regulations. For example, the State-owned Assets Supervision and Administration Commission of the State Council, which supervises all central state-owned enterprises, has established targeted awards such as the Outstanding Performance Enterprise Award, Special Award for Scientific and Technological Innovation, Special Award for Management, Special Award for International Operation, Special Award for Brand Building, and Special Award for Energy Conservation and Emission Reduction, to reinforce the implementation of the Measures for the Assessment of Business Performance of Persons in Charge of Central SOEs, which are the comprehensive performance evaluation regulations issued by the State Council of the PRC in 2010.

Following Huberman et al. (2004), Ager et al. (2016), and Shi et al. (2017), corporate awards can be seen as a type of non-financial and non-monetary performance achieved by corporations as part of status competition within their industry. Accordingly, it is natural to ask whether this type of performance will affect the compensation of executives and other employees. Considering that corporate awards are achieved by collective efforts by the managers and other employees, we must further concentrate on whether the impact of awards on compensation is equal between executives and other employees.

We collect information on awards from the annual reports of Chinese A-share listed firms between 2008 and 2016. Our empirical evidence shows that corporate awards as collective honors raise managers' compensation but significantly reduce other employees' compensation, thus widening the pay gap within a given company. It also shows that these correlations are more significant in state-owned enterprises (SOEs) than non-SOEs and in corporations with greater managerial power. Further empirical evidence reveals that although corporate awards increase only the stickiness of managers' compensation, not the compensation of other employees, such awards can still stimulate better financial performance and market value by motivating both managers and non-managerial employees. Our empirical evidence implies that because only managers are responsible for and evaluated by comprehensive corporate performance, fairness and efficiency are not issues when the economic benefits provided by corporate awards are exclusive rather than shared equally.

This study makes three contributions to the literature. First, the literature on awards mainly focuses on their effect on individual behavior, considering them non-pecuniary rewards and exploring their economic effects, such as increasing the level of individual effort and stimulating work efficiency (Ashraf et al., 2014; Ager et al., 2016; Gallus and Frey, 2016). Therefore, our study extends the literature and theory related to the economic consequences of awards from the individual level to the firm level.

Second, there is a certain difference between the fairness of the distribution of economic benefits and the incentive effects of distribution, because paying too much attention to the fairness of distribution may reduce its incentive effect. We show that the correlations between corporate awards and the managers' versus ordinary employees' compensation are very different. However, these contrary results inspire better financial performance and market value. This empirical evidence is closely associated with the pay gap realities that currently exist in virtually every corporation. Thus, we extend the literature and gain a better understanding of the economic sharing of honors as a key factor in the pay gap (Lazear and Rosen, 1981).

Third, unlike the Western world, China emphasizes collectivism rather than individualism. As a result, awards are more often given by groups to groups rather than to individuals. However, our empirical evidence reveals that collective awards can lead to more benefits for top executives. As China's corporate governance institutions come from the Western world but incorporate Chinese characteristics such as collectivism, these results can help us better understand the nature of collectivism in China.

2. Theoretical analysis and hypothesis development

According to status competition theory put forwarded by Washington and Zajac (2005), and used to interpret the motivation effect of awards (Besley and Ghatak, 2008), we can understand there are different types of

awards have been created by people to recognize outstanding contributions or excellent work by specific individuals or groups, such as the Academy Awards for the film industry, the Nobel Prize in science and literature, and Olympic medals for sports. Previous studies on the motivational effect of awards show that based on its artificial scarcity, an award provides evidence of an individual's achievement in terms of status competition and acts as a non-material and non-pecuniary incentive, which can motivate people to do their jobs better by promoting social recognition (Frey and Fever, 2005; Frey, 2006, Frey, 2007, Frey and Neckermann, 2008; Kosfeld and Neckermann, 2011; Frey and Gallus, 2017). Of course, sometimes the specific awards are associated with some monetary rewards such as the Nobel prize. Although, we cannot deny the organizations or individuals in competitive situation are achievement-oriented in the pursuit of specific competitive outcomes, we propose that social status as the unearned ascription of social rank, can also play a meaningful role in competition (Washington and Zajac, 2005). Based on status competition theory, we hypothesize that corporations must fully disclose their achievements to reduce information asymmetry in relation to external investors. Moreover, corporate awards can provide rich information, which can often boost the position and status of corporations in industry competition. According, status competition theory can help us to understand the underlying logic of the disclosure of awards information, if we take corporations as integrated and independent entities. However, this theory cannot help us understand the motivations of the executives who manage corporations to disclose awards information in annual reports, because previous studies of awards based on the reputation theory concentrate on awards given by one group to specific individuals, although awards are often given by one group to another group (Angrist and Lavy, 2009; Ashraf et al., 2014; Chan et al., 2014; Ager et al., 2016). We must therefore turn to agency theory.

According to agency theory, due to information asymmetry between the principal and agent, compensation contracts are usually linked to executives' actual performance to limit moral hazard and adverse selection problems (Jensen and Meckling, 1990; Holmström, 1982). Unfortunately, the principal cannot collect and access all information on the activities of executives and company investment opportunities. It is therefore difficult to establish perfect contracts to avoid conflicts between executives' self-interest and shareholders' interests (Jensen and Murphy, 1990). This leads to the question of how to effectively measure the ability and performance of executives in relation to compensation contract incentives. Executives' compensation contracts are usually tied to the corporation's financial performance, because financial performance is easy to observe and collect information on. However, the bonus maximization hypothesis postulates that executives may manipulate financial earnings for their own benefit. Previous studies show that when executives' compensation is significantly related to their corporations' financial performance, managers are more likely to manipulate financial earnings to maximize their own compensation.

Due to the deficiencies of linking compensation contracts to financial performance, some scholars propose that they should be contingent on both financial and non-financial performance (Behn and Riley, 1999; Banker et al., 2000; Ittner et al., 2003; Ittner and Larcker, 2009; Ibrahim and Lloyd, 2011). Therefore, corporate executives need to find ways to prove their non-financial performance.

We observe some interesting features of the disclosure of awards in Chinese A-Share companies. We find that over time, more firms have begun to disclose information on awards in their annual reports, and most firms disclose their award information in their annual reports alongside their financial performance in the "Report of the Board of Directors" section. From the perspective of agency theory, it is clear that corporate awards can be an important supplement to financial performance. In other words, executives present these awards as evidence of their past non-financial performance.

Moreover, the institutional background of China related to the compensation contracts of SOE executives' compensation contracts can help us to understand the underlying motivations of the executives in disclosing awards information in annual reports. In China, the State-Owned Assets Supervision and Administration Commission of the State Council (SASAC) published "Measures for the Assessment of the Business Performance of Persons in Charge of Central Enterprises" in 2003 (amended in 2006) to assess more comprehensively the contributions of executives in SOEs. In this document, non-financial performance measures are introduced and their corresponding awards are highlighted as proof of non-financial performance, such as the Special Award for Scientific and Technological Innovation, the Special Award for Management Progress, the Special Award for International Operation, the Special Award for Brand Building, and the Special Award for Energy Conservation and Emission Reduction. SASAC declares that the awards earned by a firm can also

be used to determine whether executives are performing their duties, and thus to effectively allocate their compensation.

If awards indeed supplement financial performance by providing evidence of non-financial performance to prove the achievements of executives, we predict the following:

Hypothesis 1: Ceteris paribus, corporate awards are positively related to executive compensation.

East Asian culture emphasizes collectivism, and the corresponding awards are mostly given to collectives. Due to increasing marketization in China, collectivism has gradually been diluted by the personal performance evaluation system. As the product of collective efforts, corporate awards are obviously not the personal achievements of managers. However, neglecting the participation of ordinary employees may reduce the incentive effect of awards. Although corporate awards recognize all internal staff, under the existing performance appraisal system, managers and ordinary employees bear different levels of business responsibility. Managers are responsible for the overall operation and management of the company, while ordinary employees are mainly responsible for the completion of specific tasks. Therefore, corporate awards as forms of social recognition are more directly linked to management performance. In addition, under market-oriented salary reform, it is generally believed that ordinary employees have less influence on corporate management than managers, and it is difficult to distinguish between individual performance and group performance within an enterprise; there may be an unfair distribution of benefits from corporate awards between managers and ordinary employees. Corporate decentralization improves managers' bargaining power for their compensation contracts (Fang and Li, 2015) and enables them to use non-financial performance to achieve greater compensation, which further strengthens the positive impact of corporate awards on executive compensation and weakens their impact on the performance evaluations of ordinary employees. Based on this, we propose Hypothesis 2:

Hypothesis 2: Ceteris paribus, corporate awards have no significant impact on the salaries of non-executive employees.

Within the special institutional setting of China, SOEs have the advantage of scale and institutional advantages compared with non-SOEs. However, they bear a greater social burden and attract more social attention. Thus they are supervised and evaluated by more social stakeholders. The results of social welfare based evaluation are sometimes directly included in the scope of performance evaluation, inducing SOEs to improve their contribution to social welfare. To comprehensively improve the competitiveness of state-owned enterprises, the State-owned Assets Supervision and Administration Commission of the State Council clearly stipulated in 2016 that the "Measures for the Performance Evaluation of the Heads of Central Enterprises" set up the Excellent Enterprise Award, Science and Technology Innovation Special Award, Management Progress Special Award, International Management Special Award, Brand Construction Special Award, and Energy Conservation and Emission Reduction Special Award to subject management efforts to greater scrutiny. It can be seen that the inspection of state-owned enterprises' financial performance, compared with that of private enterprises, cannot effectively reflect managers' efforts and capability. It is important for managers of SOEs to stand out in the social comparison and evaluation process. This not only means that SOEs must obtain more social attention and recognition in the award-related fields, but in addition, they must promote relevant industrial policies and achieve social and economic development goals. Based on this, Hypothesis 3 is proposed.

Hypothesis 3: Ceteris paribus, compared with non-SOEs, the awards of SOEs have a greater impact on executive compensation.

3. Research design

3.1. Data collection and sample composition

This study uses a sample of Chinese A-share companies listed on the Shanghai and Shenzhen stock exchanges between 2008 and 2016. The sample selection process is as follows: (1) financial listed companies and special treatment companies are deleted, (2) samples with missing data, such as corporate financial and corporate governance related characteristics, are supplemented according to the mean value, and (3) samples

with an annual number of less than 10 observations in the industry are eliminated. The sample data used in this study are from the CSMAR database, except that the corporate awards data are manually collected.

The data on corporate awards are collected using the following steps. First, we download the PDF files of all corporate annual reports, then search for keywords related to corporate awards, such as "Acquired," "Issued," "Won," "Granted," "Selected," "Finalist," "Progress Award," "Honor," and "Awarded." Second, we use Python to capture the sentences before and after these keywords in annual reports in an Excel table. Third, we manually compare the information in this Excel table with the annual reports in PDF format to determine whether it is related to corporate awards. If so, we determine to which award category this information belongs (national awards, issued by the central government, such as the National Science and Technology Progress Award; local awards, issued by local governments, such as the Shanghai Mayor's Quality Award; and industry association awards, issued by non-governmental industry associations, such as China's AAA Credit Enterprise in the plastics industry). We do so by entering the name of the award in the Baidu search engine, to obtain information about the award-issuing institution based on the news item directly related to the award, and to determine the category based on the characteristics of the award-issuing institution. For example, the National Science and Technology Progress Award is given by the State Council of the People's Republic of China, so it is classified as a national award. As the key steps in collecting and collating award data are manual verification and judgment, this can reduce noise in textual analysis. When the same award appears several times in the same annual report of the same company, it is counted only once.

According to the nature of the awarding unit, corporate awards are divided into three types: national, local, and industry association awards. National awards include the National Science and Technology Progress Award, China Time-honored Brand, and China Top Brand, and are issued by the central government department. Local awards include Top 10 Innovative Enterprises in Shantou, Lanzhou Civilized Unit, and Leading Enterprises in Zhejiang Province, and are issued by local government departments. Industry association awards include Top 100 Pharmaceutical Companies in China, Top 500 Manufacturing Enterprises in China, and Top 100 National Software Enterprises, and are issued by industry associations.

3.2. Models and variables

To test Hypothesis 1, we design a multiple regression model (1). In this model, the dependent variable is executive compensation (*EXEPAY*, which is obtained by taking the logarithm of the average salary of directors, supervisors, and executives), and the explanatory variable in this paper contains four specific variables related to corporate awards, which are *Award*, *C_Award, P_Award, I_Award*. We set *Award* which is the

Table 1
Descriptive statistics of the main variables.

Variable	N	Mean	SD	P25	P50	P75	Min	Max
EXEPAY	16,433	12. 112	0.672	11.682	12.109	12.544	10.423	13.896
EMPAY	16,433	11. 277	0.582	10.907	11.241	11.597	9.984	13.239
Award	16,433	0.518	0.500	0	1	1	0	1
C Award	16,433	1.343	2.400	0	0	2	0	13
P Award	16,433	0.867	2.223	0	0	1	0	14
I Award	16,433	0.971	2.446	0	0	0	0	14
Size	16,433	21.894	1.204	21	21.731	22.590	19.726	25.597
ROA	16,433	0.048	0.053	0.017	0.0430	0.076	−0.128	0.217
LEV	16,433	0.423	0.214	0.248	0.416	0.592	0.044	0.871
BM	16,433	0.851	0.828	0.328	0.574	1.029	0.087	4.626
Growth	16,433	0.429	1.127	−0.031	0.147	0.487	−0.639	8.182
DUAL	16,433	0.251	0.434	0	0	1	0	1
DR	16,433	0.370	0.052	0.333	0.333	0.400	0.333	0.571
SHRCR1	16,433	35.903	14.992	23.950	34.160	46.438	9	74.824
SHRZ	16,433	11.844	20.950	1.874	4.174	11.522	1.003	134.696
STATE	16,433	0.406	0.491	0	0	1	0	1

Table 2
Corporate awards and executive compensation.

	(1) *EXEPAY*	(2) *EXEPAY*	(3) *EXEPAY*	(4) *EXEPAY*
Award	0.06318***			
	(6.44)			
C_Award		0.00953***		
		(4.97)		
P_Award			0.00469**	
			(2.49)	
I_Award				0.00986***
				(5.59)
Size	0.30825***	0.30576***	0.31175***	0.30844***
	(56.96)	(55.23)	(57.89)	(56.90)
ROA	2.52090***	2.51345***	2.51708***	2.50570***
	(26.82)	(26.73)	(26.75)	(26.64)
LEV	−0.05252*	−0.06082**	−0.05841**	−0.05952**
	(−1.85)	(−2.14)	(−2.05)	(−2.10)
BM	−0.08695***	−0.08514***	−0.08808***	−0.08669***
	(−10.42)	(−10.18)	(−10.55)	(−10.39)
Growth	−0.02346***	−0.02403***	−0.02424***	−0.02396***
	(−5.97)	(−6.12)	(−6.17)	(−6.10)
DUAL	−0.04001***	−0.03969***	−0.03963***	−0.04028***
	(−4.00)	(−3.96)	(−3.95)	(−4.02)
DR	0.44354***	0.43567***	0.42974***	0.43428***
	(5.49)	(5.39)	(5.31)	(5.37)
SHRCR1	−0.00305***	−0.00296***	−0.00301***	−0.00304***
	(−9.53)	(−9.26)	(−9.41)	(−9.51)
SHRZ	−0.00087***	−0.00092***	−0.00092***	−0.00090***
	(−3.87)	(−4.10)	(−4.08)	(−4.01)
STATE	−0.04487***	−0.04502***	−0.04369***	−0.04578***
	(−4.38)	(−4.39)	(−4.26)	(−4.47)
Constant	4.78799***	4.86063***	4.73844***	4.79878***
	(31.04)	(31.11)	(30.73)	(31.06)
Industry	YES	YES	YES	YES
Year	YES	YES	YES	YES
N	16,433	16,433	16,433	16,433
adj. R^2	0.403	0.403	0.402	0.403
F	121.67	121.36	121.03	121.48

*** Indicates significance at the 1% level (two-tailed).
** Indicates significance at the 5% level (two-tailed).
* Indicates significance at the 10% level (two-tailed).

dummy variable to determine whether the company has won an award. If the company has won an award in the current year, it is assigned the value of 1, and otherwise 0. Other variables related to corporate awards are the number of national awards (*C_Award*), the number of local awards (*P_Award*), and the number of industry association awards (*I_Award*).

$$EXEPAY_{i,t} = \alpha + \beta * X_{i,t} + \gamma * Controls + \varepsilon_{i,t} \quad (1)$$

If Hypothesis 1 is correct, which means that corporate awards can increase executives' compensation, the variables related to corporate awards should be positively correlated with *EXEPAY*.

To test Hypothesis 2, we design a multiple linear regression model (2). The dependent variable is the salary of ordinary employees (*EMPAY*). To calculate this variable, we use the overall salary of the corporation's staff minus the total salary paid to directors, supervisors, and executives, divided by the number of employees in the company other than directors, supervisors, and executives, and then take the logarithm. The explanatory vari-

ables are corporate awards: the dummy variable (*Award*), the number of national awards (*C_Award*), the number of local awards (*P_Award*), and the number of industry association awards (*I_Award*).

$$EMPAY_{i,t} = \alpha + \varphi * X_{i,t} + \eta * Controls + \varepsilon_{i,t} \quad (2)$$

If Hypothesis 2 is true, corporate awards have no significant effect on non-executive salaries; thus, the coefficient of the independent variable will not be significant. In addition, to test Hypothesis 3, we conduct subsample regressions on model (1) and model (2) according to differences in corporate property rights (*STATE*).

In addition, the control variables in models (1) and (2) include the size of the company (*SIZE*, measured by the natural logarithm of corporate total assets at the end of the year); financial leverage (*LEV*, measured by the corporate assets-liabilities ratio at the end of the year); financial performance (*ROA*, measured by the ratio of net profit to total assets at the end of the year); book-to-market ratio (*BM*, measured by the ratio of year-end total assets to corporate market value); development capacity (*GROWTH*, measured by the growth rate of operating revenue compared to the previous year); *DUAL* (a dummy variable; if the CEO and chairman of board are not the same person, it is equal to 1, and otherwise 0); the proportion of independent directors

Table 3
Corporate awards and the salary level of ordinary employees.

	(1) *EMPAY*	(2) *EMPAY*	(3) *EMPAY*	(4) *EMPAY*
Award	−0.03813***			
	(−4.22)			
C_Award		−0.00330*		
		(−1.87)		
P_Award			−0.00302*	
			(−1.74)	
I_Award				−0.00202
				(−1.24)
Size	0.08637***	0.08619***	0.08428***	0.08471***
	(17.34)	(16.92)	(17.02)	(16.98)
ROA	0.57173***	0.57449***	0.57416***	0.57511***
	(6.61)	(6.64)	(6.64)	(6.64)
LEV	−0.16878***	−0.16428***	−0.16524***	−0.16483***
	(−6.46)	(−6.28)	(−6.32)	(−6.30)
BM	−0.03524***	−0.03558***	−0.03455***	−0.03485***
	(−4.59)	(−4.62)	(−4.50)	(−4.54)
Growth	0.00669*	0.00711**	0.00716**	0.00714**
	(1.85)	(1.97)	(1.98)	(1.97)
DUAL	−0.01683*	−0.01709*	−0.01705*	−0.01701*
	(−1.83)	(−1.85)	(−1.85)	(−1.84)
DR	0.05083	0.05750	0.05911	0.05884
	(0.68)	(0.77)	(0.79)	(0.79)
SHRCR1	0.00141***	0.00137***	0.00139***	0.00139***
	(4.80)	(4.66)	(4.72)	(4.73)
SHRZ	0.00028	0.00031	0.00031	0.00031
	(1.36)	(1.52)	(1.50)	(1.50)
STATE	0.20558***	0.20511***	0.20490***	0.20495***
	(21.83)	(21.76)	(21.74)	(21.73)
Constant	8.82365***	8.81251***	8.85336***	8.84321***
	(62.16)	(61.31)	(62.43)	(62.19)
Industry	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes
N	16,433	16,433	16,433	16,433
adj. R^2	0.326	0.325	0.325	0.325
F	87.38	87.15	87.14	87.12

*** Indicates significance at the 1% level (two-tailed).
** Indicates significance at the 5% level (two-tailed).
* Indicates significance at the 10% level (two-tailed).

Table 4
Corporate awards and salaries in state-owned enterprises and non-state-owned enterprises.

	STATE = 1 *EXEPAY*	*STATE* = 0 *EXEPAY*	*STATE* = 1 *EMPAY*	*STATE* = 0 *EMPAY*
Award	0.10061***	0.04046***	−0.04703***	−0.01882*
	(6.07)	(3.28)	(−2.83)	(−1.78)
Size	0.27964***	0.33837***	0.09858***	0.05622***
	(35.74)	(43.61)	(12.56)	(8.46)
ROA	2.83550***	2.21454***	0.70810***	0.62317***
	(18.54)	(18.50)	(4.62)	(6.08)
LEV	−0.14758***	−0.05238	−0.16174***	−0.16753***
	(−3.28)	(−1.40)	(−3.59)	(−5.23)
BM	−0.04986***	−0.10605***	−0.05483***	0.03176**
	(−4.65)	(−7.26)	(−5.09)	(2.54)
Growth	−0.00515	−0.03658***	0.01881***	−0.00682
	(−0.92)	(−6.77)	(3.34)	(−1.47)
DUAL	0.01719	−0.05274***	−0.06819***	0.00164
	(0.79)	(−4.64)	(−3.13)	(0.17)
DR	0.27303**	0.67178***	−0.11567	0.14323
	(2.12)	(6.46)	(−0.89)	(1.61)
SHRCR1	−0.00413***	−0.00189***	0.00605***	−0.00153***
	(−8.08)	(−4.53)	(11.80)	(−4.28)
SHRZ	−0.00038	−0.00194***	−0.00042	−0.00004
	(−1.42)	(−4.58)	(−1.57)	(−0.10)
Constant	5.34318***	4.24495***	8.48413***	9.89422***
	(26.16)	(17.57)	(41.41)	(47.82)
Industry	YES	YES	YES	YES
Year	YES	YES	YES	YES
Chi-square		11.74***		8.70***
P value		0.0006		0.0032
N	6676	9757	6676	9757
adj. R^2	0.462	0.388	0.331	0.320
F	68.41	72.07	39.82	53.66

*** Indicates significance at the 1% level (two-tailed).
** Indicates significance at the 5% level (two-tailed).
* Indicates significance at the 10% level (two-tailed).

(*DR*, measured by the ratio of the number of independent directors to board members); large shareholding ratio (*SHRCR1*, measured by the shareholding ratio of the largest shareholder); balance of equity (*SHRZ*, measured by the ratio of the shareholding of the largest shareholder to the second largest shareholder); and the nature of property rights (*STATE*, equal to 1 if it is a state-owned enterprise, and otherwise 0). In addition, we control for fixed year and industry effects.

4. Empirical results

4.1. Descriptive statistics

The general descriptive statistics of the main variables are given in Table 1. It can be seen that the average value of executive compensation is 12.112, with a standard deviation of 0.672, and the average salary of ordinary employees is 11.277, with a standard deviation of 0.582. Thus, the differences of these values within the sample are small. Award-winning companies account for 51.8% of the sample, and the mean values of the number of national awards (*C_Award*), local awards (*P_Award*), and industry association awards (*I_Award*) are 1.343, 0.867, and 0.971. In addition, the average assets-liabilities ratio is 42.3%, and the mean value of *ROA* is 4.8%. Development capacity has a growth rate of 42.9%, and 40.6% of the sample consists of state-owned companies.

Table 5
Corporate awards and salary within the company under different levels of managerial power.

	(1) *EXEPAY*	(2) *EXEPAY*	(3) *EXEPAY*
C_Award	−0.00314		
	(−0.85)		
*Tenure*C_Award*	0.00099*		
	(1.68)		
P_Award		−0.00735**	
		(−2.02)	
*Tenure*P_Award*		0.00183***	
		(2.77)	
I_Award			−0.00488
			(−1.46)
Tenure I_Award*			0.00232***
			(4.25)
Tenure	0.01777***	0.01768***	0.01642***
	(9.35)	(10.01)	(9.17)
Size	0.25697***	0.25788***	0.25551***
	(35.19)	(36.27)	(35.70)
ROA	2.97321***	2.97755***	2.96913***
	(24.18)	(24.22)	(24.16)
LEV	−0.06638*	−0.06684*	−0.06606*
	(−1.79)	(−1.80)	(−1.78)
BM	−0.09503***	−0.09495***	−0.09442***
	(−8.69)	(−8.70)	(−8.65)
Growth	−0.02172***	−0.02171***	−0.02173***
	(−4.22)	(−4.23)	(−4.23)
DUAL	0.09533***	0.09524***	0.09456***
	(7.23)	(7.22)	(7.17)
DR	−0.39262***	−0.39412***	−0.39296***
	(−3.71)	(−3.73)	(−3.72)
SHRCR1	−0.00307***	−0.00309***	−0.00308***
	(−7.24)	(−7.29)	(−7.26)
SHRZ	−0.00093***	−0.00093***	−0.00092***
	(−3.18)	(−3.17)	(−3.13)
STATE	0.02198	0.02127	0.02024
	(1.64)	(1.59)	(1.51)
Constant	7.07167***	7.05198***	7.08875***
	(34.55)	(34.91)	(35.02)
Industry	YES	YES	YES
Year	YES	YES	YES
N	16,433	16,433	16,433
adj. R^2	0.237	0.238	0.238
F	55.40	55.47	55.69
	EXEPAY	*EXEPAY*	*EXEPAY*
C_Award	−0.00236		
	(−0.83)		
*DUAL*C_Award*	0.01982***		
	(3.78)		
P_Award		−0.00381	
		(−1.34)	
*DUAL*P_Award*		0.01635***	
		(2.92)	
I_Award			0.00540**
			(2.03)
DUAL I_Award*			0.00260
			(0.52)

	EXEPAY	*EXEPAY*	*EXEPAY*
DUAL	0.08561***	0.09881***	0.11073***
	(5.67)	(7.00)	(7.88)
Size	0.26750***	0.27004***	0.26779***
	(36.81)	(38.23)	(37.62)
ROA	2.94901***	2.95000***	2.94469***
	(23.90)	(23.90)	(23.85)
LEV	−0.05997	−0.05509	−0.05774
	(−1.61)	(−1.48)	(−1.55)
BM	−0.09805***	−0.09998***	−0.09889***
	(−8.93)	(−9.13)	(−9.03)
Growth	−0.02319***	−0.02355***	−0.02340***
	(−4.50)	(−4.57)	(−4.54)
DR	−0.37205***	−0.36904***	−0.36800***
	(−3.51)	(−3.48)	(−3.47)
SHRCR1	−0.00387***	−0.00392***	−0.00393***
	(−9.22)	(−9.33)	(−9.37)
SHRZ	−0.00071**	−0.00069**	−0.00068**
	(−2.41)	(−2.35)	(−2.31)
STATE	0.02102	0.02070	0.01836
	(1.56)	(1.54)	(1.37)
Constant	6.92028***	6.86864***	6.91041***
	(33.76)	(33.96)	(34.05)
Industry	YES	YES	YES
Year	YES	YES	YES
N	16,433	16,433	16,433
adj. R^2	0.232	0.231	0.231
F	54.26	54.17	54.15

*** Indicates significance at the 1% level (two-tailed).
** Indicates significance at the 5% level (two-tailed).
* Indicates significance at the 10% level (two-tailed).

4.2. Empirical analysis

Table 2 shows the regression results of the multiple regression model (1). It can be seen that corporate awards are significantly positively related to executive compensation (*EXEPAY*) at the 1% level. Regarding the types of corporate awards, the higher the number of national, local, or industry awards a company receives, the higher the increase in executive compensation, which supports Hypothesis 1. Therefore, the empirical results show that as a type of non-financial performance, corporate awards highlight management's efforts and capabilities (Ager et al., 2016; Shi et al., 2017), thus influencing managers' compensation contracts.

In Table 3, we report the results of the regression of model (2) for Hypothesis 2, in which the explanatory variable is the salary level of ordinary employees (*EMPAY*). The results show that the salary of ordinary employees has a significant negative relationship with corporate awards, which fails to support Hypothesis 2. Corporate awards increase managers' bargaining power for their compensation contracts, thus weakening it for ordinary employees.

To enhance the competitiveness of state-owned enterprises, the State-owned Assets Supervision and Administration Commission of the State Council issued the Operation Performance of the Head of the Central Enterprise, and set up the Outstanding Enterprise Award, Special Award for Technology Innovation, Special Award for Management Progress, and Special Award for Brand Building to reward managers' efforts and capabilities in state-owned enterprises, indicating that corporate awards have a greater impact on the performance appraisal of internal staff in state-owned enterprises. The results reported in Table 4 show that the impact of corporate awards on the compensation of managers and ordinary employees is more significant in SOEs than non-SOEs.

Table 6
Corporate awards and pay stickiness within the company.

	(1) EXEPAY	(2) EMPAY
Award	−0.01200	−0.09672***
	(−0.53)	(−4.88)
ROA	2.41737***	0.68431***
	(10.99)	(3.55)
D	0.04991***	0.00771
	(2.72)	(0.48)
*ROA*Award*	1.38792***	0.67398***
	(4.72)	(2.61)
*D*ROA*	−0.04128	−0.49845**
	(−0.16)	(−2.24)
*D*Award*	0.03117	0.05452**
	(1.21)	(2.42)
*Award*ROA*D*	−1.00278***	−0.31248
	(−2.85)	(−1.01)
Size	0.31077***	0.08551***
	(54.72)	(17.17)
LEV	−0.00748	−0.16920***
	(−0.25)	(−6.42)
BM	−0.11971***	−0.03354***
	(−13.65)	(−4.36)
Growth	−0.02437***	0.00641*
	(−5.91)	(1.77)
DUAL	0.06558***	−0.01560*
	(6.24)	(−1.69)
DR	−0.15550*	0.05110
	(−1.83)	(0.69)
SHRCR1	−0.00268***	0.00140***
	(−7.97)	(4.76)
SHRZ	−0.00082***	0.00028
	(−3.47)	(1.34)
STATE	0.04341***	0.20704***
	(4.03)	(21.95)
Constant	5.72825***	8.83435***
	(35.25)	(62.02)
Industry	YES	YES
Year	YES	YES
	*ROA** *Award* coefficient difference test	
Chi-square		3.76*
P value		0.0525
N	16,433	16,433
adj. R^2	0.377	0.327
F	103.35	83.36

*** Indicates significance at the 1% level (two-tailed).
** Indicates significance at the 5% level (two-tailed).
* Indicates significance at the 10% level (two-tailed).

5. Further test

5.1. Managerial power

Li and Hu (2012) argue that firms' compensation structures are influenced by managerial power. Therefore, based on the above analyses and findings, we further investigate the impact of managerial power on the relationship between compensation and corporate awards. Following Adams et al. (2005) and Pathan (2009), we

Table 7
Incentive effects of corporate awards.

	(1) *F_ROA*	(2) *F_TFP*	(3) *F_ROA*	(4) *F_TQ*	(5) *F_TFP*	(6) *F_TQ*
Award	0.00219***	0.22679***	−0.02041**	−1.35501***	−0.89079*	−1.88072***
	(3.37)	(7.75)	(−2.06)	(−4.41)	(−1.81)	(−5.52)
EXEPAY			0.00393***	0.01252		
			(5.90)	(0.61)		
*Award*EXEPAY*			0.00185**	0.10343***		
			(2.26)	(4.07)		
EMPAY					0.34484***	0.11340***
					(11.49)	(5.46)
Award EMPAY*					0.10086**	0.15907***
					(2.30)	(5.24)
Size	0.00284***	−0.56730***	0.00131***	−0.42188***	−0.60271***	−0.41884***
	(7.92)	(−35.20)	(3.35)	(−34.68)	(−37.24)	(−37.41)
ROA	0.53150***	2.92454***	0.51920***	1.71161***	2.69866***	1.76469***
	(85.31)	(10.45)	(81.79)	(8.69)	(9.70)	(9.16)
LEV	−0.01235***	0.57168***	−0.01221***	0.30123***	0.63246***	0.32773***
	(−6.56)	(6.75)	(−6.49)	(5.16)	(7.52)	(5.63)
BM	−0.00614***	0.18716***	−0.00566***	−0.27297***	0.20322***	−0.27279***
	(−11.11)	(7.53)	(−10.21)	(−15.87)	(8.23)	(−15.96)
Growth	−0.00007	0.07521***	0.00003	−0.00503	0.07253***	−0.00770
	(−0.29)	(6.42)	(0.12)	(−0.62)	(6.23)	(−0.96)
DUAL	−0.00037	−0.01373	−0.00017	−0.05821***	−0.00618	−0.05681***
	(−0.56)	(−0.46)	(−0.26)	(−2.83)	(−0.21)	(−2.77)
DR	−0.01197**	−0.02094	−0.01401***	0.74129***	−0.03349	0.76465***
	(−2.23)	(−0.09)	(−2.62)	(4.46)	(−0.14)	(4.62)
SHRCR1	0.00011***	0.00468***	0.00012***	−0.00310***	0.00414***	−0.00353***
	(5.03)	(4.92)	(5.71)	(−4.71)	(4.38)	(−5.39)
SHRZ	−0.00006***	−0.00224***	−0.00006***	0.00159***	−0.00237***	0.00148***
	(−4.10)	(−3.37)	(−3.84)	(3.46)	(−3.58)	(3.23)
STATE	−0.00044	−0.01839	−0.00025	0.13921***	−0.10086***	0.09632***
	(−0.65)	(−0.60)	(−0.37)	(6.62)	(−3.28)	(4.53)
Constant	−0.03557***	12.76087***	−0.04699***	11.29342***	9.88063***	10.19655***
	(−3.48)	(27.81)	(−4.01)	(31.02)	(17.95)	(26.76)
Industry	YES	YES	YES	YES	YES	YES
Year	YES	YES	YES	YES	YES	YES
N	16,334	16,334	16,334	16,334	16,334	16,334
adj. R^2	0.471	0.303	0.474	0.372	0.313	0.375
F	158.78	78.07	157.27	103.83	80.03	105.41

*** Indicates significance at the 1% level (two-tailed).
** Indicates significance at the 5% level (two-tailed).
* Indicates significance at the 10% level (two-tailed).

Table 8
Propensity score model (PSM) results.

	ATT			T-stat
	Treatment Group	Control Group	Difference	
EXEPAY	12.161	12.114	0. 046	3.23***
EMPAY	11.216	11.354	−0.138	−10.82***

*** Indicates significance at the 1% level (two-tailed).
** Indicates significance at the 5% level (two-tailed).
* Indicates significance at the 10% level (two-tailed).

Table 9
Corporate awards and the salaries of employees.

Panel A	(1) *EXEPAY*	(2) *EXEPAY*	(3) *EXEPAY*	(4) *EXEPAY*
Award	0.0683***			
	(5.09)			
C_Award		0.0121***		
		(3.80)		
P_Award			0.0064*	
			(2.29)	
I_Award				0.0097***
				(3.53)
Controls	YES	YES	YES	YES
Industry	YES	YES	YES	YES
Year	YES	YES	YES	YES
N	5990	5361	4267	4048
adj. R^2	0.418	0.420	0.407	0.430
F	51.01	46.58	36.66	37.84
Panel B	*EMPAY*	*EMPAY*	*EMPAY*	*EMPAY*
Award	−0.0387***			
	(−3.34)			
C_Award		−0.0056*		
		(−2.06)		
P_Award			−0.0039	
			(−1.57)	
I_Award				−0.0052*
				(−2.26)
Controls	YES	YES	YES	YES
Industry	YES	YES	YES	YES
Year	YES	YES	YES	YES
N	5990	5361	4267	4048
adj. R^2	0.373	0.354	0.312	0.389
F	42.40	35.52	24.56	32.09

*** Indicates significance at the 1% level (two-tailed).
** Indicates significance at the 5% level (two-tailed).
* Indicates significance at the 10% level (two-tailed).

take whether the CEO and chairman of the board are the same person and CEO tenure as proxy variables for managerial power. The results reported in Table 5 show that the multiplier coefficients of managerial power (*Tenure*, *DUAL*) and corporate awards (*C_Award*, *P_Award*, and *I_Award*) are positive, indicating that the greater the managerial power, the greater the impact of corporate awards on executive compensation.

5.2. Corporate awards and pay stickiness

Previous studies find that changes in the compensation structure between ordinary employees and executives are mainly caused by the stickiness of executive compensation (Fang, 2009), and by differences in the variation of compensation between ordinary employees and executives when financial performance increases or decreases (Fang, 2011). We use the compensation stickiness model to test the variation of compensation structure. The dummy variable D equals 1 if financial performance of this year is worse than last year, and otherwise 0. The results in Table 6 show that the increase in executive salary when financial performance rises is 1.3578 times the salary decline when performance decreases, showing that corporate awards enhance the pay stickiness of managers but do not affect the pay stickiness of ordinary employees.

In Table 6, it can be seen that when financial performance increases, the difference in the coefficient of *ROA*Award* for executive vs. non-executive employees shows that the corporate awards improve the growth

Table 10
Tests of fixed effects model and first-order difference model.

Panel A	(1)	(2)	(3)	(4)
	F_ EXEPAY	*F_ EXEPAY*	*F_ EXEPAY*	*F_ EXEPAY*
Award	0.05531***			
	(7.40)			
C_Award		0.00780***		
		(4.94)		
P_Award			0.00241*	
			(1.74)	
I_Award				0.00556***
				(4.29)
Controls	YES	YES	YES	YES
Industry	YES	YES	YES	YES
Year	YES	YES	YES	YES
N	16,403	16,403	16,403	16,403
adj. R^2	0.248	0.246	0.245	0.246
F	745.39	740.97	737.88	740.11
Panel B	(1)	(2)	(3)	
	ΔEXEPAY	*ΔEXEPAY*	*ΔEXEPAY*	
ΔC_Award	0.00370**			
	(2.55)			
ΔP_Award		0.00386***		
		(3.37)		
ΔI_Award			0.00209**	
			(1.98)	
Controls	YES	YES	YES	
Industry	YES	YES	YES	
Year	YES	YES	YES	
N	14,592	14,592	14,592	
adj. R^2	0.036	0.036	0.035	
F	7.05	7.11	7.02	

*** Indicates significance at the 1% level (two-tailed).
** Indicates significance at the 5% level (two-tailed).
* Indicates significance at the 10% level (two-tailed).

of executive compensation significantly more than for ordinary employees. When financial performance declines, the coefficient of *ROA*Award* shows that corporate awards act as a supplement for financial performance, ensuring that the reduction of executive compensation due to a decline in performance is significantly lower than the reduction of the compensation of ordinary employees.

5.3. Corporate awards and differentiated incentive effects

According to the principal-agent theory, management efforts are difficult to accurately measure, and it is impossible to formulate a completely effective compensation contract. The preceding investigation shows that corporate awards increase the salary gap between ordinary employees and managers. In this section, we further investigate the incentive effect or fairness effect resulting from the salary gap. If the incentive effect prevails, the financial performance of the company will improve; if the fairness effect prevails, it will adversely affect the financial performance of the company.

We investigate the subsequent impact of corporate awards on managers and ordinary employees from the perspective of future corporate financial performance (*ROA*) and total factor productivity (*TFP*). The results in columns (1) and (2) of Table 7 show that corporate awards enhance the incentive effect for managers and ordinary employees. After investigating the moderating effect of salary levels in columns (3) and (5), we see the incentive effect still exists. We next investigate the incentive effect on internal staff through the corporate

Table 11
Corporate awards and differentiated compensation.

Panel A	(1) *EXEPAY*	(2) *EXEPAY*	(3) *EXEPAY*	(4) *EXEPAY*
Award	0.06711***			
	(6.80)			
C_Award		0.00854***		
		(4.42)		
P_Award			0.00454**	
			(2.41)	
I_Award				0.00940***
				(5.32)
IMR	0.23587***	0.18197**	0.82206***	0.20847
	(3.83)	(2.47)	(2.74)	(1.58)
Controls	YES	YES	YES	YES
Industry	YES	YES	YES	YES
Year	YES	YES	YES	YES
N	16,100	16,100	16,100	16,100
adj. R^2	0.408	0.407	0.406	0.407
F	139.50	138.93	138.60	139.00
Panel B	EMPAY	EMPAY	EMPAY	EMPAY
Award	−0.03305***			
	(−3.63)			
C_Award		−0.00392**		
		(−2.20)		
P_Award			−0.00306*	
			(−1.77)	
I_Award				−0.00224
				(−1.38)
IMR	0.20015***	0.27606***	1.35530***	0.29459**
	(3.52)	(4.06)	(4.91)	(2.42)
Controls	YES	YES	YES	YES
Industry	YES	YES	YES	YES
Year	YES	YES	YES	YES
N	16,100	16,100	16,100	16,100
adj. R^2	0.323	0.323	0.323	0.323
F	97.23	97.06	97.20	96.83

*** Indicates significance at the 1% level (two-tailed).
** Indicates significance at the 5% level (two-tailed).
* Indicates significance at the 10% level (two-tailed).

market value (*TQ*). We find that the change in the internal compensation structure influenced by corporate awards enhances the market value of the company. This indicates that managers and ordinary employees are bearers of different levels of operating responsibility, and when the economic benefits are shared by individual managers, this does not raise concerns about fairness among ordinary employees, but instead promotes the improvement of the company's operating performance and market value.

5.4. Robustness tests

5.4.1. Endogeneity problem

(1) First, we use the propensity score matching method to solve the endogeneity problem. Referring to Malmendier and Tate (2009) and Jin and Zheng (2015), award-winning company is not randomly selected, their standing out in social comparison and evaluation may be the result of their better financial performance and larger size. Company that are larger and have better corporate governance may obtain higher social recognition, and this type of company may pay higher salaries and have a larger internal salary gap. Therefore, the research

Table 12
Corporate awards and compensation.

Panel A	(1) *EXEPAY*	(2) *EXEPAY*	(3) *EXEPAY*	(4) *EXEPAY*
Award	0.05790***			
	(3.92)			
C_Award		0.00516***		
		(2.60)		
P_Award			0.00193	
			(1.15)	
I_Award				0.00755***
				(4.40)
Controls	YES	YES	YES	YES
Industry	YES	YES	YES	YES
Year	YES	YES	YES	YES
N	9221	9221	9221	9221
adj. R^2	0.397	0.396	0.396	0.397
F	66.26	66.10	66.00	66.33
Panel B	*EMPAY*	*EMPAY*	*EMPAY*	*EMPAY*
Award	−0.02427**			
	(−2.09)			
C_Award		−0.00321**		
		(−2.06)		
P_Award			−0.00033	
			(−0.25)	
I_Award				−0.00123
				(−0.93)
Controls	YES	YES	YES	YES
Industry	YES	YES	YES	YES
Year	YES	YES	YES	YES
N	9221	9221	9221	9221
adj. R^2	0.370	0.370	0.369	0.369
F	59.15	59.15	59.08	59.09

*** Indicates significance at the 1% level (two-tailed).
** Indicates significance at the 5% level (two-tailed).
* Indicates significance at the 10% level (two-tailed).

question in this investigation may have an endogeneity problem. Referring to Malmendier and Tate (2009) and Jin and Zheng (2015), the propensity score matching method is used to control the differences in general characteristics between award-winning companies and non-award-winning companies, such as corporate size, solvency, profitability, development capacity, book-to-market ratio, and the level of internal governance, which may lead to corporate awards. Table 8 reports the differences for the dependent variables between the control group and treatment group based on the sample from a 1:1 nearest neighbor matching method, which shows that management compensation in the treatment group is higher than among non-winning companies (the control group), at the 1% level of significance, while the salary of ordinary employees is lower. The results of a multiple linear regression in Table 9 confirm the research hypotheses. Obviously, these findings exclude the endogeneity problem due to better corporate governance and larger size.

(2) Further, we use a fixed effects model and first-order difference model. To further confirm the causal relationship between corporate awards and executive compensation, we reexamine management compensation in the following year (*F_EXEPAY*) as the interpreted variable, using a fixed effects model. The results in Panel A of Table 10 indicate that corporate awards positively affect executive compensation. Additionally, we use the first-order difference model to rule out the influence of unobservable factors that do not change with time. The results in Panel B of Table 10 validate the main conclusions.

5.4.2. Corporate award information disclosure issues

(1) Award information disclosure bias. As corporate awards are disclosed voluntarily, it is assumed that award-winning companies have the incentive to disclose information related to their awards based on the assumption of "rational economic man," but there may be reasons for companies not to disclose this information, given that information disclosure always has a cost. To avoid the impact of this information disclosure bias, we adopt the Heckman two-stage model. In the first stage, the dependent variable (*C_Award*, *P_Award*, or *I_Award*) is regressed by corporate characteristics such as size, solvency, development capacity, profitability, cash flow, and corporate governance using the probit model to obtain the inverse Mills ratio (IMR). Next, the IMR is added to the regression models (1) and (2) as a control in the second stage. The final results are shown in Table 11, in which the coefficient of the IMR is significantly positive, indicating that there is indeed a selective bias problem caused by unobservable factors. After excluding these factors, corporate awards still increase the salary level and salary gap of employees within the company, so the conclusions are still robust. The empirical results of the Heckman two-stage regression still support the hypothesis that corporate awards serve as indicators of non-financial performance to improve executive compensation and increase the internal salary gap.

(2) Repeated award-related information disclosure. As some companies may disclose award information repeatedly, we delete repeated disclosures of the same corporate award in the same year. There may also be cross-year repeated disclosures; thus, we try to remove the same number of award data in different years to exclude the possibility of repeated disclosure of their awards. Next, the remaining sample of 9221 firm-year data is used to reexamine the research hypotheses. The results are shown in Table 12; they validate the main conclusions.

6. Conclusion

Modern enterprises face a complex environment and multiple stakeholders, and must adopt complicated management strategies to deal with interest distribution issues in the management process. It is necessary to obtain comprehensive information about managers' responsibilities to formulate effective compensation contracts. The empirical results of this investigation confirm that corporate awards are an important form of non-financial performance, and thus are beneficial to managers' compensation. Further investigation reveals the incentive effect of the executive compensation resulting from corporate awards. However, in the traditional view, ordinary employees have less influence on the corporation's financial performance than managers, so the salary of ordinary employees is often lower than that of managers. The degree of the relationship between the corporation's financial performance and the salaries of ordinary employees is also far lower than for managers (Fang, 2011), which is exacerbated by managerial power obtained through non-financial performance and by managers' motivation to defend their compensation. The empirical results confirm the hypothesis in this paper that corporate awards, as a form of nonfinancial performance, provide effective incentives and enhance the power of managers, and increase and defend executive compensation. The role played by internal managers in enterprises' performance creation and profit distribution has been overestimated.

Further investigation shows that in award-winning enterprises, the increase in executive compensation when financial performance rises is 1.3578 times greater than the decrease when it declines, indicating that corporate awards increase the stickiness of executive compensation but not ordinary employees' compensation. In addition, when the financial performance of the award-winning company increases, executive compensation rises more than that of ordinary employees, and executive compensation declines less than that of ordinary employees when financial performance worsens. A corporate award is a kind of management achievement, which benefits managers and enhances the incentive effect of salary structure change. Therefore, corporate awards promote the incentive effect of differentiated compensation. Under the current performance evaluation system, when corporate awards only financially benefit managers, this does not lead to fairness concerns among ordinary employees but promotes operating performance.

Although corporate awards have been in existence for some time, few studies focus on them, let alone explore their substance and economic significance. This study explores the differential impact of corporate awards on the compensation of managers and ordinary employees and its incentive effect from the perspective

of non-financial performance and the management achievement of awards. The external impacts of corporate awards, such as their impact on the capital market, should be investigated in the future.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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The potential harms of goodwill impairment avoidance: Evidence based on future performance and stock prices

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ABSTRACT

The rapidly increasing volume of goodwill assets in the capital market generates potential risks due to the possibility of an untimely recognition of goodwill impairment. In this paper, we investigate the financial consequences of goodwill impairment avoidance based on firms' future performance and stock prices. Using Chinese A-share listed firms with goodwill balances, we find that avoiding goodwill impairments negatively affects a firm's performance growth and increases its risk of a future stock price crash. These adverse effects continue for the three years following the goodwill impairment avoidance. Our results indicate that goodwill impairment avoidance has detrimental impacts on a firm's future performance and stock price and that these impacts are persistent. Our conclusions are helpful for regulators on how to prevent the risks hidden in goodwill impairment recognition and maintain the stable development of the financial market.
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1. Introduction

After decades of extensive and rapid development, China's economy is currently facing the problems of overcapacity and a supply-demand mismatch, and is in urgent need of adjustments to its economic structure and industrial transformation. Mergers and acquisitions (M&As) are an important way to re-allocate resources in the capital market and have been widely adopted. Recent national policies and the accompanying

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regulations have prompted multiple waves of M&As. Although these M&As have made great contributions to country-level strategies and real economic development, they have also resulted in an increasing volume of goodwill assets, which are a "sword of Damocles" for many listed firms. According to statistics from China Stock Market and Accounting Research (CSMAR), by the end of 2018, there were 2048 Chinese A-share listed firms with goodwill balances and the cumulative value of goodwill assets exceeded 1.3 trillion RMB.

The current accounting standards for the treatment goodwill assets in most countries, including the U.S., Europe and China, have abolished periodical amortization and instead use an impairment test approach to better reflect the underlying economics of goodwill assets. Under the principles-based impairment approach, firms are allowed greater discretion in handling goodwill impairment (Ramanna and Watts, 2012). Studies document that managers exploit the unverifiable discretion inherent to avoid the timely recognition of goodwill impairments for their private incentives related to compensation and reputation (Beatty and Weber, 2006; Ramanna and Watts, 2012; Li and Sloan, 2017; Glaum et al., 2018). Given the rapid increase in the volume of goodwill assets, the potential risk to firms and investors from the untimely reporting of impairments should not be neglected. However, there is limited evidence of the financial consequences of goodwill impairment avoidance.

According to *International Financial News* in 2018,[1] some listed companies, such as Lianjian Optoelectronics (stock number: 300269), have experienced a steep downturn in their earnings performance and stock prices because of their accumulated goodwill impairments being recorded together. Similar events have occurred elsewhere. *Paper News* reported in 2019[2] that several firms, including Zeus Entertainment (stock number: 002354), had recorded accumulated goodwill impairments, leading to the deterioration of their financial performance and a sharp drop in their stock prices. We examine firms' future performance and stock prices to reveal the potential harm from avoiding the timely recognition of goodwill impairments.

Although goodwill impairment avoidance can increase a firm's short-term accounting earnings and stock price (Li and Sloan, 2017), it is myopic behavior that can cause uncertainty about the firm's future earnings, because when avoiding impairment is no longer possible, the firm's earnings performance may significantly decline. The literature finds that managers manipulate earnings upward through real and accrual-based activities to support their choice of goodwill impairment avoidance (Filip et al., 2015; Han and Tang, 2019). However, this manipulation damages a firm's future performance growth because the upward accrual earnings management requires a reversal in future earnings, so the upward real earnings management is conducted at the expense of future earnings. Therefore, we hypothesize that goodwill impairment avoidance negatively impacts a firm's future performance growth.

We also examine whether goodwill impairment avoidance has an impact on a firm's risk of a stock price crash. Studies document that corporate information management, such as the timely disclosure of good news and the concealing of bad news, can lead to stock price crashes (Jin and Myers, 2006; Hutton et al., 2009; Kothari et al., 2009; Kim et al., b, 2011a; Kim and Zhang, 2016; Kim et al., 2016). Based on this finding, we argue that avoiding the timely recognition of goodwill impairments leads to inflated accounting earnings and overvalued stock prices in the short term (Li and Sloan, 2017). Postponing the recognition of goodwill impairments allows the negative news associated with the goodwill impairments to accumulate within a firm, increasing the possibility of a concentrated release at a later time and the risk of a sharp decline in the firm's stock price. Therefore, we hypothesize that goodwill impairment avoidance increases the risk of a stock price crash in the future.

China's capital market is an appropriate setting to address our research question. Although China has grown tremendously and its information disclosure practices are gradually being standardized, its capital market still features an opaque information environment and weak legal enforcement relative to developed markets, resulting in a high risk of stock price crashes (Piotroski et al., 2015; Wang et al., 2015) and frequent performance fluctuations. We select A-share companies listed on the Shanghai and Shenzhen stock markets as our sample. Our empirical results support the hypothesis that goodwill impairment avoidance has a significantly negative effect on a firm's future performance growth and a significantly positive effect on a firm's risk

[1] See http://stock.eastmoney.com/news/1406,20180515872237425.html.
[2] See https://baijiahao.baidu.com/s?id=1624147940110273126&wfr=spider&for=pc.

of a stock price crash. These findings demonstrate the detrimental impacts of avoiding the timely recognition of goodwill impairments on a firm's future performance and stock price. We also find that the relationships persist for three years, suggesting that the adverse impacts are long lasting.

Our study makes several contributions to the literature. First, we document the economic consequences of goodwill impairments. Most studies explore the value relevance of goodwill impairments (Li et al., 2011; Bens et al., 2011; Knauer and Wöhrmann, 2016; Li and Sloan, 2017; Qu et al., 2017; Guler, 2018) and the effects of goodwill impairments on future cash flows (Bostwick et al., 2016), management compensation (Darrough et al., 2014), auditor risks (Ayres et al., 2019a), audit fees (Ye et al., 2016), the cost of debt and the debt maturity structure (Xu et al., 2017; Du et al., 2019). We discuss the potential harms of goodwill impairment avoidance on a firm's future performance growth and stock price crash risk and provide new insights into the economic outcomes of avoiding recognizing a goodwill impairment.

Second, our study enriches the literature on the causes of stock price crash risk. The literature on this topic usually assumes that bad news has been concealed. One stream of the literature, represented by Jin and Myers (2006) and Hutton et al. (2009), addresses the quality of accounting information and explores the reasons for managers to hide bad news. The other stream, represented by Kothari et al. (2009) and Kim et al. (2011a, b), Kim and Zhang (2016) and Kim et al. (2016), investigates the effects of managers' incentives (in the form of compensation and reputation) to conceal bad news based on agency conflicts. However, few studies directly discuss the types of bad news hidden by managers that lead to a higher risk of a stock price crash. We examine whether concealing the negative news of impairment losses increases a firm's future stock price crash risk.

Finally, our study has useful practical implications. The Central Economic Work Conference held in Beijing in December 2017 listed "three major battles"[3] that should be the focus of the next three years' work; "preventing and resolving major risks" is the primary task. Stock price crashes reduce investors' wealth, weaken the effective operation of the capital market and can endanger national financial stability and real economic development. The deterioration of public firms' financial performance occurs quite frequently and is referred to as "hidden thunder" in the capital market.[4] We show that goodwill impairment avoidance hurts a firm's future performance growth and increases its crash risk. These adverse impacts are persistent. Our conclusions have implications for investors seeking to improve their prevention awareness and protect their personal interests. Our results can also enlighten regulators on how to detect performance fluctuations and crash risks, prevent major risks from developing in the capital market and maintain the stability of the financial market's development.

The remainder of this paper is organized as follows. Section 2 introduces the policy background. Section 3 discusses the literature and develops our hypotheses. Section 4 describes the research design. Section 5 provides the empirical results. Section 6 offers a further discussion and Section 7 concludes the paper.

2. Policy background

M&A transactions increase in popularity during economic recovery periods. They change the allocation of society's resources and promote economic development. Waves of M&As began in the 1980s in China, and China's M&A experience has progressed from the initial stage through an extensive development stage and gradually into the mature stage over the last 40 years. As a result of these waves of M&As, a tremendous volume of goodwill assets has accumulated in China's capital market. Like the accounting standards in the U.S. and other countries, China's accounting standards on the treatment of goodwill have transitioned from systematic amortization to impairment testing. China's earlier accounting standards considered goodwill as an intangible asset and required amortization over an estimated life not exceeding ten years. The current accounting standards recognize goodwill as a separate long-term asset and require an impairment test at least annually.

As required by the accounting standard CAS No. 8, "Asset Impairment," which came into effect in January 2007, if there is any indication of impairment on the asset group(s) related to the goodwill, a firm must conduct

[3] The three major battles are to prevent and resolve major risks, to carry out targeted poverty alleviation, and to prevent and control pollution.

[4] Reported by *Securities Times* in 2019; see http://stock.qq.com/a/20190129/001822.htm.

an impairment test. As goodwill assets cannot bring future cash flows independently from other assets or asset groups, the impairment test for goodwill is conducted at the level of the asset group(s). The first step in the test is to calculate the recoverable amount of the asset group(s) and compare it with the carrying value excluding the goodwill to confirm the impairment amount. The second step in the test is to compare the carrying value of the asset group(s) including the allocated goodwill with the recoverable amount. If the latter is less, the difference between the two amounts is recorded as the goodwill impairment.

There are three layers of discretion in the implementation of a goodwill impairment test. The first is the identification of the asset group. The recognition of an asset group under CAS No. 8 should be based on whether the main cash inflows generated by the asset group are independent of those generated by other assets or other group assets. The literature shows that the more operating divisions a company has, the more freedom managers have in choosing the asset groups and the lower is the probability of the company recording a goodwill impairment (Laurion et al., 2014). Therefore, the identification of an asset group likely involves subjectivity. The second layer of discretion is the amount of goodwill allocated to each asset group. According to CAS No. 8, the book value of goodwill should be allocated to the related asset group in a reasonable way from the date of purchase. If it is difficult to allocate the goodwill to one group, it should be allocated to the relevant asset groups. The amount of goodwill allocated to each asset group is based on the proportion of each asset group's fair value. When the fair value cannot be reliably estimated, it should be allocated using the proportion of each asset group's book value. Hence, managers can allocate more goodwill to asset groups with higher fair values to avoid recognizing an impairment. The third layer of discretion is the determination of the recoverable amount of the asset group. The standards require that the recoverable amount be the higher of the net fair value of the asset group minus the disposal expenses and the present value of the asset group's expected future cash flows. As it is difficult to obtain an asset group's quoted price in the open market, the fair value of the goodwill assets cannot always be reliably estimated. If the firm chooses the future cash flow discount model, it must clearly identify the asset group's future net cash flows, discount rate and other relevant information. In reality, such information often depends on managers' subjective judgments and is difficult to verify or audit (Ramanna and Watts, 2012).

3. Literature review and hypothesis development

As mentioned in Section 2, firms have great leeway in handling goodwill assets under the current impairment testing approach. The literature confirms that managers exploit this discretion to avoid the recognition of goodwill impairments. Beatty and Weber (2006) provide evidence that managers avoid the timely recording of goodwill impairments out of concerns related to debt covenants, earnings-based bonuses, reputation and exchange delisting risk. Ramanna and Watts (2012) find that compensation and reputation incentivize managers to not record impairments in a timely manner. Similarly, Darrough et al. (2014) show that cash and option-based compensation is significantly decreased when goodwill impairments are reported. Glaum et al. (2018) find that CEO compensation and reputation concerns lead to selective impairment testing.

The literature documents that the board of directors (including the audit committee), external auditors and financial analysts all impose restrictions on managers to prevent the avoidance of goodwill impairments (Bepari and Mollik, 2015; Ferramosca et al., 2017; Ayres et al., 2019b; Gros and Koch, 2020). Majid (2015) shows that increasing the shares held by non-controlling shareholders provides them with more incentives to supervise managers' rent-seeking behavior through goodwill impairments. Using an international dataset from 21 countries, Glaum et al. (2018) find that strong accounting and auditing enforcement tends to lead to a timelier recognition of goodwill impairment and restrains managers from altering impairment decisions out of compensation concerns. Firms in countries with weak enforcement delay the recognition of their impairment losses, and private monitoring through institutional investors can substitute for public enforcement in these regions. Facing these constraints, managers might manipulate their firm's earnings upward to convince others that goodwill is not impaired even when its economic value declines and to protect their private interests from being damaged by an impairment (Filip et al., 2015; Han and Tang, 2019).

The literature suggests that managers have incentives and opportunities to conduct goodwill impairment avoidance. Even when facing internal and external constraints, managers can alter real activities to conceal

the untimely reporting of goodwill impairments. We examine whether goodwill impairment avoidance has an adverse impact on a firm's future performance growth.

Goodwill impairment is considered an operating expense and so directly reduces a firm's current accounting performance. If managers avoid the timely recognition of goodwill impairment, the firm's current performance is inflated relative to the performance of firms that do recognize impairments in a timely fashion. Goodwill impairment avoidance can also increase the uncertainty around future profitability. Impaired goodwill is less capable of creating future profits, and ignoring an impairment in the short term increases the probability of recording an extremely large impairment later, which could significantly harm the firm's performance.

In addition, goodwill impairment avoidance can induce upward earnings management through accruals and real activities. The upward accrual earnings management will reverse later, resulting in a decline in future performance. There are several reasons why real earnings management can damage future performance growth. Although sales manipulation activities such as discount promotion can improve a firm's short-term net income, this improvement comes at the expense of the unit product profit, which harms long-term profitability. Similarly, expanding production can reduce the unit product cost, but it increases future costs such as product maintenance. Cutting discretional expenditures including research and development (R&D), advertising outlays and selling, general and administrative (SG&A) costs can increase a firm's current earnings, but these cuts undermine the firm's future growth potential (Zang, 2012). Although these real activities enhance a firm's short-term performance, they are conducted at the cost of the firm's future performance. In short, using either upward accrual or real earnings management to avoid goodwill impairment damages a company's future performance growth.

Based on this analysis, we hypothesize that a public firm's goodwill impairment avoidance has a negative impact on its future performance growth, as follows.

H_1: Goodwill impairment avoidance is negatively associated with a firm's future performance growth.

Next, we explore whether goodwill impairment avoidance increases a firm's stock price crash risk. The literature discusses the determinants of stock price crash risk from two perspectives. The first is based on the quality of accounting information. Studies argue that when a firm produces poor quality accounting information, investors cannot understand the true performance of the firm's business operations. Managers are more likely to hide negative information, resulting in overvalued stock prices. Once the firm can no longer conceal the negative news and the real information is disclosed, its stock price rapidly declines. Jin and Myers (2006) and Hutton et al. (2009) find empirical evidence of a positive association between information opaqueness and stock price crash risk. Kim and Zhang (2016) and Kim et al. (2016) investigate the effect of financial reporting quality on firm-level crash risks and find that financial statement comparability and conditional conservatism can discourage managers from hiding bad news, reducing the risk of future crashes. Chen et al. (2017) show that earnings smoothing exacerbates the risk of a crash. The second perspective is related to agency conflicts. The literature states that managers are incentivized by a variety of factors, such as compensation and career concerns, to withhold bad news and accelerate the disclosure of good news, resulting in a high risk of a future stock price crash (Kothari et al., 2009; Kim et al., b, 2011a; Xu et al., 2014; Piotroski et al., 2015).

These findings indicate that concealing negative news is a direct source of stock price crash risk. Motivated by these findings, we investigate whether avoiding the timely recognition of goodwill impairments increases the risk of a future stock price crash. There are several reasons why goodwill impairment avoidance might lead to stock price crashes. First, recording a goodwill impairment is considered bad news for a firm. An impairment means that the acquired resources from prior M&A transactions failed to achieve the expected synergies (Li and Sloan, 2017). The impairment reduces the company's current accounting performance and sends a signal that the firm's future profitability and cash flows could decline (Li et al., 2011; Bostwick et al., 2016). As a result, investors short the company's shares, leading to a decrease in the firm's stock price (Bens et al., 2011; Knauer and Wöhrmann, 2016; Qu et al., 2017). Therefore, goodwill impairments are often regarded as negative news. Second, managers have incentives and opportunities to avoid the timely recording of goodwill impairments (Beatty and Weber, 2006; Ramanna and Watts, 2012; Glaum et al., 2018). Even when supervised by auditors and financial analysts, managers can achieve impairment avoidance by building a defense mechanism through upward earnings management (Filip et al., 2015; Han and Tang, 2019). Finally, avoiding

impairments inflates a firm's short-term earnings, due to both the unrecorded impairment and the upward earnings management, which causes the firm's stock price to be overvalued in the period after the earnings announcement (Li and Sloan, 2017). However, negative news then accumulates within the firm. When it is no longer possible to conceal the bad news, the accumulated negative news is released to the market at once, leading to a sharp decline in the firm's stock price.

Combining these arguments, we expect companies that avoid goodwill impairments to experience more stock price crashes than those that recognize impairments in a timely fashion. We summarize this conjecture in the following hypothesis.

H_2: Goodwill impairment avoidance is positively associated with a firm's future stock price crash risk.

4. Research design

4.1. Sample selection and data source

We select firms listed on China's A-share market between 2007 and 2016 as our initial sample. Following the literature (Jarva, 2014; Wang et al., 2015; Kim and Zhang, 2016; Kim et al., 2016; Knauer and Wöhrmann, 2016; Ayres et al., 2019a), we take several steps to filter our sample. (1) We exclude firms in the finance and insurance industries because their accounting systems and asset structures differ significantly from those of other industries. (2) We delete firms without goodwill balances using the footnote information in firms' financial statements. To ensure the effectiveness of the impairment avoidance measurement, we retain only firms with more than 10 million RMB in goodwill assets or with goodwill assets accounting for more than 0.1% of the firm's total assets before impairments in the fiscal year. (3) We remove firm-year observations with fewer than 30 weekly returns to increase the reliability of our measurement of stock price crash risks. (4) Firms with missing values or negative net assets are excluded. To mitigate the effect of outliers, all continuous variables are winsorized at the 1% and 99% levels. Our data are from the CSMAR database, supplemented by the firms' financial statements when necessary.

4.2. Variable measurement

4.2.1. Measuring goodwill impairment avoidance

The research objective of this paper requires us to identify firms that should have recorded impaired goodwill assets in their accounting books but did not. Following the literature, we adopt two methods to compute goodwill impairment avoidance, which we denote as *GWIMPA*.

First, we use the propensity score matching (PSM) method to identify firms that have goodwill assets but did not record impairment charges. We divide the sample into a control group, consisting of firms taking a goodwill impairment, and an experimental group, consisting of firms carrying goodwill but not taking an impairment. Then, we choose the propensity indexes, including the year, industry, market-to-book ratio (M/B) and annual goodwill amounts.[5] Next, we conduct the matching procedure as a one-to-one match with no replacement. Finally, we delete all unmatched observations. *GWIMPA* is set to one if a firm belongs to the experimental group and zero if it belongs to the control group.

The second method uses M/B as an indicator to identify firms that had potentially impaired goodwill but that did not report an impairment. Other studies argue that goodwill assets are more likely to be impaired

[5] Enterprises in the same industry-year are likely to be affected by the same current economic situation. If a company takes a goodwill impairment at a given valuation level, competitors with the same valuation and no impairment loss are likely to take a goodwill impairment in the future. Under this assumption, we choose the year and industry as matching indicators. M/B is a relevant proxy for potential goodwill impairment in many empirical studies (Beatty and Weber, 2006; Li et al., 2011; Ramanna and Watts, 2012; Filip et al., 2015; Ayres et al., 2019b). Gu and Lev (2011) and Glaum et al. (2018) find that firms with large volumes of goodwill assets are likely to take impairment losses. Therefore, we increase this matching propensity, which helps to identify the companies that avoid goodwill impairments more accurately.

when M/B falls below one (Ramanna and Watts, 2012; Ayres et al., 2019b). Given that the P/E ratios of Chinese A-share listed firms are generally high, we refer to Francis et al. (1996) and expect firms with M/B below the industry-year median to take goodwill impairments. *GWIMPA* equals one if the firm did not record an impairment and zero otherwise.

As Filip et al. (2015) point out, the second method has a higher probability of generating type II errors because the impairment test's reporting unit is at the asset group level and firms with M/B ratios above one can also have impaired goodwill. Therefore, we rely on the first method to measure goodwill impairment avoidance in our main test and use the second method as a robustness check.

4.2.2. Measuring firm future performance growth

Following the literature (Filip et al., 2015; Chen et al., 2015), we use the change in a firm's return on assets (ΔROA) and the change in its return on equity (ΔROE) to measure the company's future performance growth, *FPERFORM*.

4.2.3. Measuring firm-specific crash risk

Following the literature on stock price crash risks (Hutton et al., 2009; Kim et al., 2011a, 2016; Wang et al., 2015), we use two measures of a firm's stock price crash risk. We first estimate the firm-specific weekly returns for each firm-year, denoted by $W_{\mathrm{i,t}}$, as the natural log of one plus the residual returns from the expanded market model regression given by

$$R_{i,t} = \alpha_i + \beta_{1,i}R_{m,t-2} + \beta_{2,i}R_{m,t-1} + \beta_{3,i}R_{m,t} + \beta_{4,i}R_{m,t+1} + \beta_{5,i}R_{m,t+2} + \xi_{i,t} \tag{1}$$

where $R_{\mathrm{i,t}}$ represents the return on firm i's stock in week t and $R_{\mathrm{m,t}}$ is the value-weighted A-share market return in week t. We include the lagged and leading market weekly returns to allow for nonsynchronous trading (Kim et al., 2011a). The firm-specific weekly return for firm i in week t is measured as $W_{\mathrm{i,t}} = \ln(1 + \xi_{\mathrm{i,t}})$, where $\xi_{\mathrm{i,t}}$ is the residual from Eq. (1).

The first measure of firm-year's crash risk is the negative skewness, *NCSKEW*, calculated as the negative of the third moment of the firm-specific weekly returns for each sample year divided by the standard deviation of the firm-specific weekly returns raised to the third power. For each firm i in year t, we estimate *NCSKEW* as

$$NCSKEW = -\left[n(n-1)^{3/2}\sum W_{i,t}^3\right] \Big/ \left[(n-1)(n-2)\left(\sum W_{i,t}^2\right)^{3/2}\right] \tag{2}$$

where n is the number of observations of the firm-specific weekly returns of firm i in year t.

The second measure of the crash risk is the down-to-up volatility, *DUVOL*, calculated as follows. For each stock i in year t, we separate all weeks with firm-specific weekly returns below the period mean ("down weeks") from weeks with firm-specific weekly returns above the period mean ("up weeks") and compute the standard deviation for each of these subsamples separately. We then take the log of the ratio of the standard deviation of down weeks to the standard deviation of up weeks. This calculation is given by

$$DUVOL = \log\left\{\left[(n_u - 1)\sum_{Down} W_{i,t}^2\right] \Big/ \left[(n_d - 1)\sum_{Up} W_{i,t}^2\right]\right\} \tag{3}$$

where n_{u} and n_{d} are the numbers of up and down weeks in the period, respectively.

These two measures are both continuous variables and based on the distribution of the firm-specific weekly returns. A higher value of either *NCSKEW* or *DUVOL* indicates that a firm is more prone to stock price crashes. *DUVOL* is less influenced by extreme values than *NCSKEW* is (Francis, Hasan and Li, 2016).

4.2.4. Control variables

As is common in the literature, we control for several determinants of a firm's future performance growth (Chen et al., 2015; Han and Tang, 2017). These control variables include size (*SIZE*), financial leverage (*LEV*), market-to-book ratio (*M/B*), sales growth (*GROWTH*) and the proportion of intangible assets (*INTANG*). Following Hutton et al. (2009), Wang et al. (2015), Kim and Zhang (2016) and Kim et al. (2016), we include several control variables that are predictors of stock price crash risk, including size (*SIZE*), financial leverage

(*LEV*), return on assets (*ROA*), market-to-book ratio (*M/B*), stock return (*RET*), return volatility (*SIGMA*), trading turnover (*DTURN*), information opacity (*ABSDA*), audit quality (*BIG4*), controlling shareholder's holding (*TOP1*), institutional ownership (*INSTIOS*) and lagged crash risk. In addition, we include year and industry fixed effects. The detailed variable definitions are given in Table 1.

4.3. Empirical model

To test whether goodwill impairment avoidance decreases a firm's future performance growth (H_1), we use the following OLS regression model, as is common in the literature (Chen et al., 2015).

$$FPERFORM_{i,t+1} = \lambda_0 + \lambda_1 GWIMPA_{i,t} + \lambda_2^{'} CONTROL_{i.t} + \eta_1 \quad (4)$$

The dependent variable, *FPERFORM*, is one of our proxies for a firm's future performance growth, *ΔROA* and *ΔROE*, measured in year $t + 1$. The independent variable, *GWIMPA*, is the firm's goodwill impairment avoidance measured in year t (see Section 4.2.1) and *CONTROL* is a set of control variables. In model (4), λ_0 is a constant, λ_2' is the estimated coefficient of *CONTROL* and η_1 is the regression residual. We are interested in the coefficient of the independent variable *GWIMPA*, λ_1, which is significantly negative if H_1 holds.

To examine H_2, we use the following OLS regression model, as is common in the literature (Wang et al., 2015; Kim and Zhang, 2016; Kim et al., 2016).

$$CRASHRK_{i,t+1} = \alpha_0 + \alpha_1 GWIMPA_{i,t} + \alpha_2^{'} CONTROL_{i.t} + \eta_2 \quad (5)$$

The dependent variable, *CRASHRISK*, is one of our two proxies for the firm-specific crash risk, *NCSKEW* and *DUVOL*, measured in year $t + 1$. The independent variable, *GWIMPA*, is the firm's goodwill impairment avoidance measured in year t and *CONTROL* is a set of control variables. In model (5), α_0 is a constant, α_2' is the estimated coefficient of *CONTROL* and η_2 is the regression residual. We focus on the coefficient α_1, which is significantly positive if H_2 is true.

Table 1
Variable definitions.

Variables	Definitions
NCSKEW	*NCSKEW* is the negative coefficient of skewness, calculated as the negative of the third moment of the firm-specific weekly returns for each sample year, divided by the standard deviation of the firm-specific weekly returns raised to the third power. See Eqs. (1) and (2) for details.
DUVOL	*DUVOL* is the down-to-up volatility, computed as the log of the ratio of the standard deviation of down weeks to the standard deviation of up weeks. See Eqs. (1) and (3) for details.
ΔROA	*ΔROA* is the change in *ROA*, calculated as the next year's *ROA* minus the current year's *ROA*.
ΔROE	*ΔROE* is the change in *ROE*, calculated as the next year's *ROE* minus the current year's *ROE*.
GWIMPA	An indicator variable equal to one if the firm avoided reporting goodwill impairment and zero otherwise. See Section 4.2.1 for details.
SIZE	*SIZE* is the log of the firm's total assets.
LEV	*LEV* is the book value of the firm's total liabilities divided by the book value of its assets.
ROA	*ROA* is the firm's income before extraordinary items divided by total assets.
M/B	*M/B* is the firm's market-to-book ratio.
GROWTH	*GROWTH* is the growth rate of the firm's sales income.
INTANG	*INTANG* is the ratio of the firm's intangible assets over its total assets.
RET	*RET* is the mean of the firm-specific weekly returns over the fiscal year.
SIGMA	*SIGMA* is the standard deviation of the firm-specific weekly returns over the fiscal year.
DTURN	*DTURN*, a proxy for investor heterogeneity, is the detrended stock trading volume, calculated as the average monthly share turnover in the current fiscal year minus the average monthly share turnover in the previous fiscal year.
ABSDA	*ABSDA* is the absolute value of the firm's discretionary accruals estimated by the modified Jones model.
TOP1	*TOP1* is the proportion of the firm's shares held by the largest shareholder.
BIG4	An indicator variable equal to one if the firm is audited by a Big 4 auditor and zero otherwise.
INSTIOS	*INSTIOS* is the proportion of the firm's shares held by institutional investors.
YEAR	Dummy variable for year.
INDUSTRY	Dummy variable for industry.

5. Empirical results

5.1. Descriptive statistics

Table 2 displays the descriptive statistics of the main variables. Detailed definitions of all of the variables are provided in Table 1. The mean values of $NCSKEW_{t+1}$ and $DUVOL_{t+1}$ are −0.237 and −0.162, respectively, and their median values are −0.199 and −0.150, respectively. These numbers are higher than those reported by Wang et al. (2015), who use a larger sample. One possible explanation for this difference is that our sample only consists of firms with goodwill balances and our sample size is relatively small. The standard deviations of $NCSKEW_{t+1}$ and $DUVOL_{t+1}$ are 0.691 and 0.487, respectively, indicating that the distribution of stock price crash risks in our study is wide, possibly due to the avoidance of goodwill impairment. The mean, median and standard deviation of ΔROA_{t+1} are −0.002, 0.000 and 0.039, respectively, and the mean, median and standard deviation of ΔROE_{t+1} are −0.001, 0.000 and 0.087, respectively. The descriptive statistics for the other variables are similar to those found by others (e.g., Wang et al., 2015; Kim and Zhang, 2016; Kim et al., 2016).

Table 2
Descriptive statistics for the full sample.

Variable	N	Mean	SD	Min	p25	p50	p75	Max
$NCSKEW_{t+1}$	4574	−0.237	0.691	−2.251	−0.622	−0.199	0.169	1.738
$DUVOL_{t+1}$	4574	−0.162	0.487	−1.366	−0.494	−0.150	0.163	1.113
ΔROA_{t+1}	4574	−0.002	0.039	−0.141	−0.015	0.000	0.01	0.150
ΔROE_{t+1}	4574	−0.001	0.087	−0.320	−0.0300	0.000	0.020	0.400
$GWIMPA_t$	4574	0.500	0.500	0	0	0.500	1	1
$NCSKEW_t$	4574	−0.273	0.673	−2.322	−0.641	−0.228	0.138	1.472
$DUVOL_t$	4574	−0.192	0.478	−1.382	−0.519	−0.178	0.135	1.000
RET_t	4574	0.006	0.011	−0.017	−0.002	0.004	0.013	0.042
$SIGMA_t$	4574	0.073	0.029	0.032	0.052	0.066	0.087	0.168
$DTURN_t$	4574	−0.045	0.381	−1.104	−0.275	−0.035	0.186	0.923
$SIZE_t$	4574	22.303	1.272	20.024	21.416	22.105	22.952	26.472
LEV_t	4574	0.446	0.201	0.0720	0.285	0.443	0.604	0.863
M/B_t	4574	4.115	2.977	0.803	2.160	3.282	5.079	17.728
ROA_t	4574	0.042	0.047	−0.13	0.020	0.040	0.060	0.180
$GROWTH_t$	4574	0.231	0.504	−0.500	0.000	0.130	0.320	3.350
$INTANG_t$	4574	0.051	0.055	0.000	0.02	0.040	0.060	0.580
$ABSDA_t$	4574	0.058	0.060	0.001	0.018	0.040	0.077	0.329
$BIG4_t$	4574	0.132	0.338	0	0	0	0	1
$TOP1_t$	4574	0.327	0.145	0.074	0.214	0.305	0.425	0.729
$INSTIOS_t$	4574	0.358	0.247	0.000	0.136	0.360	0.558	0.864

Table 3
Univariate test.

Variable	$GWIMPA = 1$ ($N = 2287$)			$GWIMPA = 0$ ($N = 2287$)			Mean t-values (Student's *t*-test)	Mean z-values (Wilcoxon test)
	Mean	SD	Median	Mean	SD	Median		
ΔROA_{t+1}	−0.003	0.033	0.000	0.0004	0.045	0.000	3.363^{***}	3.170^{***}
ΔROE_{t+1}	−0.005	0.101	0.000	0.004	0.070	0.000	3.536^{***}	2.661^{***}
$NCSKEW_{t+1}$	−0.204	0.696	−0.172	−0.271	0.684	−0.240	-3.265^{***}	-3.728^{***}
$DUVOL_{t+1}$	−0.137	0.489	−0.131	−0.186	0.488	−0.173	-3.410^{***}	-3.354^{***}

Note: $^{*}p < 0.1$, $^{**}p < 0.05$.
*** $p < 0.01$.

Table 4
Correlations.

	$GWIMPA_t$	$NCSKEW_{t+1}$	$DUVOL_{t+1}$	ΔROA_{t+1}	ΔROE_{t+1}	$NCSKEW_t$	$DUVOL_t$	RET_t	$SIGMA_t$	$DTURN_t$	$SIZE_t$	LEV_t	M/B_t	ROA_t	$GROWTH_t$	$INTANG_t$	$ABSDA_t$	$BIG4_t$	$TOP1_t$	$INSTIOS_t$
$GWIMPA_t$	1																			
$NCSKEW_{t+1}$	0.048***	1																		
$DUVOL_{t+1}$	0.050***	0.885***	1																	
ΔROA_{t+1}	−0.050***	−0.056***	−0.075***	1																
ΔROE_{t+1}	−0.052***	−0.032**	−0.050***	0.865***	1															
$NCSKEW_t$	0.033**	0.073***	0.070***	−0.004	0.016	1														
$DUVOL_t$	0.036**	0.079***	0.076***	0.010	0.027*	0.882***	1													
RET_t	0.088***	0.030**	−0.005	0.036**	0.010	−0.031**	−0.034**	1												
$SIGMA_t$	0.099***	−0.044***	−0.064***	0.065***	0.051***	−0.049***	−0.055***	0.614***	1											
$DTURN_t$	−0.015	−0.087***	−0.097***	0.007	−0.007	−0.014	−0.022	0.543***	0.405***	1										
$SIZE_t$	−0.032**	−0.144***	−0.158***	−0.001	−0.021	−0.181***	−0.195***	−0.155***	−0.196***	−0.000	1									
LEV_t	−0.118***	−0.110***	−0.115***	0.072***	0.049***	−0.108***	−0.111***	−0.086***	−0.097***	0.014	0.544***	1								
M/B_t	0.016	0.047***	0.030**	0.025*	0.029*	0.021	0.009	−0.037**	0.043***	−0.072***	−0.067***	−0.055***	1							
ROA_t	0.134***	0.061***	0.056***	−0.390***	−0.380***	0.059***	0.040***	0.063***	−0.088***	−0.027*	−0.054***	−0.364***	0.024	1						
$GROWTH_t$	0.096***	0.044***	0.045***	−0.051***	−0.061***	0.034**	0.022	0.105***	0.106***	−0.046***	0.00800	−0.0110	−0.039***	0.190***	1					
$INTANG_t$	−0.035**	0.018	0.017	0.002	0.007	0.006	0.016	−0.003	−0.022	0.016	−0.073***	−0.024*	0.007	−0.048***	−0.042***	1				
$ABSDA_t$	−0.014	0.045***	0.044***	0.049***	0.070***	0.024	0.024	0.043***	0.059***	−0.005	−0.057***	0.098***	0.012	−0.037**	0.231***	−0.087***	1			
$BIG4_t$	−0.056***	−0.011	−0.0120	0.00200	−0.001	−0.093***	−0.112***	−0.173***	−0.124***	−0.143***	0.347***	0.097***	0.024	0.020	0.003	−0.008	−0.043***	1		
$TOP1_t$	0.033**	−0.055***	−0.064***	−0.00100	−0.011	−0.047***	−0.051***	−0.0240	−0.062***	−0.028*	0.245***	0.108***	−0.020	0.092***	−0.012	−0.007	−0.035**	0.118***	1	
$INSTIOS_t$	0.023	−0.020	−0.033**	0.026*	0.012	−0.034**	−0.045***	−0.026*	−0.048***	−0.092***	0.319***	0.147***	−0.014	0.091***	−0.015	−0.029**	−0.052***	0.152***	0.311***	1

Note:
* $p < 0.1$.
** $p < 0.05$.
*** $p < 0.01$ (two-tailed).

We perform a *t*-test (Wilcoxon) for each year to determine whether the mean (median) values of future performance growth and crash risk for firms that avoided recognizing goodwill impairment are statistically different from those for firms that recorded an impairment. Table 3 provides the univariate analysis results. We find that the mean and median values of ΔROA_{t+1} are significantly lower for the firms avoiding impairment. We also find that the mean and median of ΔROE_{t+1} are significantly lower for firms avoiding goodwill impairment. These results support the prediction of H_1. Similarly, we show that the mean and median values of the stock price crash risks as measured by $NCSKEW_{t+1}$ and $DUVOL_{t+1}$ are significantly higher in firms avoiding the impairment charges, supporting H_2.

5.2. Correlations

Table 4 presents the Pearson correlation matrix for our main variables. The correlation coefficient between ΔROA_{t+1} and ΔROE_{t+1} is 0.865 and significant at the 1% level, indicating that the two measures of future performance growth are highly correlated. More importantly, both measures of future performance growth are negatively correlated with our measure of goodwill impairment avoidance, $GWIMPA_t$, supporting our prediction that firms that avoid goodwill impairment have worse performance growth. We also find that the two crash risk measures, $NCSKEW_{t+1}$ and $DUVOL_{t+1}$, are highly correlated (0.885). Consistent with H_2, both measures of the future stock price crash risk are positively correlated with our measure of goodwill impairment avoidance, $GWIMPA_t$.

The correlation analysis only provides preliminary evidence for the underlying associations; due to the lack of control variables, more stringent multiple regressions are needed to fully support our hypotheses. Table 4 shows that the correlation between the two variables used in our models is relatively small, indicating that there is no multicollinearity problem.

Table 5
The effect of goodwill impairment avoidance on a firm's future performance growth.

Variable	(1) ΔROA_{t+1}	(2) ΔROA_{t+1}	(3) ΔROE_{t+1}	(4) ΔROE_{t+1}
$GWIMPA_t$	−0.004***	−0.003***	−0.008***	−0.007***
	(−3.26)	(−2.64)	(−3.15)	(−2.68)
$SIZE_t$		−0.002**		−0.003**
		(−2.56)		(−2.21)
LEV_t		0.020***		0.034***
		(5.13)		(3.90)
M/B_t		0.000		0.001***
		(0.98)		(2.62)
$GROWTH_t$		−0.004***		−0.010***
		(−3.14)		(−3.92)
$INTANG_t$		−0.009		−0.014
		(−0.81)		(−0.57)
_cons	−0.004	0.026*	−0.007	0.050
	(−0.84)	(1.74)	(−0.66)	(1.50)
INDUSTRY	Yes	yes	yes	yes
YEAR	Yes	yes	yes	yes
N	4574	4574	4574	4574
AR^2	0.017	0.025	0.017	0.026
F	3.704	4.370	3.683	4.455

Notes: t-statistics in parentheses.
* $p < 0.1$.
** $p < 0.05$.
*** $p < 0.01$.

5.3. Multivariate analyses

5.3.1. Goodwill impairment avoidance and future performance growth

To test H_1, we estimate regression model (4). The results are presented in Table 5.

In columns 1 and 2 of Table 5, we use ΔROA_{t+1} as the dependent variable. In columns 3 and 4, ΔROE_{t+1} is the dependent variable. In columns 1 and 3, we only include the independent variable $GWIMPA_t$ and the controls for the year and industry effects. In columns 2 and 4, we include the other control variables into the regressions. The estimated coefficients of $GWIMPA_t$ in columns 1 and 3 are −0.004 and −0.008, respectively, and both are significant at the 1% level. These results indicate that goodwill impairment avoidance has a significantly negative impact on a company's future performance growth after controlling for year and industry effects. In columns 2 and 4, the estimated coefficients of $GWIMPA_t$ are −0.003 and −0.007, respectively, and

Table 6
The effect of goodwill impairment avoidance on the future stock price crash risk.

Variable	(1) $NCSKEW_{t+1}$	(2) $NCSKEW_{t+1}$	(3) $DUVOL_{t+1}$	(4) $DUVOL_{t+1}$
$GWIMPA_t$	0.059***	0.048**	0.044***	0.039***
	(2.80)	(2.29)	(2.95)	(2.65)
$NCSKEW_t$		0.047***		
		(3.11)		
$DUVOL_t$				0.043***
				(2.84)
RET_t		2.673		0.036
		(1.62)		(0.03)
$SIGMA_t$		−2.232***		−1.730***
		(−3.16)		(−3.48)
$DTURN_t$		−0.196***		−0.118***
		(−5.75)		(−4.94)
$SIZE_t$		−0.040***		−0.047***
		(−3.04)		(−5.05)
LEV_t		−0.094		−0.014
		(−1.25)		(−0.27)
M/B_t		0.017***		0.008**
		(3.62)		(2.33)
ROA_t		0.123		0.132
		(0.49)		(0.74)
$ABSDA_t$		0.398**		0.303**
		(2.28)		(2.47)
$BIG4_t$		0.048		0.033
		(1.47)		(1.44)
$TOP1_t$		−0.125		−0.103*
		(−1.62)		(−1.90)
$INSTIOS_t$		0.050		0.046
		(0.93)		(1.20)
_cons	−0.233	0.804*	−0.292	0.880***
	(−0.77)	(1.94)	(−1.36)	(3.01)
INDUSTRY	yes	yes	yes	yes
YEAR	yes	yes	yes	yes
N	4574	4574	4574	4574
AR2	0.031	0.062	0.030	0.066
F	5.983***	8.355***	5.908***	8.929***

Notes: t-statistics in parentheses.
* $p < 0.1$.
** $p < 0.05$.
*** $p < 0.01$.

both are significant at the 1% level, providing strong evidence that avoiding goodwill impairment is detrimental for a firm's future growth. In short, H_1 is supported.

5.3.2. Goodwill impairment avoidance and future stock price crash risk

To test H_2, we run regression model (5). The results are seen in Table 6.

In columns 1 and 2 of Table 6, we use $NCSKEW_{t+1}$ as the dependent variable. In columns 3 and 4, we use $DUVOL_{t+1}$ as the dependent variable. In columns 1 and 3, we only include the independent variable $GWIMPA_t$ and the controls for year and industry effects. Columns 2 and 4 include the other control variables. In columns 1 and 3, we find that the estimated coefficients of $GWIMPA_t$ are 0.059 and 0.044, respectively, and both are significant at the 1% level. Thus, goodwill impairment avoidance has a significantly positive effect on

Table 7
Robustness test: Deleting the observations from the year in which CAS No. 8 came into effect.

Variable	(1) ΔROA_{t+1}	(2) ΔROE_{t+1}	(3) $NCSKEW_{t+1}$	(4) $DUVOL_{t+1}$
$GWIMPA_t$	−0.003***	−0.007***	0.048**	0.039***
	(−2.64)	(−2.68)	(2.29)	(2.65)
$NCSKEW_t$			0.047***	
			(3.11)	
$DUVOL_t$				0.043***
				(2.84)
RET_t			2.673	0.036
			(1.62)	(0.03)
$SIGMA_t$			−2.232***	−1.730***
			(−3.16)	(−3.48)
$DTURN_t$			−0.196***	−0.118***
			(−5.75)	(−4.94)
$SIZE_t$	−0.002**	−0.003**	−0.040***	−0.047***
	(−2.56)	(−2.21)	(−3.04)	(−5.05)
LEV_t	0.020***	0.034***	−0.094	−0.014
	(5.13)	(3.90)	(−1.25)	(−0.27)
M/B_t	0.000	0.001***	0.017***	0.008**
	(0.98)	(2.62)	(3.62)	(2.33)
ROA_t			0.123	0.132
			(0.49)	(0.74)
$ABSDA_t$			0.398**	0.303**
			(2.28)	(2.47)
$BIG4_t$			0.048	0.033
			(1.47)	(1.44)
$TOP1_t$			−0.125	−0.103*
			(−1.62)	(−1.90)
$INSTIOS_t$			0.050	0.046
			(0.93)	(1.20)
$GROWTH_t$	−0.004***	−0.010***		
	(−3.14)	(−3.92)		
$INTANG_t$	−0.009	−0.014		
	(−0.81)	(−0.57)		
_cons	0.026*	0.050	0.804*	0.880***
	(1.74)	(1.50)	(1.94)	(3.01)
INDUSTRY	Yes	yes	yes	yes
YEAR	Yes	yes	yes	yes
N	4574	4574	4574	4574
AR2	0.025	0.026	0.062	0.066
F	4.370***	4.455***	8.355***	8.929***

Notes: t-statistics in parentheses
* $p < 0.1$.
** $p < 0.05$.
*** $p < 0.01$.

a company's risk of a future stock price crash. In columns 2 and 4, the estimated coefficients of $GWIMPA_t$ are −0.003 and −0.007, respectively, and statistically significant at the 5% and 1% levels, respectively. In short, after factoring in the effects of control variables and year and industry effects, goodwill impairment avoidance significantly increases a firm's risk of a future stock price crash, supporting H_2.

5.4. Robustness tests

To validate our main findings, we conduct a series of robustness tests. First, CAS No. 8 has been in effect since 2007. CAS No. 8 involves a change in accounting principles on whether goodwill impairments can be classified as below-the-line items. Managers' incentives during the first year of the implementation of CAS

Table 8
Robustness test: Truncating the goodwill impairment amount at the 1st and 99th percentiles.

Variable	(1) ΔROA_{t+1}	(2) ΔROE_{t+1}	(3) $NCSKEW_{t+1}$	(4) $DUVOL_{t+1}$
$GWIMPA_t$	−0.003**	−0.007***	0.051**	0.042***
	(−2.57)	(−2.61)	(2.37)	(2.76)
$NCSKEW_t$			0.048***	
			(3.07)	
$DUVOL_t$				0.043***
				(2.76)
RET_t			3.175*	0.112
			(1.89)	(0.09)
$SIGMA_t$			−2.368***	−1.731***
			(−3.30)	(−3.43)
$DTURN_t$			−0.199***	−0.122***
			(−5.76)	(−5.02)
$SIZE_t$	−0.002**	−0.003**	−0.041***	−0.047***
	(−2.48)	(−1.99)	(−3.03)	(−4.94)
LEV_t	0.020***	0.032***	−0.115	−0.024
	(5.05)	(3.70)	(−1.50)	(−0.44)
M/B_t	0.000	0.001**	0.017***	0.008**
	(0.57)	(2.39)	(3.45)	(2.27)
ROA_t			0.039	0.112
			(0.15)	(0.62)
$ABSDA_t$			0.385**	0.296**
			(2.19)	(2.39)
$BIG4_t$			0.050	0.032
			(1.50)	(1.39)
$TOP1_t$			−0.113	−0.101*
			(−1.46)	(−1.84)
$INSTIOS_t$			0.048	0.043
			(0.88)	(1.12)
$GROWTH_t$	−0.003***	−0.009***		
	(−2.83)	(−3.71)		
$INTANG_t$	−0.008	−0.014		
	(−0.77)	(−0.56)		
_cons	0.026*	0.045	0.721**	0.922***
	(1.71)	(1.33)	(2.29)	(4.15)
INDUSTRY	Yes	yes	yes	yes
YEAR	Yes	yes	yes	yes
N	4488	4488	4488	4488
AR2	0.024	0.024	0.062	0.066
F	4.139***	4.211***	8.208***	8.773***

Notes: t-statistics in parentheses.
* $p < 0.1$.
** $p < 0.05$.
*** $p < 0.01$.

No. 8 may be different than those after 2007, because there is a trade-off between taking a write-off below the line in 2007 and facing potential future impairments (Filip et al., 2015; Xu et al., 2017). To account for this change, we delete the observations from 2007 and use the remaining sample to re-run the regressions. The test results are reported in Table 7, and we find that our main conclusions do not change substantially.

Second, studies find that some firms record relatively small amounts of goodwill impairment many times when the firms are profitable and then take a "big bath" of impairment when their performance is extremely bad (Giner and Pardo, 2015). These strategies can lead to a noisy sample in the control group. Therefore, we keep the control group sample with goodwill impairments truncated at the 1st and 99th percentiles and match the experimental group with the remaining control group sample and re-run our regressions. The test results are shown in Table 8. They are statistically indistinguishable from those of the main tests.

Table 9
Robustness test: Alternative measure of $GWIMPA_t$ discussed in Section 4.2.

Variable	(1) ΔROA_{t+1}	(2) ΔROE_{t+1}	(3) $NCSKEW_{t+1}$	(4) $DUVOL_{t+1}$
$GWIMPA_t$	−0.004***	−0.010***	0.045*	0.041**
	(−2.88)	(−3.14)	(1.66)	(2.14)
$NCSKEW_t$			0.031	
			(1.59)	
$DUVOL_t$				0.033*
				(1.65)
RET_t			−0.329	−2.217
			(−0.12)	(−1.11)
$SIGMA_t$			−2.118**	−1.302*
			(−2.11)	(−1.84)
$DTURN_t$			−0.147***	−0.093**
			(−2.85)	(−2.54)
$SIZE_t$	−0.002**	−0.004**	−0.051***	−0.036***
	(−2.01)	(−2.34)	(−3.40)	(−2.93)
LEV_t	0.017***	0.034***	0.052	−0.134*
	(3.24)	(3.16)	(0.52)	(−1.83)
M/B_t	0.002***	0.005***	0.051***	0.032***
	(2.99)	(3.31)	(3.43)	(3.03)
ROA_t			0.014	−0.403
			(0.04)	(−1.53)
$ABSDA_t$			0.282	0.351*
			(0.99)	(1.76)
$BIG4_t$			0.032	0.012
			(0.78)	(0.42)
$TOP1_t$			−0.203**	−0.147**
			(−1.98)	(−2.03)
$INSTIOS_t$			−0.017	0.021
			(−0.23)	(0.41)
$GROWTH_t$	−0.005**	−0.008*		
	(−2.25)	(−1.67)		
$INTANG_t$	0.002	0.020		
	(0.15)	(0.63)		
_cons	0.031	0.077*	1.027*	0.618
	(1.60)	(1.92)	(1.75)	(1.44)
INDUSTRY	yes	yes	yes	yes
YEAR	yes	yes	yes	yes
N	2640	2640	2640	2640
AR2	0.042	0.048	0.063	0.068
F	4.284***	4.794***	5.316***	5.728***

Notes: t-statistics in parentheses.
* $p < 0.1$.
** $p < 0.05$.
*** $p < 0.01$.

Next, we adopt the second method discussed in Section 4.2 to identify firms with impaired goodwill but that did not record any impairment losses. Table 9 reports the test results. We find that the main conclusions continue to hold, but with weaker statistical significance.

Finally, to address the impact of autocorrelation and other statistical concerns about the regression models and to obtain more robust results, we correct the standard errors by clustering at the firm level. The adjusted test results are presented in Table 10. The results are consistent with our primary findings.

6. Further analyses and results

In our main tests, we investigate the impact of goodwill impairment avoidance on a firm's performance growth and stock price crash risk in the next year. However, it is likely that managers conceal the negative

Table 10
Robustness test: Standard errors clustered at the firm level.

Variable	(1) ΔROA_{t+1}	(2) ΔROE_{t+1}	(3) $NCSKEW_{t+1}$	(4) $DUVOL_{t+1}$
$GWIMPA_t$	−0.003***	−0.007***	0.048**	0.039**
	(−2.93)	(−3.17)	(2.26)	(2.57)
$NCSKEW_t$			0.047***	
			(3.05)	
$DUVOL_t$				0.043***
				(2.70)
RET_t			2.673*	0.036
			(1.66)	(0.03)
$SIGMA_t$			−2.232***	−1.730***
			(−3.18)	(−3.48)
$DTURN_t$			−0.196***	−0.118***
			(−6.01)	(−4.97)
$SIZE_t$	−0.002***	−0.003***	−0.040***	−0.047***
	(−3.13)	(−2.58)	(−3.06)	(−5.15)
LEV_t	0.020***	0.034***	−0.094	−0.014
	(5.33)	(3.83)	(−1.25)	(−0.26)
M/B_t	0.000	0.001**	0.017***	0.008**
	(0.81)	(1.96)	(3.64)	(2.22)
ROA_t			0.123	0.132
			(0.45)	(0.68)
$ABSDA_t$			0.398**	0.303**
			(2.23)	(2.45)
$BIG4_t$			0.048	0.033
			(1.49)	(1.49)
$TOP1_t$			−0.125	−0.103*
			(−1.54)	(−1.83)
$INSTIOS_t$			0.050	0.046
			(0.89)	(1.18)
$GROWTH_t$	−0.004**	−0.010***		
	(−2.57)	(−2.89)		
$INTANG_t$	−0.009	−0.014		
	(−0.94)	(−0.68)		
_cons	0.026**	0.050*	0.804***	0.880***
	(2.19)	(1.78)	(2.83)	(4.53)
INDUSTRY	yes	yes	yes	yes
YEAR	yes	yes	yes	yes
N	4574	4574	4574	4574
AR2	0.025	0.026	0.062	0.066
F	5.871***	3.990***	10.223***	14.479***

Notes: t-statistics in parentheses.
* $p < 0.1$.
** $p < 0.05$.
*** $p < 0.01$.

news associated with goodwill impairment for extended periods, so the impact of the avoidance is likely to exhibit persistence. Motivated by this consideration, we expand the testing period to a three-year window and examine the persistence of the impact of goodwill impairment avoidance on a firm's performance growth and stock price crash risk. The results are shown in Table 11.

In columns 1 to 4 of Table 11, the dependent variable is a firm's performance growth as measured by ΔROA and ΔROE in the second (t + 2) and third (t + 3) year. In columns 5 to 8, the dependent variable is the firm's stock price crash risk as measured by $NCSKEW$ and $DUVOL$ in years t + 2 and t + 3. The independent variable in all of the columns is $GWIMPA_t$. As seen in columns 1 to 4, we still find a significant negative association between goodwill impairment avoidance and a firm's performance growth in the second and third year after excluding the influence of the control variables and industry and year effects. The results in columns 5 to

Table 11
The persistence of the effect of goodwill impairment avoidance on a firm's future performance and stock price crash risk.

Variable	(1) ΔROA_{t+2}	(2) ΔROA_{t+3}	(3) ΔROE_{t+2}	(4) ΔROE_{t+3}	(5) $NCSKEW_{t+2}$	(6) $NCSKEW_{t+3}$	(7) $DUVOL_{t+2}$	(8) $DUVOL_{t+3}$
$GWIMPA_t$	−0.009***	−0.014***	−0.016***	−0.031***	0.056**	0.059**	0.034**	0.049**
	(−4.33)	(−5.28)	(−3.09)	(−4.45)	(2.33)	(1.97)	(2.12)	(2.47)
$NCSKEW_{t+1/t+2}$					0.073***	0.060***		
					(4.41)	(3.08)		
$DUVOL_{t+1/t+2}$							0.046***	0.038**
							(2.82)	(2.04)
$RET_{t+1/t+2}$					2.487*	0.014	2.078**	−0.781
					(1.65)	(0.01)	(2.05)	(−0.61)
$SIGMA_{t+1/t+2}$					0.157	0.780*	0.011	0.419
					(0.42)	(1.76)	(0.04)	(1.42)
$DTURN_{t+1/t+2}$					−0.036	−0.028	−0.020	−0.001
					(−1.15)	(−0.67)	(−0.96)	(−0.04)
$SIZE_{t+1/t+2}$	−0.004***	−0.007***	−0.001	−0.007**	−0.013	−0.041**	−0.019*	−0.043***
	(−3.06)	(−4.92)	(−0.26)	(−1.99)	(−0.81)	(−2.17)	(−1.80)	(−3.42)
$LEV_{t+1/t+2}$	0.040***	0.044***	−0.011	0.007	0.034	0.285***	0.021	0.230***
	(5.83)	(5.24)	(−0.64)	(0.34)	(0.39)	(2.76)	(0.36)	(3.35)
$M/B_{t+1/t+2}$	−0.000	−0.003***	0.001	−0.004***	0.002	−0.011*	−0.001	−0.010**
	(−0.97)	(−6.54)	(0.96)	(−2.91)	(0.30)	(−1.70)	(−0.24)	(−2.32)
$ROA_{t+1/t+2}$					0.423	1.456***	0.305	1.056***
					(1.47)	(4.34)	(1.57)	(4.74)
$ABSDA_{t+1/t+2}$					0.496***	−0.195	0.321**	−0.183
					(2.59)	(−0.84)	(2.49)	(−1.18)
$BIG4_{t+1/t+2}$					0.023	0.124**	0.015	0.069*
					(0.45)	(2.01)	(0.42)	(1.68)
$TOP1_{t+1/t+2}$					−0.129	−0.078	−0.090	−0.046
					(−1.51)	(−0.78)	(−1.55)	(−0.69)
$INSTIOS_{t+1/t+2}$					0.092	0.003	0.040	0.002
					(1.54)	(0.04)	(1.00)	(0.03)
$GROWTH_{t+1/t+2}$	−0.034***	−0.050***	−0.072***	−0.119***				
	(−7.22)	(−8.57)	(−6.22)	(−7.92)				
$INTANG_{t+1/t+2}$	0.007	−0.033	0.080*	−0.001				
	(0.38)	(−1.42)	(1.71)	(−0.01)				
_cons	0.047*	0.125***	−0.063	0.157*	0.380	0.581	0.476*	0.682**
	(1.75)	(3.87)	(−0.97)	(1.90)	(1.01)	(1.26)	(1.87)	(2.22)
INDUSTRY	Yes	yes	yes	yes				
YEAR	Yes	yes	yes	yes				
N	4490	3256	4483	3248	4470	3215	4470	3215
AR2	0.054	0.101	0.033	0.063	0.047	0.043	0.058	0.058
F	9.220	12.772	5.962	8.043	6.802	4.841	8.299	6.242

Notes: t-statistics in parentheses.
* $p < 0.1$.
** $p < 0.05$.
*** $p < 0.01$.

8 show a significantly positive relationship between *GWIMPA* and the risk of a stock price crash in years 2 and 3. Overall, we confirm that goodwill impairment avoidance has an adverse impact on a firm's performance growth and stock price crash risk and that these effects persist for at least three years.

7. Conclusion

The rapid increase in the volume of goodwill assets in China's capital market has strengthened the importance of the timely recognition of goodwill impairments under the current impairment testing approach. The literature documents that managers exploit their discretion in asset valuation to avoid reporting impairment losses due to concerns about the managers' compensation and reputation (Beatty and Weber, 2006; Ramanna and Watts, 2012; Glaum et al., 2018). Even when facing monitoring pressure, managers can conduct upward earnings management to avoid recording impairments and protect their personal interests (Filip et al., 2015; Han and Tang, 2019). We investigate the financial consequences of goodwill impairment avoidance from the perspectives of a firm's future performance and stock price crash risk.

Using data on firms listed on China's A-share market as our sample, we find that goodwill impairment avoidance is negatively associated with a firm's future performance growth and positively associated with its stock price crash risk. These detrimental effects persist for at least three years. Our results enrich the literature on the consequences of goodwill impairment and the determinants of stock price crash risk and provide a new perspective for explaining the performance changes observed in listed companies. Our results also have practical implications. For regulators, the primary task of the current "three major battles" paradigm is to prevent major risks. We find that avoiding the recognition of goodwill impairment worsens a company's future performance and increases its risk of a stock price crash. Therefore, regulators should pay attention to firms' goodwill avoidance behavior and its potential harms and enhance their monitoring intensity to prevent the occurrence of major risks. External investors should stay alert when interpreting a firm's impairment information and be aware of potential avoidance when making investment decisions.

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Business and financial information integration and voluntary management earnings forecasts

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ABSTRACT

In this study, the impact of business and financial information integration (BFII) on the voluntary management earnings forecasts (VMEFs) of listed firms in China between 2008 and 2018 is investigated. Drawing on litigation cost and ability signaling theories, we find that the adoption of BFII encourages top managers to disclose VMEFs. BFII firms are identified through the textual analysis of management discussion and analysis (MD&A) reports, and the empirical results indicate that BFII firms have a higher probability and frequency of issuing VMEFs than non-BFII firms. The results remain robust after we identify causality by applying a propensity score matching and difference-in-differences (PSM-DID) test and use an alternate measure of BFII. Further tests show that BFII firms issue more accurate VMEFs and are able to issue them at an earlier stage. We also find that the positive relationship between BFII and VMEFs is weakened if the media expresses concern about the uncertainty of BFII adoption.
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1. Introduction

Today's increasingly complex business environment makes business and financial information integration (BFII) essential to firms' value creation. BFII, which enables western firms to succeed against fierce global

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competition (Bai et al., 2018; Garicano and Rossi-Hansberg, 2006; Gu et al., 2017; Imbs, 2006; Mendoza et al., 2009), involves removing the boundary between the financial and business departments, improving information integration and connections within a firm, and ensuring that financial information reflects business operations. By adopting BFII, a firm demonstrates its determination to ensure that its financial department is fully aware of daily operations rather than simply functioning as an auxiliary department and enables business departments to make full use of financial information in their decision-making, activity monitoring, and business performance evaluation. Thus, BFII can improve the efficiency of information production and transmission.

BFII is becoming popular worldwide, as it can reduce the mismatch between business operations and financial information. The International Financial Reporting Standards Foundation (IFRS) 15 revised its revenue recognition model in 2014 to improve accounting timeliness and relevance. In 2017, China issued new revenue standards that converged with those of the IFRS, with the aim of making it possible to compare the accounting of different countries. In the area of information comparability and transparency, the new standards require a "five-step" model for revenue and cost recognition, which are measured based on the percentage of completion. Timely and effective communication between financial and business departments is thus required. In this study, we focus on how information integration influences the quality of corporate information disclosure. When recruiting finance personnel, firms that have implemented BFII focus more on operational industry knowledge than those that have not. They are also more likely to insist on rotations of finance personnel into business units, and to use the "percentage to completion" method correctly. The implementation of BFII thus has both theoretical and practical significance for the comparability and standardization of revenue, and hence earnings information.

Although BFII is globally significant in terms of accounting standards and firm operations, its antecedents and consequences have not been fully considered in academic research. This gap may be due to the ambiguous definition of BFII concepts and their confusion with specific managerial tools, or to the difficulty of measuring BFII. Jacobs and Whybark (2000), Giachetti (2004), Gil-Garcia et al. (2009), and Jagoda and Samaranayake (2017) measured it through the use of enterprise resource planning (ERP), but this measure has limitations, because ERP is a computer system that assists in firm operations, whereas BFII is a concept, culture, and strategy for integrating business and financial information. BFII affects every area of a firm, including recruiting, accounting policies, organizational restructuring, information sharing across departments, and management styles.

Thus, we consider BFII as a firm strategy under which the duty of the financial staff is no longer simply the post-accounting supervision of the business. Instead, they predict business trends, calculate daily performance, and feed important information back to other departments. We construct an innovative measure of BFII, based on the textual analysis of the management discussion and analysis (MD&A) that all listed firms are required to release. We thus examine the characteristics of a firm's BFII by analyzing information in its MD&A. Information about executives is disclosed in MD&A, and thus it is a significant component of financial reports. If a firms discloses that it is "adopting BFII," it is likely that the firm has integrated its business and financial information. In our robustness tests, we attempt to identify BFII by applying the textual analysis to news released on social media. Social media is an external issuer of information, and thus it can be used to monitor firms. Firms in China that adopt BFII are of great interest to the media, particularly when it is promoted by the Ministry of Finance.

The disclosure of voluntary management earnings forecasts (VMEFs) represents an extremely important decision for listed companies, as it can be a double-edged sword. It can optimize the firm's information environment, but can also lead to potential litigation. VMEFs reduce informational asymmetry between firms and investors and thus improve the firms ability to raise capital (Diamond and Verrecchia, 1991) and signal competence (Trueman, 1986). However, if a false statement leads to losses for investors, they can initiate legal proceedings that threaten the listed company (Kasznik, 1999).

The relationship between BFII and VMEFs is supported by litigation cost and ability signaling theories. BFII reduces the information asymmetry between finance and business departments, and protects a firm against claims that it issues misleading information, thus reducing the litigation risk. As the number of claims

against firms has increased, BFII has gradually gained popularity, particularly among listed firms with a higher (perceived) litigation risk. Ability signaling theory suggests that managers provide voluntary disclosures about the firm's operations as a signal of their ability to anticipate changes in the economic environment and to manage the firm effectively (Trueman, 1986). BFII firms have the advantage of integrating information from different departments, and managers are thus likely to be more aware of firm operations and more able to predict future earnings. They signal this ability to investors through the issuance of VMEFs.

We identify causality between BFII and VMEFs by applying a difference-in-differences methodology. After controlling for potential endogeneity, we observe that BFII has a positive and significant impact on the probability and frequency of VMEF disclosures, and that BFII firms are associated with more accurate and timelier VMEFs than non-BFII firms.

Our study makes three main contributions to the literature. First, we extend studies of management earnings forecasts (MEFs) that explore the determinants of information disclosure, including litigation risk (*e.g.*, Bourveau et al., 2018; Brown et al., 2005; Cao and Narayanamoorthy, 2011; Field et al., 2005; Francis et al., 1994; Houston et al., 2019; Johnson et al., 2001; Rogers and Buskirk, 2009; Skinner, 1994, 1997; Wynn, 2008), legal environment (Baginski et al., 2002), and analyst and investor environment (Ajinkya et al., 2005; Anilowski et al., 2007; Healy and Palepu, 2001). However, information integration has rarely been considered in MEFs. We extend this research by examining the effect of BFII, and suggest that information integration is an essential factor in the issuance of VMEFs. As indicated in other studies, the integration of team members confirms common values, reduces communication costs, and enhances synergy (Bizjak et al., 2009; Certo et al., 2006; Fracassi and Tate, 2012; Larcker et al., 2011). Our research results confirm the importance of information integration in corporate information disclosure decisions, and thus supplement previous findings on the determinants of information disclosure.

Second, we extend the research on the economic consequences of information integration by considering the perspective of disclosure incentives. Most studies of the economic consequences of information integration focus on capital operations, such as capital markets, investment mergers and acquisitions (M&A), and supply chains (*e.g.*, Dhaliwal et al., 2013), rather than information disclosure. Information integration has a more direct transformative effect on the production and transmission of company information than on M&A or the supply chain.

Third, we use textual analysis to identify whether and when firms introduce BFII. This innovative method uses the MD&A text (see the management discussion and analysis section) in firms' annual reports. We establish a database on the implementation of BFII through this process, thus enabling a comprehensive analysis of the economic consequences of BFIIs. In addition, we verify whether a company's goals are achieved through BFII by manually collecting relevant media coverage from leading newspapers and websites. This third-party evidence provides the basis for our objective evaluation of BFII. Thus, we obtain a direct measurement of BFII that can be used in future research.

The remainder of this paper is organized as follows. Section 2 presents a discussion of information disclosure and BFII in China. Section 3 presents our hypothesis development. The research design is discussed in Section 4. Section 5 reports the main empirical results. The endogeneity of BFII is addressed in Section 6. Section 7 provides further analysis and Section 8 concludes the paper.

2. Institutional background

2.1. Information disclosure in China

The emerging economy of China developed its capital markets relatively recently. The opening of the Shanghai and Shenzhen Stock Exchanges in December 1990 represented China's most significant steps toward market-oriented reform (Jiang and Kim, 2015). The China Securities Regulatory Commission (CSRC) is the main securities regulator, which notes that firms listed on the two exchanges should have similar financial reporting and disclosure rules. According to Article 2 of the *Regulations on Information Disclosure for China's*

Listed Companies issued by CSRC in 2007, listed firms should "disclose information truly, accurately, completely, and timely" and that it is unlawful "to make any untrue and misleading statement of a material fact or to omit to state a material fact."[1]

According to the rules and regulations issued by Chinese Stock Exchanges and the CSRC, Chinese listed companies are required to disclose earnings forecasts in the following circumstances: (1) if they report losses; (2) if their earnings increase or decrease by more than 50% relative to earnings during the same period of the previous year; and (3) if they change from losses to profits for the whole year, half-year, or the third quarter. The forecasting company, along with its executives and directors, may be publicly denounced by the stock exchanges if mandatory forecasts are omitted or delayed.

Firms are otherwise encouraged to release earnings forecasts voluntarily. Penalties are imposed by the stock exchanges if misleading voluntary forecasts are issued.

In many countries such as the U.S., firms are encouraged to provide information about expected earnings (Hirst et al., 2008) regardless of VMEFs. Market traders seeking private information can use VMEFs and financial reports to optimize their investments. The information environment of China's capital markets is less developed than other mature markets (Piostroski and Wong, 2012), and both the motivation to disclose VMEFs and the potential penalties are lacking for Chinese listed companies. The optimization of the information environment is therefore extremely challenging. Thus, by examining the motivations for issuing VMEFs, new insights into how to mitigate the information asymmetry that characterizes the China stock market may be revealed.

2.2. BFII adoption in China

The Chinese Ministry of Finance encourages BFII as part of the broader integration of global business and financial information. Increasingly, firms are realizing the significance of BFII, and the proportion of firms adopting it has grown since 2008. Exploring BFII from VMEFs can provide insights into information disclosure in China's capital market. Investors in emerging economies such as China face much uncertainty due to high information asymmetry (Zhang, 2006). According to institutional theory information disclosure is critical for firms seeking to gain a competitive advantage in capital markets, particularly in emerging economies that lack independent financial intermediaries and in which resource allocation depends on the government (Zhou et al., 2017).

The BFII of Chinese firms provides a unique context, as there are many differences between China and Western countries. In Western countries, changes in the business environment are implemented through system and process controls, whereas Chinese firms rely on a "leadership culture" (Graham et al., 2012, 2013) in which strict power divisions exist among departments. The leaders of each department perform their duties according to their levels of expertise, and have limited access to other departments. China's leadership culture offers an appropriate institutional setting for studying the influence of BFII. In addition, the adoption of the new 2017 revenue recognition standards requires firms to recognize revenues and costs according to completion rates, which leads to the further integration of business and financial information.

Thus, research into BFII in the capital markets of emerging economies such as China not only improves our understanding of information disclosure but also examines the role of accounting standards and practices.

3. Hypothesis development

VMEF disclosure is the process of combining information so that forward-looking earnings can be predicted (Kwak et al., 2012; Yhim et al., 2003). Executives may often not fully understand information from departments that are not within their areas of specific expertise. Thoroughly integrating expertise from business and finance departments is increasingly required in many firms, as complex business environments require comprehensive information for decision-making. Thus, firms may be more likely to adopt BFII when the

[1] Information for *Regulations on Information Disclosure for China's Listed Companies* can be checked at the official website: http://www.csrc.gov.cn/pub/newsite/ssb/ssflfg/bmgzjwj/ssxxpl/200911/t20091111_167865.html (in Chinese)

information environment is opaque, when the firm is growing, or when business operations become more diverse. Adopting BFII indicates that a firm is attempting to integrate business and financial information and to combine the expertise of the two departments. Unsurprisingly, the number of firms adopting BFII continues to increase, particularly since the Ministry of Finance published its documents and guidelines regarding BFII in 2014 and 2016.

Two major changes occur when firms adopt BFII: (a) information asymmetry between the business and financial departments is reduced, and their communication efficiency improves; and (b) future earnings increases can be forecast. The integration of business and financial information also leads to the recruitment of employees with both business and financial experience, more job rotations within the firm, and the application of a percentage-of-completion methodology for recognizing revenues and costs. In contrast, for non-BFII firms, the accounting figures from their financial departments do not fully reflect daily operations, and the business department may find it difficult to use the financial information when optimizing their decisions. This information asymmetry between departments in non-BFII firms makes forecasting earnings challenging.

Studies on corporate disclosure suggest that firms voluntarily issue earnings forecasts for various reasons, such as to gain access to external finance, to reduce the risk of management dismissal and hostile takeovers, and to communicate with analysts (Dai et al., 2005; Diamond and Verrecchia, 1991; Healy and Palepu, 2001; Verrecchia, 1983). Two other motives are closely related to the role of BFII: litigation costs and ability signaling. Investors can initiate legal action against managers who provide misleading information (Bamber and Cheon, 1998). A firm facing lawsuits generally experiences a major loss in value. VMEF litigation not only imposes substantial costs in terms of lost time and money (Kasznik, 1999), but also in terms of intangibles such as the reputation and prestige of its managers. The risk of litigation therefore justifiably deters firms from issuing biased earnings forecasts. After a firm adopts BFII, its business and financial departments become more closely connected. Financial departments in non-BFII firms are focus on financial practices, whereas those in BFII firms have an understanding of business operations. Business departments can also use the information embedded in accounting figures to support decision-making, monitoring, and feedback in their daily activities. We argue that such a reduction in information asymmetry between the business and financial departments is particularly important when issuing VMEFs. Executives in BFII firms have access to integrated information, which allows them to manage their firms more effectively, through better control of future cash flows, earnings per share, and discount rates. The familiarity theory examines the behavioral biases of people and shows that their decision-making processes involve heuristic simplification (Massa and Simonov, 2006). When financial and business departments communicate, they gradually come to share a common language, and the increasing familiarity leads to further information integration as the trust between the two groups increases (Custódio and Metzger, 2014). As suggested in other studies, an information advantage enables firms to issue more accurate earnings forecasts (*e.g.*, Hurwitz, 2017; Kwak et al., 2012), and the increased accuracy reduces potential litigation costs. Thus, information asymmetry and unfamiliarity will deter non-BFII firms from issuing a VMEF due to concerns of potential litigation (Cao and Narayanamoorthy, 2011; Trueman, 1986), whereas BFII firms are more likely to issue VMEFs because they face fewer litigation risks.

The ability signaling theory suggests that voluntarily issuing a management earnings forecast is viewed as a test of the abilities of managers (Baik et al., 2011), who signal to investors their competence in anticipating changes in the economic environment and managing the organization. Investors infer executives' ability through their management earnings forecasts (Baik et al., 2011). After BFII is adopted, executives become more confident in the accuracy of their estimates of future earnings. However, non-BFII firms may experience risk information asymmetry and potential distrust between the financial and business departments.

To summarize, based on litigation theory and ability signaling theory, we propose that BFII firms are more likely to issue a VMEF than non-BFII firms.

Hypothesis: *Ceteris paribus*, firms that adopt BFII have a higher propensity for and frequency of VMEFs than non-BFII firms.

4. Methodology

4.1. Sample selection

We obtain BFII adoption announcements from firm's MD&A reports, and third-party evaluations of the BFII adoptions from China's leading financial media. We apply textual analyses to both these datasets. The sample includes all A-share public firms listed in the Shanghai and Shenzhen Stock Exchanges in China between 2008 and 2018. Our sample starts in 2008, as this is when the new Accounting Standards for Business Enterprises were applied. Since 2008, Chinese listed companies have been required to disclose earnings forecasts if the predicted performance reaches the required thresholds. We collect management earnings forecast data and other financial data from the China Stock Market and Accounting Research (CSMAR) database. This database is widely used in accounting studies (Chen et al., 2018; Li et al., 2016). We exclude firms that (a) are in the financial industry; (b) are required to disclose management earnings forecasts, and (c) have missing values for key variables. The final sample for our baseline regression contains 14,443 firm-year observations.

4.2. Variable measurement

4.2.1. Measuring business and financial information integration (BFII)

We use textual analysis to collect business and financial information integration data from MD&A sections of financial reports. MD&A reduces information asymmetry between firms and stakeholders by providing stakeholders with supplemental information (Bryan, 1997). China introduced MD&A disclosure in 2001, and a series of modifications have been applied in subsequent years. For example, "review and prospect of operating" was replaced by "management discussion and analysis" in 2003. Chinese listed firms are required to reveal and analyze important information about their operations. They also disclose their forecasts for future development, risks, opportunities, and challenges in the MD&A. We extract the MD&A sections from quarterly, semi-annual, and annual financial reports. We then analyze the content to identify whether the firm uses BFII. The details of the MD&A and BFII identification are presented in Appendix 1. We define BFII as a dummy variable that equals one (1) if a firm adopts BFII in year t and the following years. BFII equals zero (0) if a firm never adopts BFII or if the firm has not yet adopted BFII.

4.2.2. Measurements of voluntary management earnings forecast (VMEF) and other control variables

To examine whether BFII influences the probability that firms issue VMEFs, we construct a dummy variable *Dummy_Forecast,* which equals one (1) if a firm releases at least one earnings forecast voluntarily in year $t + 1$ and zero (0) otherwise. We also compute the frequency of VMEF issuance (*Forecast_Frequency*) by counting the number of voluntary earnings forecasts issued in year $t + 1$.

Following the literature, we control for a set of firm and industry characteristics. All of the control variables are measured for a firm in year t. These include firm size (the natural logarithm of the book value of total assets), firm leverage (the book value of total debts divided by the book value of total assets), the number of directors on the board, firm profitability (the ratio of net profit divided by the book value of total assets), cash holdings (cash and cash equivalent scaled by book value of total assets), ownership type (whether a firm is owned by the government), firm age (number of years since the listing year), shareholder concentration (concentration index of shares owned by the three main shareholders), and industry competition (the Herfindahl-Hirschman Index). Panel A of Table 1 provides the definitions of the variables.

4.3. Summary statistics

To mitigate the effect of outliers, we winsorize the continuous variables at the 1st and 99th percentiles. Panel A of Table 1 provides the summary statistics of the variables. On average, 52.3% of the observations have issued VMEFs. Firms issue four VMEFs at most. Only 1.4% of the observations have adopted BFII. As for the other variables, the average natural log of total assets is 21.884, average firm leverage is 0.451, average ROA is 3.4%, average natural log of number of board members is 2.280, average cash and cash equivalents

Table 1
Definition of variables and summary statistics. This table provides the definitions of variables and summary statistics for a sample of Chinese A-share listed firms between 2008 and 2018. Panel A provides the variable definitions. Panel B reports the summary statistics for the variables in Panel A.

Panel A: Variable definition

Variables	Definitions
Dependent variables	
Dummy_Forecast	A dummy variable that equals one (1) if a listed firm releases at least one earnings forecast voluntarily in year $t + 1$ and zero (0) otherwise
Forecast_Frequency	The number of VMEFs that a listed firm releases in year $t + 1$
Independent variables	
BFII	A dummy variable that equals one (1) if a firm adopts BFII in year t and the following years and zero (0) otherwise
Control variables	
Firmsize	Firm size, calculated by the natural logarithm of the book value of total assets in year t
Leverage	Financial leverage, calculated by the book value of total debts divided by the book value of total assets in year t
Boardsize	Board size, which is the logarithm value of the number of directors in a firm's board in year t
ROA	Return on assets, calculated as the ratio of net profit divided by the book value of total assets in year t
Cash	Cash and cash equivalents scaled by the book value of total assets in year t
SOE	A dummy variable that equals one (1) if the ultimate controlling shareholder of a listed firm is the state in year t and zero (0) otherwise
Listage	Listing age of a firm, calculated as the difference of fiscal year t minus the year the firm was listed
Top3	The concentration index of shares owned by the largest three shareholders in year t
Competition	The Herfindahl-Hirschman Index of the industry

Panel B: Summary statistics

Variable	mean	sd	min	median	max
Dummy_Forecast	0.523	0.499	0.000	1.000	1.000
Forecast_Frequency	0.624	0.664	0.000	4.000	4.000
BFII	0.014	0.116	0.000	0.000	1.000
Size	21.884	1.382	18.938	21.707	27.293
Lev	0.451	0.212	0.032	0.367	0.990
ROA	0.034	0.067	−0.640	0.046	0.429
Boardsize	2.280	0.194	0.000	2.302	3.135
Cash	0.184	0.141	0.000	0.163	0.844
Listage	8.803	6.476	0.000	1.946	28.000
SOE	0.454	0.498	0.000	0.000	1.000
TOP3	0.171	0.125	0.010	0.131	0.618
Competition	0.951	0.077	0.000	0.983	0.991

is 18.4%, average firm age is 8.803, 45.4% of the observations are stated-owned enterprises, the average concentration index of the largest three shareholders is 17.1%, and the average competition intensity is about 0.951.

Table 2 reports the distribution of firms that adopt BFII. The number of firms adopting BFII has increased year-on-year since 2013. The Ministry of Finance issued a guidance document in 2014 for the construction of comprehensive management accounting systems, which notes that integrating financial and business activities to provide information for decision-making, control, and evaluation of firms is a significant component of accounting. In 2016, the Ministry of Finance issued the Guidance of Managerial Accounting document, which proposes that firms should integrate financial and business information, thus providing management with timely and relevant strategic information. Between 2013 and 2018, the number of firms increases incrementally year by year and by 2018, 251 firms had adopted BFII, accounting for 6.99% of all A-share listed firms.

5. Baseline empirical results

We estimate the influence of BFII on the propensity and frequency of VMEF using Models (1) and (2).

$$Dummy\_Forecast_{i,t+1} = \alpha + \beta * BFII_{i,t} + \gamma * Z_{i,t} + \varepsilon_{i,t} \text{ and} \quad (1)$$

$$Forecast\_Frequency_{i,t+1} = \alpha + \beta * BFII_{i,t} + \gamma * Z_{i,t} + \varepsilon_{i,t}, \quad (2)$$

where i represents the firm and t represents year. In Model (1), the dependent variable captures the probability of issuing a VMEF. A dummy variable equals one (1) if firm i issues at least one VMEF in year $t + 1$ and zero (0) otherwise. In Model (2), the dependent variable is used to assess the frequency of VMEF. The independent variable BFII is a dummy variable indicating whether firm i adopts BFII in year t. Z is the vector of all control variables. The process of adopting BFII takes about one year, so we measure VMEF in year $t + 1$. We control for year and industry fixed effects. Standard errors are clustered at the firm level.

Table 3 reports the results of the effect of BFII on VMEF. The dependent variable in column (1) is the probability of issuing a VMEF. The coefficient of *BFII* is 0.052 (P-value < 0.05), which indicates that managers in firms that adopt BFII have a higher probability of issuing VMEF than those that do not adopt BFII. In column (1), the coefficient of *BFII* is 0.286 (P-value < 0.001), which indicates that when firms adopt BFII, managers issue VMEFs more frequently. These results are consistent with litigation theory and ability signaling theory. The increased communication and trust after adopting BFII leads to the integration of financial and business information. Executives become more confident about their ability and signal this confidence by issuing earnings forecasts voluntarily.

6. Endogeneity

To reduce the likelihood of endogeneity, we apply propensity score matching (PSM) and difference-in-differences (DID) methods. We first use 1:1 propensity score matching with non-replacement to identify the control sample. We use the one-year lagged value of all of the control variables in Model (1) to match a treated sample with a control sample. We obtain 154 treatment firms and 154 control firms. Panel A in Table 4 provides covariate balance checks for both samples. None of the differences between the matching variables are significant.

We then design a DID model to compare the probability and frequency of voluntary earnings forecasts between treated and control firms over a three-year observation window. In Models (3) and (4), *Post* is a dummy variable that equals one (1) if the observation is in or after the years when the firms adopts BFII and zero (0) otherwise. The variable of interest is the interaction item of *BFII* and *Post*.

$$Dummy\_Forecast_{i,t+1} = \alpha + \beta * BFII_{i,t} + \delta * BFII_{i,t} * Post + \theta * Post + \gamma * Z_{i,t} + \varepsilon_{i,t} \quad (3)$$

$$Forecast\_Frequency_{i,t+1} = \alpha + \beta * BFII_{i,t} + \delta * BFII_{i,t} * Post + \theta * Post + \gamma * Z_{i,t} + \varepsilon_{i,t} \quad (4)$$

Panel B in Table 4 provides the DID regression results of Models (3) and (4). In columns (1) and (2), we control for year and industry fixed effects. In columns (3) and (4), we control for year and firm fixed effects to mitigate the influence of time-invariant omitted firm characteristics. In column (1), the coefficient of *BFII* *

Table 2
Distribution of firms adopting BFII.

Year	Incremental number of firms that adopt BFII (A)	Cumulative number of firms that adopt BFII (B)	Number of A-share-listed firms (C)	Column (B)/ Column (C)
2008	1	3	1,603	0.19%
2009	3	6	1,752	0.34%
2010	3	9	2,107	0.43%
2011	9	18	2,341	0.77%
2012	1	19	2,470	0.77%
2013	6	25	2,515	0.99%
2014	13	38	2,633	1.44%
2015	22	60	2,824	2.12%
2016	40	100	3,119	3.21%
2017	53	153	3,496	4.38%
2018	98	251	3,590	6.99%

Post is 0.055 (P-value < 0.05). This indicates that for firms that adopt BFII, managers have a higher probability of issuing VMEF than firms that do not adopt BFII. In column (2), the coefficient of *BFII* Post* is 0.072 (P-value < 0.05). This indicates that managers of firms that adopt BFII issue VMEF more frequently than those that do not adopt BFII. In columns (3) and (4), the interactive item is significantly positive, showing that the results also hold after controlling for time-invariant omitted firm characteristics. After using PSM and DID to control for potential endogeneity problems, our hypothesis that BFII firms have a higher probability and frequency to issue a VMEF is supported.

7. Further analyses

7.1. Impact of BFII on the properties of VMEFs

Our empirical results indicate that firms that have adopted BFII are more likely than firms that have not adopted BFII to issue VMEF and to issue them more frequently. In this subsection, we further examine the influence of BFII on the properties of VMEFs, including forecast accuracy and forecast horizon. Firms with BFII are more likely to issue more accurate VMEF than those without, because of the increased confidence and ability of their managers. Accurate forecasts demonstrate a manager's confidence in a firm's prospects and operational stability and risk, and this may lead to higher share prices (Lees, 1981). As BFII can help executives to share information, we argue that firms with BFII produce more accurate VMEFs.

In addition, firms with BFII are able to issue VMEFs earlier than firms without BFII. Information uncertainty, which is mainly due to fluctuations in firm fundamentals or limited information (Zhou et al., 2014), is closely related to firms' business and operating environment (Jiang et al., 2005). Information uncertainty increases as the horizon of forecasted future earnings becomes longer. BFII leads to a more accurate reflection of accounting figures. Executives in the financial and business departments can thus gather more accurate information and make better judgments about future earnings.

To examine the influence of BFII on the accuracy and horizons of VMEFs, we construct two measures. The first is *EPS_Accuracy*, which indicates the accuracy of earnings per share (EPS) forecasts. This is calculated as the absolute value of the difference between the predicted and real EPS divided by the real value and then multiplied by (-1). The larger the value of *EPS_Accuracy*, the more accurate a VMEF. The second measure is *Forecast_Gap*, a variable indicating the forecast gap between the date that managers issue a VMEF and the predicted date. The earlier the earnings forecast is released, the greater the value of *Forecast_Gap.* We estimate the influence of BFII on the accuracy and horizons of VMEFs using Models (5) and (6).

$$EPS\_Accuracy_{i,t+1} = \alpha + \beta * BFII_{i,t} + \delta * BFII_{i,t} * Post + \theta * Post + \gamma * Z_{i,t} + \varepsilon_{i,t} \quad (5)$$

$$Forecast\_Gap_{i,t+1} = \alpha + \beta * BFII_{i,t} + \delta * BFII_{i,t} * Post + \theta * Post + \gamma * Z_{i,t} + \varepsilon_{i,t} \quad (6)$$

Table 3
Baseline Regression of BFII's Impact on VMEF. Column (1) reports the influence of BFII on firms' probability of issuing a VMEF. The dependent variable is *Dummy_Forecast*. Column (2) reports the influence of BFII on firms' VMEF frequency. The dependent variable is *Forecast_Frequency*. *BFII* equals one (1) if a firm adopts BFII in year *t* and the following years and zero (0) otherwise. Firm-level characteristics include the logarithm of total assets (*Size*), firm leverage (*LEV*), firm profitability (*ROA*), board size (*Boardsize*), firm cash holdings (*Cash*), firm age (*Listage*), firm property right (*SOE*), and ownership concentration (*TOP3*). At the industry level, we control for industry competition (*Competition*). ***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively.

Dependent variable	(1) *Dummy_Forecast*	(2) *Forecast_Frequency*
BFII	0.052**	0.286***
	(2.25)	(2.76)
Size	0.001	−0.035**
	(0.24)	(−2.20)
Lev	−0.136***	−0.580***
	(−6.73)	(−6.45)
ROA	0.028	−1.414***
	(0.46)	(−5.19)
Boardsize	0.023	−0.031
	(1.06)	(−0.32)
Cash	0.047**	−0.153
	(2.04)	(−1.50)
Listage	−0.077***	−0.437***
	(−18.34)	(–23.45)
SOE	−0.116***	−0.614***
	(−14.52)	(−17.31)
TOP3	−0.045	−0.358***
	(−1.61)	(−2.85)
Competition	−0.158	−0.504
	(−1.55)	(−1.11)
Constant	0.983***	5.220***
	(8.21)	(9.78)
Year and industry fixed effects	Yes	Yes
Observations	14,443	14,443
Pseudo R^2/Adj. R^2	0.458	0.420

Table 5 reports the regression results. In column (1), the coefficient of *BFII* is 0.030 (P-value < 0.05), indicating that firms that adopt BFII issue more accurate VMEFs than firms that do not adopt BFII. In column (2), the coefficient of *BFII* is 12.638 (P-value < 0.05), indicating that managers in firms that adopt BFII issue VMEFs earlier than managers in firms that do not adopt BFII.

7.2. Measuring BFII based on media coverage

We next use an alternative measure of BFII to avoid measurement errors. First, we collect news items that contains keywords such as "business and financial information integration" from both online news sources and newspapers in the 2008 to 2018 period. We then link these news items to specific A-share public firms using stock codes and firm names. We can thus identify whether and when firms adopt BFII. The details of our newspaper searches are presented in Appendix 2. *BFII_Media* is a variable that equals one (1) if the firm adopts BFII in year *t* and the following years based on public media information. The results are reported in Table 6. Columns (1)-(4) present the results of the influence of BFII on the probability, frequency, accuracy, and forecast horizon of a firm's VMEF. The coefficients of *BFII_Media* are similar to the results when *BFII* is constructed based on MD&A. In particular, if a firm adopts BFII, the probability and frequency of issuing VMEFs is found to increase. A firm with BFII can also predict earnings more accurately and earlier than firms without BFII.

Table 4
PSM and DID results. This table provides the covariate balance checks and DID regression results. Panel A reports the covariate balance checks of the 1:1 propensity score matching. The matching variables include the logarithm of total assets (*Size*), firm leverage (*LEV*), firm profitability (*ROA*), board size (*Boardsize*), firm cash holdings (*Cash*), firm age (*Listage*), firm property right (*SOE*), ownership concentration (*TOP3*), and industry competition (*Competition*). Panel B reports the DID regression results of Models (3) and (4). The dependent variables are *Dummy_Forecast* and *Forecast_Frequency*. *BFII* equals one if a firm adopts BFII in year *t* and the following years and zero (0) otherwise. ***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Covariate balance checks of BFII firms and control firms

Variable	Means *t*-test			
	BFII firms	Control firms	t-values	$p>\|t\|$
Size	23.112	23.024	0.660	0.510
Lev	0.495	0.488	0.420	0.676
ROA	0.050	0.046	1.180	0.240
Boardsize	2.289	2.292	−0.190	0.848
Cash	0.189	0.173	1.410	0.158
Listage	11.914	12.305	−0.760	0.449
SOE	0.441	0.441	0.000	1.000
TOP3	0.186	0.175	0.980	0.326
Competition	0.956	0.956	0.930	0.126

Panel B: DID regression

Dependent variable	(1)	(2)	(3)	(4)
	Dummy_Forecast	*Forecast_Frequency*	*Dummy_Forecast*	*Forecast_Frequency*
BFII	0.016	0.130	−0.042	0.074
	(0.20)	(1.27)	(−0.67)	(0.88)
*BFII*Post*	0.055**	0.072**	0.033*	0.052**
	(1.97)	(2.16)	(1.73)	(2.01)
Post	0.001	−0.011		
	(0.04)	(−0.44)		
Size	−0.040	−0.035	0.006	−0.045
	(−0.73)	(−0.82)	(0.12)	(−0.72)
Lev	−0.012	−0.153	−0.066	0.073
	(−0.04)	(−0.52)	(−0.24)	(0.19)
ROA	−3.634***	−3.791***	−0.927	−1.612**
	(−3.64)	(−5.03)	(−1.61)	(−2.06)
Boardsize	−0.092	−0.305	−0.143	−0.362
	(−0.34)	(−1.00)	(−0.62)	(−1.17)
Cash	−0.305	−0.433	−0.013	0.006
	(−0.83)	(−1.55)	(−0.05)	(0.02)
Listage	−0.032***	−0.032***	0.011	−0.019
	(−3.22)	(−4.05)	(0.56)	(−0.70)
SOE	−0.573	−0.869	0.130	0.436
	(−0.61)	(−1.11)	(0.23)	(0.56)
TOP1	0.362	−0.078	−0.176	0.617
	(1.03)	(−0.26)	(−0.43)	(1.12)
Competition	−1.815**	−0.371	−1.075	1.184
	(−2.16)	(−0.30)	(−1.32)	(1.08)
Constant	3.316***	3.564***	3.316***	3.564***
	(2.58)	(2.68)	(2.58)	(2.68)
Year fixed effects	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes		
Firm fixed effects			Yes	Yes
Observations	489	477	489	477
Pseudo R^2/Adj. R^2	0.288	0.312	0.056	0.065

7.3. Mediating role of social media tone

We use newspapers and website news to analyze the attitudes of social media users toward firms' adoption of BFII. In the sub-sample of BFII firms, we conduct a textual analysis of social media posts. We establish a dictionary containing 227 words related to uncertainty, such as "it depends on," "not defined," "somewhere," and "seem." We then count how many of these "uncertainty" words are contained in each news item. Next, we divide the number of "uncertainty" words by the total number of words in that news item (*Uncertainty*). The greater the value of *Uncertainty*, the more uncertain social media is about the prospect of BFII adoption.

We construct the interactive item *BFII*Uncertainty* to test the mediating role of social media tone. Social media can be viewed as an external corporate governance channel that monitors firm behavior (Joe et al., 2009). Doubts expressed on social media about a BFII process is a signal that the process faces obstacles. In firms where the adoption of BFII is accompanied by uncertainty, the frequency of VMEFs is likely to be lower. Table 7 reports the mediating role of social media tone. The *Uncertainty* item is omitted because of collinearity. The coefficients of BFII are negative in columns (1) and (2), but the coefficient of the interactive item is significantly positive. These results show that the higher the uncertainty about the BFII adoption process, the less frequently the firm issues a VMEF.

Table 5
Influence of BFII on the accuracy and horizons of VMEFs. This table reports the regression results of Models (5) and (6). The dependent variables are *EPS_Accuracy* and *Forecast_Gap*. *BFII* equals one (1) if a firm adopts BFII in year *t* and the following years and zero (0) otherwise. Control variables include the logarithm of total assets (*Size*), firm leverage (*LEV*), firm profitability (*ROA*), board size (*Boardsize*), firm cash holdings (*Cash*), firm age (*Listage*), firm property right (*SOE*), ownership concentration (*TOP3*), and industry competition (*Competition*). Panel B reports the DID regression results of Models (3) and (4). ***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively.

Dependent variables	(1) *EPS_Accuracy*	(2) *Forecast_Gap*
BFII	0.030**	12.638**
	(2.40)	(2.19)
Size	0.003***	−4.836***
	(3.72)	(−7.93)
Lev	0.003	11.682***
	(0.44)	(3.09)
ROA	0.135***	−144.517***
	(6.12)	(−12.26)
Boardsize	−0.003	−13.383***
	(−0.88)	(−3.81)
Cash	0.010	6.103
	(1.31)	(1.36)
Listage	0.006**	−15.843***
	(2.36)	(−10.52)
SOE	−0.000	0.009
	(−1.01)	(0.08)
TOP1	0.019***	−35.918***
	(3.15)	(−6.70)
Competition	−0.032	113.554***
	(−1.18)	(4.86)
Constant	−0.031	52.006**
	(−1.12)	(2.14)
Year fixed effects	Yes	Yes
Industry fixed effects	Yes	Yes
Observations	1,014	15,646
Adjusted R^2	0.091	0.324

8. Conclusion

In this study, we examine the impact of business and financial information integration on firms' VMEFs. The empirical results for the baseline model show that firms that adopt BFII have a higher probability and frequency of issuing VMEFs. To identify the causal relationship, we introduce the DID approach and find that the probability and frequency of issuing VMEFs significantly increases for firms that switch from non-BFII to BFII. In addition, we examine the quality of the VMEF. Using the VMEF sub-sample, we find that firms with BFII issue more accurate VMEFs than firms without BFII. They can also predict earnings in a timelier manner. Our findings are consistent with litigation cost theory and ability signaling theory.

Our study contributes to the literature on BFII and information disclosure, and more generally to the literature on corporate governance. The motivation to disclose earnings forecast information for Chinese listed companies is relatively low, but our study identifies a new motivation that can more effectively encourage VMEFs. Forecast disclosure reduces the information asymmetry between managers and investors (Dai et al., 2005), and consequently improves a firm's informational environment (Dorantes et al., 2013). VMEFs have an important role in earnings forecasts in China, so our findings make an important contribution to the literature.

Our study has various implications. First, listed companies should realize the importance of information integration, and their adoption of BFII should not be a mere formality. Second, investors should consider the tone used in reports about firms' BFII in the public media, as well as BFII announcements in the MD&A sections of annual reports. Third, policymakers should combine the guidance on corporate informa-

Table 6

Influence of BFII on the Probability, Frequency, Accuracy, and Forecast Horizon of VMEFs: BFII Measured Using News Information. This table reports the regression results the influence of BFII on the probability, frequency, accuracy, and forecast horizon of VMEF when BFII is measured using news information. The dependent variables are *Dummy_Forecast*, *Forecast_Frequency*, *EPS_Accuracy,* and *Forecast_Gap*. *BFII* equals one (1) if a firm adopts BFII in year *t* and the following years and zero (0) otherwise. *BFII* is measured by news information. Control variables include the logarithm of total assets (*Size*), firm leverage (*LEV*), firm profitability (*ROA*), board size (*Boardsize*), firm cash holdings (*Cash*), firm age (*Listage*), firm property right (*SOE*), ownership concentration (*TOP3*), and industry competition (*Competition*). ***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively.

Dependent variables	(1) *Dummy_Forecast*	(2) *Forecast_Frequency*	(3) *EPS_Accuracy*	(4) *Forecast_Gap*
BFII_Media	0.051***	0.278***	0.034**	4.396*
	(5.34)	(6.55)	(2.08)	(1.65)
Size	0.001	−0.031**	0.011*	−8.537***
	(0.33)	(−2.07)	(1.88)	(−9.71)
Lev	−0.110***	−0.435***	−0.099***	5.257
	(−5.51)	(−4.95)	(−2.80)	(1.09)
ROA	0.083	−1.100***	1.001***	−54.979***
	(1.38)	(−4.14)	(6.88)	(−3.00)
Boardsize	0.003	−0.110	−0.069**	−14.657***
	(0.19)	(−1.45)	(−2.36)	(−3.68)
Cash	0.071***	−0.018	−0.039	33.348***
	(3.20)	(−0.18)	(−0.84)	(7.00)
Listage	−0.016***	−0.091***	−0.003**	0.261
	(−27.93)	(−36.12)	(−2.47)	(1.64)
SOE	−0.080***	−0.413***	0.013	−8.871***
	(−10.05)	(−11.73)	(1.01)	(−4.61)
TOP3	−0.076***	−0.520***	0.085*	−30.295***
	(−2.84)	(−4.41)	(1.75)	(−5.00)
Competition	−0.164*	−0.582	−0.030	6.354
	(−1.75)	(−1.41)	(−0.16)	(0.31)
Constant	0.989***	5.099***	−0.180	176.276***
	(9.29)	(10.86)	(−0.89)	(6.92)
Year and industryfixed effects	Yes	Yes	Yes	Yes
Observations	14,445	14,445	1,160	11,748
Pseudo R^2 / Adj. R^2	0.474	0.448	0.106	0.329

tion disclosure and BFII adoption. Finally, analysts should monitor BFII adoption by company executives, as it can inform their evaluations of the information quality of VMEFs.

Our study has three main limitations that can be addressed in future research. First, the self-selection problem may lead to endogeneity issues, i.e., the decision to adopt BFII may not be purely exogenous. Thus, the relationship we find between BFII adoption and VMEF may be explained by self-selection. We address this concern by applying a PSM and DiD approach. Second, a cumulative number of 251 firms adopted BFII between 2008 and 2018, which is only a small proportion of Chinese listed firms, and this may affect the stability of our causal inference. Fortunately, the number of BFII firms is increasing rapidly, so future examinations of business and financial information integrations can validate our results with a larger sample. Third, although we have carefully conducted our textual analysis and manually checked the effectiveness to ensure that the error rate is within the statistically allowable range, textual analysis is always to some degree inexact, particularly when analyzing a large volume of news articles.

Table 7

Mediating role of social media tone in the relationship between BFII and the frequency of VMEFs: BFII measured using MD&A information. This table reports regression results of how BFII influences the probability, frequency, accuracy, and forecast horizon of a VMEF when BFII is measured using news items. The dependent variable is *Forecast_Frequency*. *BFII* equals one (1) if a firm adopts BFII in year *t* and the following years and zero (0) otherwise. *BFII* is measured by MD&A information. The control variables include the logarithm of total assets (*Size*), firm leverage (*LEV*), firm profitability (*ROA*), board size (*Boardsize*), firm cash holdings (*Cash*), firm age (*Listage*), firm property right (*SOE*), ownership concentration (*TOP3*), and industry competition (*Competition*). ***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively.

Dependent variables	(1) *Dummy_Forecast*	(2) *Forecast_Frequency*
BFII	−0.047	−0.145
	(−1.45)	(−0.98)
BFII Uncertainty*	0.086**	0.496**
	(2.24)	(2.17)
Size	−0.007	−0.131*
	(−0.44)	(−1.85)
Lev	−0.069	−0.087
	(−0.68)	(−0.19)
ROA	0.181	0.566
	(1.40)	(0.85)
Boardsize	−0.055	−0.149
	(−0.55)	(−0.34)
Cash	0.151	0.285
	(1.19)	(0.52)
Listage	−0.116***	−0.676***
	(−3.89)	(−5.10)
SOE	−0.022	−0.235
	(−0.57)	(−1.42)
TOP3	−0.520*	−1.775
	(−1.93)	(−1.56)
Competition	0.110	0.031
	(0.85)	(0.06)
Constant	0.913	6.911***
	(1.46)	(2.68)
Year and industry fixed effects	Yes	Yes
Observations	536	536
Pseudo R^2/Adj. R^2	0.638	0.568

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Appendix 1. Identifying firms adopting BFII based on MD&A information

We follow six steps to obtain the MD&A portion of financial reports. First, we download quarterly, semi-annual, and annual financial reports of A-share listed companies from the Shenzhen and Shanghai Stock Exchange websites. We then import these files into our database system for transcoding and textual analysis. Second, we identify the stock code on the first pages of the financial reports to relate these files to specific listed companies and fiscal years. Third, we identify and then separate all of the pictures and tables, as the financial figures presented in tables become text during the transcoding process. We transform the content of the pictures into text. Tables generally begin with the following words: unit (RMB), unit (shares), serial number, company name, and the table then follows. A table generally ends with "total," "illustration," "reason for change," and words for cross references such as "See note 17 for details" or the title of the next chapter. We separate all of the tables by applying limiting words for the beginning and the ending. Fourth, we remove the formatted content, including the headers, "contents," "documents for reference," "e-mail," and others. Through the above four steps, we obtain a clean database for extracting the MD&A section. Next, we identify the beginning of the MD&A section. We randomly choose 10% of all financial reports and then manually read these files to characterize the beginnings of the MD&A sections. These sections generally start with words like "management discussion and analysis," "operating discussion and analysis," "report of the board," and "executive speech." We also exclude phrases such as "see management discussion and analysis." The end of the MD&A section is identified as the title of the next chapter. Last, we randomly choose a sample and check the accuracy of the results of our textual analysis. When the accuracy rate for identifying MD&A sections reaches 98%, it can sufficiently support further analysis.

We use the MD&A sections to determine whether firms adopt BFII in a specific year. BFII is defined as the integration of business and financial information. We identify two sets of words related to this process. The first is a set of verbs, including "starting," "adopting," "applying," "beginning," and other verbs that suggest starting. The second is a set of words related to BFII, including "business and financial information integration," "business and financial integration," "financial sharing," "integration of business and financial information," and other Chinese words for BFII. Using textual analysis, we identify whether an MD&A section contains a combination of the two sets of words. For example, if "we have applied business and financial information integration successfully" appears in an MD&A, then we classify the firm as a BFII firm in that year and the following years.

Appendix 2. Identifying firms adopting BFII based on online news and newspapers

MD&A is information released by a firm. As a robustness test, we use external information to identify BFII firms and thus reduce bias in information disclosure. We download all news items containing keywords about business and financial information integration from the HuiKe Database. This database collects articles published by almost 13,000 media sources, including over 1,200 newspapers, 10,000 websites, and 1,500 social media platforms, such as TouTiao, Sino, Sohu, JuChao, and Tencent. The database is updated with newspaper articles every morning between 8 and 10 am, and website news and social media news are updated every second. Items have been collected regularly since 2000, with some items from as far back as 1998. The database holds more than 30,000,000 pieces of news and 500,000 articles. We use keywords to search the database for relevant news items. We search for a set of words related to BFII in Chinese, including "business and financial information integration," "business and financial integration," "financial sharing," "integration of

business and financial information," and others. We download this news for each year and finally obtain more than 100,000 items of news in .txt format. We import them into our system and begin our textual analysis, following four steps.

First, we relate each piece of news to specific listed companies by identifying those in which their stock code and company name appear together. We also determine the observation year by the date that the news was reported.

Second, we identify whether the firm adopts BFII in a certain year in a manner similar to that used in Appendix 1. We have two sets of words. The first set is verbs, including "starting," "adopting," "applying," "beginning," and others words with the meaning of starting. The second set is words related to BFII, such as "business and financial information integration," "business and financial integration," "financial sharing," "integration of business and financial information," and other Chinese words for BFII. Using textual analysis, we identify whether the news contains a combination of the two sets of words. For example, if "we have applied business and financial information integration successfully" appears in a news piece, then the firm is classified as a BFII firm in that year and in the following years.

Third, we use the sub-sample of all BFII firms to conduct further analyses, beginning with a textual analysis process. We establish a dictionary containing 227 words expressing the meaning of uncertainty, such as "it depends on," "not defined," "somewhere," and "seem."

Last, we count how many uncertainty related words are contained in each piece of news. Then, we divide the number of "uncertainty" words by the number of all of the words in that piece of news. The larger the ratio, the more uncertain social media is about the prospect of a firms' BFII adoption.

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Job satisfaction and firm leverage: Evidence from the "China's Best Employer Award 100" winners

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ABSTRACT

In this study, we examine the relationship between job satisfaction and firm leverage using a sample of Chinese listed firms. We find that in a sample of "China's 100 Best Employers Award" winners during 2011–2017, job satisfaction is negatively associated with firm leverage. The effect is more pronounced in firms with higher distress risk and operating in human capital intensive industries. We confirm the validity of the main findings using a matched sample and a series of robustness checks. Overall, our results indicate that firms can credibly demonstrate their commitment to stakeholders and re-shape their capital structure by improving job satisfaction.
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1. Introduction

The influence of a firm's nonfinancial stakeholders (e.g., customers, suppliers, and workers) on its capital structure decisions attracts much attention from academics and practitioners. However, there is a dearth of empirical evidence on the effect of job satisfaction on firm leverage in emerging markets, where legal and financial systems are generally underdeveloped and firms obtain external financing based on their reputations and relationships (Allen et al., 2005). Specifically, there are few studies of the reputational consequences of firms'

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attitudes toward nonfinancial stakeholders in emerging markets. In this study, we investigate how employees' job satisfaction affects the financing decisions of Chinese A-share listed firms.

The relationship between job satisfaction and leverage ratio in an emerging market like China is *ex ante* ambiguous. On the one hand, in China, employees are important stakeholders in firms, and both law and social norms support stakeholder governance.[1] As firms tend to be stakeholder-oriented, they may protect their employees and suppliers by lowering their debt level and thus avoiding bankruptcy (Bae et al., 2011; Allen et al., 2014). Therefore, maintaining a lower leverage ratio could represent a commitment to stakeholders. Employees' job satisfaction may also provide positive soft information about a firm's true intrinsic value, leading such firms to price their equity at a higher rate. Consequently, firms with higher job satisfaction may have more access to equity finance and less need of debt finance, which also leads to lower firm leverage (Chemmanur et al., 2019).

On the other hand, as both employees and creditors are important non-shareholder stakeholders, adopting employee-friendly practices and fulfilling employees' needs can benefit a firm by improving its reputation for the fair treatment of value-relevant stakeholders and impressing potential and current creditors, which can facilitate subsequent debt financing by creating more efficient contracting (Francis et al., 2019).[2] Consequently, firms with higher job satisfaction can sustain a higher leverage ratio.

A major obstacle to empirically testing which of the above channels dominates in China is the lack of measures of employee satisfaction. To address this issue, in this study, we construct a measure of job satisfaction using the "China's 100 Best Employers Award" (BE) list for the 2011–2017 period. This list identifies the best 100 employers in mainland China each year. It was first published on December 21, 2011 by ZhiLianZhaoPin (Zhaopin.com), one of the largest job search websites in China. This list is highly visible in China. First, it is widely disseminated by the *Harvard Business Review* (Chinese version), and it covers large companies. Second, it is supported by influential organizations (e.g., UN Women), raising the award's profile. Third, hundreds of media outlets are invited to the award presentation each year, so the firms' names are widely disseminated by newspapers, online websites, and television channels. Fourth, a dedicated website (best.zhaopin.com) reports on the BE list and the electronic reports used in the selection process. Fifth, a grand award ceremony is held every year, which is attended by many political and business celebrities who make keynote speeches and present the prizes. Therefore, it is reasonable to assume that firms on the BE list have sound reputations for treating employees well, and this can be used to represent job satisfaction.

Our complete sample consists of 21,496 firm-year observations from firms listed on the Shanghai and Shenzhen stock exchanges in the 2011–2017 period. We find that firms on the BE list have significantly lower leverage than other firms. This result remains robust when we control for industry-, firm-, and year-fixed effects. In addition, the baseline results are robust when we change the proxies for the main dependent variable and the main independent variable, and when we include additional control variables. Overall, our results show that there is a negative relationship between job satisfaction and firm leverage in Chinese firms, which is consistent with our first assumption.

We then use a series of additional analyses to alleviate endogeneity concerns. A potential limitation of our sample is that the BE list may suffer from selection bias, as not all of the sample firms (i.e., all of the firms listed on the Shanghai and Shenzhen stock exchanges) are included in the selection process and firms need to apply to be considered for the list. To alleviate these concerns, we use the propensity score matching (PSM) method and the Heckman inverse Mills ratio (IMR) method to address selection bias due to observable and unobservable variables, respectively (Tucker, 2010). We rerun the regression, and obtain estimation results that are in line with the baseline results. In addition, the Heckman two-stage model indicates that any selection biases are in the downward direction. That is, if firms with lower employee treatment scores do not apply because they do not expect to make the list, this simply increases the accuracy of the list, and if a firm known for high job

[1] Lin (2010) indicates that the historical tradition of emphasizing workers as a powerful political group with strong representation in the People's Congresses influences Chinese corporate governance: the 1994 Company Law, issued several years before the modern idea of CSR was conceptualized, imposes requirements for employee participation in corporate governance.

[2] Valentine and Fleischman (2008) indicate that fair treatment of employees, who are internal stakeholders, reflects a firm's ethical standards in general. As a consequence, a firm's attitude toward employees may influence external stakeholders' perceptions of the firm's corporate social responsibility (Edmans, 2011, 2014; Glavas and Kelley, 2014; Francis et al., 2019).

satisfaction does not apply because it does not need the reputation boost created by the award selection, the results are weakened (Edmans, 2011).

We further explore cross-sectional differences in the main effect. We find that the decrease in firm leverage is more pronounced for firms with higher default risk and firms in human capital intensive industries, as these firms have stronger incentives to improve job satisfaction and thereby retain their employees. Such patterns are consistent with the predictions of previous studies regarding the effects of a stakeholder-oriented view on financial decisions (Bae et al., 2011; Allen et al., 2014).

Our study contributes to the literature in several ways. We contribute to the literature on job satisfaction and its impact on firm performance (Bae et al., 2011; Verwijmeren and Derwall, 2010). Prior studies argue that human capital is a crucial part of a firm's capital structure, because when firms have a higher leverage ratio, employees invest less in firm-specific human capital. For example, Bae et al. (2011) and Verwijmeren and Derwall (2010) use the Kinder, Lydenberg, and Domini (KLD) index as a proxy for employee treatment and find a negative effect of job satisfaction on firm leverage. Chemmanur et al. (2019) use employees' ratings of firms as a proxy for firms' reputation among employees and find that firms with a better reputation among employees tend to choose equity financing rather than debt financing, leading to a lower leverage ratio. Using China's BE list, we provide evidence that job satisfaction can influence firm leverage in a representative emerging market. Moreover, our study relates to studies that use the US "Best Companies to Work For" (BC) list published by the "Fortune Magazine" as a proxy for job satisfaction (e.g., Edmans, 2011, 2012). Our overall findings complement these studies, while using a more comprehensive and objective measure of job satisfaction.[3]

The rest of this paper is organized as follows. In Section 2, we introduce the Chinese Best Employers Award. In Section 3, we describe the data and summary statistics. In Section 4, we present our empirical strategy. In Section 5, we report the results. Section 6 documents the cross-sectional tests. Section 7 summarizes and concludes the paper.

2. The Best employer list

Our main data source is China's BE list, which is published by ZhiLianZhaoPin (Zhaopin.com), one of the largest job search websites in China. An academic institution, the Center for Social Research, Peking University, is the authorized co-sponsor of the BE list, and ensures the neutrality of the evaluation process. The BE list was first published on December 21, 2011. It is updated every year between September 13 and October 13. Each year, the evaluation committee publishes the BE list on the dedicated website, best.zhaopin.com, and the results are reported in newspapers and on television. In addition, a grand award ceremony is organized and broadcast live on television and online. Therefore, the BE list receives significant attention from enterprises, shareholders, employees, and other stakeholders around China. Due to the increasing influence of the BE list, the number of firms that apply to be considered on the list has increased from 1186 in 2011 to 17,554 in 2017.

During the evaluation process, the Center for Social Research is in charge of formulating the application regulations, the selection rules, and the evaluation index system. In addition, the Center convenes the evaluation experts, monitors the evaluation process, analyzes the survey data, and writes the final report. ZhiLianZhaoPin has no direct involvement in the evaluation process, as that could create incentives to bias the list (Edmans, 2011; Reuter and Zitzewitz, 2006). The Center for Social Research and the ZhiLianZhaoPin also form a specialized evaluation committee that includes human resource specialists from industry and academia to give feedback on the survey design and evaluation criterion. Lastly, the relevant information, including the event dates, application process, evaluation process, survey reports, and BC list, is all published on the dedicated website, best.zhaopin.com. In general, the evaluation process of the BE list is objective and well monitored by the public.

Based on former studies (Ambler and Barrow, 1996) and the advice of human resource specialists, the evaluation committee constructs an evaluation system that combines Western experiences and Chinese characteristics. Specifically, the evaluation has four general parts and six specific dimensions. The four general parts are

[3] We describe the construction of this database in detail in Section 2.

Table 1
Evaluation system.

Dimensions	Sub-dimensions	Descriptive statements
Organization	Work environment	(1) The workplace has harmonious internal interpersonal relationships. (2) The work atmosphere is positive and healthy. (3) The working conditions are comfortable.
	Organization management	(1) The employment principles are fair and just. (2) The performance management system is effective. (3) The communication and coordinate mechanism works effectively and smoothly.
Culture	Corporate image	(1) The enterprise is willing to take corporate social responsibility. (2) The products and services undergo continuous innovation. (3) The firm has good prospects.
	Corporate culture	(1) The corporate culture is appealing. (2) The firm makes a strong commitment to its employees. (3) The employees feel strong trust and respect for the enterprise.
Training	Training and development	(1) The firm offers great opportunities for employees to develop personal core competencies. (2) The firm has a systematic training system. (3) There are many promotion opportunities.
Incentives	Remuneration and welfare	(1) The firm has a good income perspective. (2) The compensation system accurately reflects employees' contributions. (3) The firm has comprehensive benefits.

Source: China Best Employers Award 2017.

the organization system, corporate system, training system, and incentive system. The six specific dimensions are the work environment, organization management, corporate image, corporate culture, training and development, and remuneration and welfare. In Table 1, we provide details of the evaluation system.

A firm's rank on the BE list comes from four sources: 30% of the score comes from the responses of former, current, and potential employees to an online survey[4]; 30% comes from the online nominations of the human resources jury, which is formed by thousands of anonymous human resource managers from enterprises and job agencies[5]; 30% comes from the evaluations of the expert jury, which is formed by experts from academia, government agencies (e.g., UN Women), guilds, and the media; and 10% comes from the qualification examination, which examines whether the declaring enterprise has had any major labor safety accidents or labor safety disputes in the application year.

The BE list used in this study is equivalent to the BC lists compiled by the Great Place to Work® Institute in San Francisco and published in *Fortune* magazine since 1998 (Edmans, 2011, 2012; Faleye and Trahan, 2011). Although the institute compiles lists for more than 45 countries in Asia, America, Europe, and Latin America, it does not publish a list for mainland China.[6] The evaluation process of the Chinese BE list is slightly different from that of the BC list. However, the evaluation dimensions and survey questions are developed through an extensive process that involves a review of the academic literature and interviews with managers, employees, human resource managers, and workplace experts. In addition, discussions are organized with management consultants, survey design experts, and researchers. All of these efforts ensure the accuracy of the survey questions and the objectivity of the evaluation process.

It is worth noting that the BE list has several advantages over other measures of job satisfaction. First, a limitation of prior studies of the effects of job satisfaction is weak measures of job satisfaction. For example, the KLD index can be easily manipulated and is based on observable practices, such as minority representation (Edmans, 2011). Similarly, using expenditure on employee-friendly programs as a measure of employee

[4] As ZhiLianZhaoPin is one of the largest online job search agencies in China, it is easy for the agency to access the contact information of former, current, and potential employees of the declaring firms and to distribute online surveys to them. For example, in 2017, 30,601,890 employees responded online surveys.

[5] The human resources jury normally includes more than 1000 human resource managers, and the number increases each year. For example, in 2017, the human resources jury consisted of 7018 human resource managers.

[6] For more details on the BC list, please see the website http://www.greatplacetowork.net/.

satisfaction does not capture employees' true feelings about their firms' treatment of employees. In contrast, the BE list not only considers firms' observable practices, but also conducts in-depth "grassroots" analysis based on extensive employee surveys. Therefore, the BE list is a more accurate measure of job satisfaction to some extent. Second, we have a panel data set for a 7-year period, in which nearly 50% of the sample firms each year are listed firms for which financial data are available in the China Stock Market Trading Research (CSMAR) database, one of the major Chinese data providers. The temporal length of the dataset helps ensure the results are not driven by a specific period or market conditions (Edmans, 2012). Third, the list is particularly visible in China, and receives significant attention from shareholders, employees, and the media. Therefore, it provides a suitable setting for the study of the effect of a firm's reputation for employee treatment.

3. Sample construction and description statistics

3.1. Sample construction

The sample construction starts with the BE list from the 2011 to 2017 period. We hand-collect the BE list and relevant survey reports from the dedicated website, best.zhaopin.com.[7] We focus our analysis on listed firms due to the limited availability of financial data for non-listed firms in China. In the 2011–2017 sample, 88 separate listed firms are included in the BE list. As our research period is relatively short, our sample contains fewer firms than Edmans's (2011) sample of BC lists, which comprises 244 listed firms from the 1984–2009 period.

We retrieve the listed firms' financial and stock return data from the CSMAR database provided by the Shenzhen Guotaian (GTA) Education Technology Company, a major provider of Chinese data. Next, we match the BE list with the financial and the stock return data. In Table 2, we summarize the data on the firms listed on the BE list. We also present the number of listed firms that are added, dropped, and retained each year. As shown in Table 2, the list of firms is reasonably stable, but not unchanging: 30% to 67% of the listed firms are dropped from the BE list each year.

We clean the data as follows. First, we exclude observations from the financial industry, based on the CSRC's classification standard. Second, we delete observations with obvious errors and missing values for main variables. The final sample is an unbalanced sample of 21,496 firm-year observations. As the evaluation committee does not make available the names of firms that applied but failed to make the list, we first use listed firms that are not on the BE list as matching firms in our sample. In a robustness test, we use PSM to select matching firms that have similar characteristics to each of the best employers. Finally, to limit the effect of outliers, we truncate all of the firms' financial data at the 1% level.

3.2. Key variables

3.2.1. Job satisfaction

We create the indicator variable, *Top100*, to denote job satisfaction. If firm *i* is selected as a best employer in year *t*, *Top100* is equal to one, and otherwise zero. In our research setting, the firms on the BE list are not permanent; instead, between 30% and 67% of the listed firms are dropped from the BE list each year. Therefore, some firms are only on the BE list for a single year, whereas others are on the list for multiple years. Furthermore, the years that a firm is on the BE list are not necessarily continuous.

3.2.2. Firm leverage

Following Bae et al. (2011), we use firms' long-term debt ratio as a proxy for firm leverage. More specifically, we use the book long-term debt ratio (long-term debt divided by the total book value of assets) as the primary measure, because managers focus on book leverage rather than market leverage when making capital structure decisions (Serfling, 2016; Verwijmeren and Derwall, 2010). In the robustness checks, we also use the market long-term debt ratio (the long-term debt divided by the sum of total debt plus market value of equity),

[7] Please see the website (in Chinese): https://best.zhaopin.com/#/.

Table 2
Listed firms on the BE list by year.

Year	No. of listed firms	Added	Dropped	Retained
2011	40	–	–	–
2012	44	25	21	19
2013	41	20	23	21
2014	44	16	13	28
2015	52	20	12	32
2016	57	23	18	34
2017	67	30	20	37

which is more closely tied to theoretical predictions of target leverage levels. Our results are robust to using either measure of firm leverage as a dependent variable.

3.2.3. Other control variables

Consistent with former studies (Myers and Majluf, 1984; Rajan and Zingales, 1995), we include the following set of leverage determinants: firm size (neutral log of total assets), profitability (return on asset), tangible assets (fixed assets scaled by total assets), and growth opportunities (market to book ratio). We also include the average industry leverage and non-debt tax shield as controls. In Table 3, we provide the definitions of all of the main variables in our study.

3.3. Sample descriptions

We present the summary statistics for our sample firms in Table 4. Panel A documents the summary statistics of the firm characteristics for the full sample. The firm characteristics are relatively standard, but have a reasonable degree of variation. For instance, the average firm size is 21.86, the average ROA is 0.04, and the average tangible assets are 0.23. In Panel B, we present the mean differences in firm leverage between the top 100 firms and non-top 100 firms. We find that firms with higher job satisfaction (top 100 firms) have lower book leverage and lower market leverage than the matching firms. This provides preliminary evidence that higher job satisfaction is associated with lower firm leverage. We conduct a regression analysis to further explore this relationship.

Panel C presents the size distribution of the top 100 firms and the corresponding statistics for the matching firms in our sample. In general, the best employers are large, with mean (median) total assets and total sales of 56.8 billion RMB (32.4 billion) and 37.3 billion RMB (26 billion), respectively. For example, the top 100 list includes big firms such as Tsingtao Beer (stock code: 600600), Kweichow Moutai (stock code: 600519), and TCL (stock code: 000100). However, the listed firms in our sample have average total assets and sales of 2.7 billion RMB and 1.4 billion RMB, respectively. Therefore, firm size might be an important determinant

Table 3
Variable definitions.

Variables	Definitions
Book_lev	Book long-term debt ratio, calculated as the long-term debt divided by the total book value of assets.
Market_lev	Market long-term debt ratio, calculated as the long-term debt divided by the sum of total debt plus market value of equity.
Top100	Job satisfaction, a dummy variable that is equal to one if firm *i* has been included in the "Best Employers Award 100" list in year *t*, and zero otherwise.
Size	Firm size: the logarithm of total assets.
Roa	Return on assets: the ratio of net income to total assets.
Tangible	Tangible assets: the ratio of tangible assets to total assets.
M/B	Market-to-book ratio, calculated as the market value of assets over book value in year *t*.
Ndts	Non-debt tax shield, the ratio of depreciation expenses to total assets.
Ind_lev	Average industry leverage ratio: the average leverage ratio in firm *i*'s industry, excluding firm *i*. Leverage ratio is calculated as the ratio of total debt to total assets.

Table 4
Descriptive statistics.

Panel A: Summary of firm characteristics

Variables	p25	Median	Mean	p75	St. Dev
Book_lev	0.011	0.044	0.089	0.133	0.107
Market_lev	0.004	0.023	0.116	0.108	0.235
Size	20.929	21.717	21.862	22.62	1.308
Roa	0.014	0.038	0.040	0.068	0.060
Tangible	0.093	0.192	0.228	0.328	0.172
M/B	1.307	1.714	2.247	2.489	1.700
Ndts	0.009	0.017	0.021	0.029	0.015
Ind_lev	0.377	0.397	0.436	0.497	0.102

Panel B: Mean differences of the dependent variables

	Top 100	**Non-top 100**	**dif**	**St_Err**	**t_value**	**p_value**
Book_lev	0.089	0.120	−0.031	0.007	−4.3	0.000
Market_lev	0.115	0.245	−0.131	0.016	−8.1	0.000

Panel C: Comparisons of firm size

	Top 100		**Non-top 100**	
(¥ million)	**Assets**	**Sales**	**Assets**	**Sales**
Minimum	611.55	110.28	186.60	24.68
First quartile	9,622.14	6,613.71	1,222.07	579.76
Median	32,444.21	25,978.77	2,673.00	1,400.52
Mean	56,780.0.24	37,327.78	8,612.34	5,188.45
Third quartile	96,946.02	60,019.27	6,506.15	3,698.47
Maximum	163,542.00	95,601.25	163,542.00	95,601.25

Panel D: Industry distribution

Industry	**Freq.**	**Percent (%)**
Agriculture	1	1.14
Mining	1	1.14
Manufacturing (food, textile, and fur processing)	10	11.36
Manufacturing (furniture, paper and stationery)	8	9.09
Manufacturing (computers, telecommunication, cars, equipment)	35	39.77
Construction	1	1.14
Wholesale and retail	4	4.55
Transportation	6	6.82
Software and information technology	6	6.82
Real estate	9	10.23
Leasing and business service	2	2.27
Utility	2	2.27
Culture, sport, and entertainment	1	1.14
Comprehensive sector	2	2.27
Total	***88***	***100***

of the relationship between job satisfaction and firm leverage. We need to control firm size to ensure that omitting this variable does not bias our results. We use the PSM method to construct a sample of matching firms with similar firm characteristics, such as firm size, to alleviate the endogeneity concern.

Panel D documents the industry distribution of the top 100 firms. We find that the top 100 employers are from nearly all industries. However, industries that manufacture computers, telecommunication devices, cars, and equipment, make up 39.77% of the firms on the list. Other well represented industries are real estate (10.23%), software and information technology (6.82%), and transportation (6.82%). Generally, our industry distribution suggests that firms that rely on intensive human capital tend to have higher job satisfaction. To control for the cross-industry variation outlined above, we include industry-fixed effects in our main specifi-

cation. After controlling for industry-fixed effects, our estimates of job satisfaction should measure the effect of within-industry variation in job satisfaction on leverage.

4. Empirical results

4.1. Baseline regression

We first conduct an ordinary least squares (OLS) regression to examine the relationship between job satisfaction and firm leverage. Our model is specified as follows:

$$Leverage_{i,t} = \alpha_0 + \beta_1 Top100 + \beta_2 Controls_{i,t} + \delta_t + \eta_j + \varepsilon_{i,t}, \quad (1)$$

where the subscripts i and t denote firm and year, respectively. Leverage is the dependent variable. We use book leverage as the main dependent variable and market leverage in our robustness checks. Our main independent variable of interest is the *Top100* dummy variable. We include a number of firm-level control variables, such as firm size (*Size*), return on assets (*ROA*), tangible assets (*Tang*), market to book ratio (*M/B*), the average industry leverage ratio (*Ind_lev*), and non-debt tax shield (*Ndts*). We also include year-fixed effects (δ_t) to control for time-variant heterogeneity. The relationship between job satisfaction and firm leverage may also be driven by within-industry variation in the BE list. For example, manufacturing firms may be more interested in treating employees well than other firms (Faleye and Trahan, 2011). Thus, we use industry-fixed effects (η_j) to control for across-industry variation. Lastly, we cluster the standard errors at the firm level to correct for within-firm error terms.

In Table 5, we report the baseline regressions that examine the relationship between job satisfaction and leverage. In column (1), we include *Top100* and all of the control variables. The coefficient of *Top100* is −0.019 and significant at the 10% level. In column (2), following Bae et al. (2011), we add the lagged leverage as a control variable and estimate our baseline specifications. We find that the coefficient of *Top100* is still significantly negative. However, this approach biases our results, as lagged leverage is highly correlated with

Table 5
Baseline results (full sample).

	(1)	(2)	(3)
Top100	−0.019*	−0.022**	−0.017*
	(−1.705)	(−2.428)	(−1.885)
Size	0.032***	0.022***	0.029***
	(25.583)	(16.039)	(24.009)
Roa	−0.302***	−0.215***	−0.331***
	(−16.254)	(−12.211)	(−17.784)
Tangible	0.225***	0.165***	0.178***
	(13.356)	(11.452)	(12.071)
M/B	0.006***	0.003***	0.006***
	(4.951)	(3.415)	(4.479)
Ndts	−1.332***	−1.199***	−1.076***
	(−8.551)	(−8.830)	(−7.727)
Ind_lev	0.226***	0.019	0.083***
	(14.898)	(0.660)	(2.888)
Lagged_lev		0.129***	
		(17.827)	
_cons	−0.732***	−0.523***	−0.581***
	(−25.951)	(−13.430)	(−18.328)
Year FE	N	Y	Y
Ind FE	N	Y	Y
N	23,066	23,066	23,066
adj. R^2	0.307	0.307	0.383

Note: t statistics are reported under the coefficient estimates; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

the leverage at year t. In column (3), we also control for the year-fixed effects and industry-fixed effects, and find that the coefficient of *Top100* is still negative and significant. All of the control variables also have the expected signs. For example, firm size (*Size*) is positively related to leverage, as it is an inverse proxy for volatility and the cost of bankruptcy (Franka and Goyal, 2003). Profitability is negatively related to leverage, because profitable firms use less external financing (Myers and Majluf, 1984). Tangible assets (*Tangible*), growth opportunity (*M/B*), non-debt tax shield (*Ndts*), and average industry leverage (*Ind_lev*) also have reasonable signs that are consistent with the literature (Rajan and Zingales, 1995).

4.2. Endogeneity concern

In our research setting, listed firms make their own decisions about whether to enter the Best Employers Award contest. Thus, firms on the BE list are not randomly chosen and there is a self-selection problem in our setting. To alleviate this endogeneity concern, we follow Tucker (2010) in using PSM to mitigate selection bias caused by observable variables and estimate a Heckman two-stage model to mitigate selection bias due to unobservable variables.

4.2.1. PSM method

If listed firms' decisions to enter the Best Employers Award contest are influenced by firm characteristics, our baseline results will be biased. We first use the PSM method to reduce the effects of observable firm characteristics that are difficult to fully control in the regressions. The PSM method is able to dampen the potentially confounding firm characteristic differences between the top 100 and non-top 100 firms that affect firm leverage, and thus alleviates concerns that the results are driven by general time trends. We use Equation (2) to screen our samples to avoid selection bias between firms on the BE list and firms not on the list. Subsequently, we exclude the differences in observable characteristics between the two groups of firms. Our PSM model is as follows:

$$P(Top100 = 1) = \alpha_0 + \beta_1 Controls_{i,t} + \eta_i + \varepsilon_{i,t}. \quad (2)$$

First, to eliminate the order effect, we randomly order the observations before matching (Dehejia, 2004). Second, we estimate the propensity score using probit models in which the dependent variable is *Top100* and then perform a nearest neighbor matching strategy, using a propensity score within 0.01 as the criterion to match each firm on the BE list with a non-top 100 firm (1:1 matching) with replacement (Rosenbaum and Rubin, 1983). We retain all of the pairs in the case of multiple matches. The probit models contain all of the control variables in Equation (1) and the industry-fixed effects. Table 6 presents the mean differences in the firm characteristics of the top 100 firms and non-top 100 firms after matching. After matching, there are no significant differences between the two groups in any of the main variables.

In Table 7, we document the baseline results estimated for the PSM sample. In column (1), we report the regression results in the PSM sample using the 1:1 nearest neighbor matching strategy. We find that the top 100 firms' leverage is 0.015 lower than that of the matching firms, and the difference is significant at the 5% level, indicating a significantly negative relationship between job satisfaction and firm leverage. The 1:1 matching strategy reduces the number of observations in the sample. In columns (2) to (4), we re-estimate our base-

Table 6
Mean differences of firm characteristics after matching.

	Non-top 100	Top 100	Diff	SD	T-value	P-value
Book_lev	0.124	0.114	0.010	0.010	1.000	0.317
Market_lev	0.222	0.231	−0.009	0.028	−0.350	0.744
Size	23.901	23.916	−0.015	0.005	−0.850	0.568
Roa	0.047	0.044	0.002	0.005	0.350	0.714
Tangible	0.205	0.187	0.019	0.014	1.350	0.180
M/B	1.904	1.710	0.194	0.132	1.450	0.141
Ndts	0.019	0.018	0.001	0.002	0.650	0.520
Ind_lev	0.432	0.428	0.004	0.001	0.700	0.675

Table 7
Baseline results (PSM sample).

	(1) PSM 1:1	(2) PSM 1:2	(3) PSM 1:3	(4) PSM 1:4
Top100	−0.015**	−0.015**	−0.012*	−0.014**
	(−1.971)	(−2.054)	(−1.680)	(−2.053)
Size	0.019***	0.026***	0.029***	0.031***
	(3.445)	(5.506)	(7.232)	(8.161)
Roa	−0.249***	−0.373***	−0.307***	−0.366***
	(−3.063)	(−5.260)	(−4.942)	(−6.307)
Tangible	0.133**	0.082	0.137***	0.138***
	(2.051)	(1.517)	(3.037)	(3.464)
M/B	−0.003	−0.002	−0.003	−0.001
	(−0.829)	(−0.789)	(−1.463)	(−0.666)
Ndts	−1.165**	−0.965*	−1.059**	−1.181***
	(−1.964)	(−1.918)	(−2.565)	(−3.126)
Ind_lev	0.253***	0.246***	0.222***	0.234***
	(3.059)	(3.026)	(3.096)	(3.506)
_cons	−0.468***	−0.594***	−0.660***	−0.729***
	(−3.335)	(−5.102)	(−6.651)	(−7.511)
Year FE	Y	Y	Y	Y
Ind FE	Y	Y	Y	Y
N	1111	1541	1999	2403
adj. R^2	0.455	0.414	0.453	0.446

line regression using the 1:2, 1:3, and 1:4 PSM samples, respectively. The results are consistent with those in column (1). In general, after using the PSM samples to eliminate the concern that observable firm characteristics are biasing our results, we still find a significantly negative relationship between job satisfaction and firm leverage.

4.2.2. Heckman two-stage model

In this study, we are interested in the differences between the leverage ratios of the top 100 firms and the leverage ratios they would have if they were not top 100 firms. This difference is referred to as the average treatment effect on the treated (Ayyagari et al., 2010). As we cannot observe the leverage ratios of top 100 firms if they were not top 100 firms, we need to find matching non-top 100 firms and observe their leverage ratios. For example, we use the sample of non-top 100 firms as matching firms in our regressions. However, this process may bias the estimated results, as the top 100 firms are not randomly selected. The Heckman (1979) two-stage model explicitly addresses bias caused by a correlation of the regressor with omitted variables by adding the inverse Mills ratio, which represents the non-zero expectation of the error term. This term is interpreted as private information driving the selection decision.

To estimate the first stage of the Heckman model, we need to find an instrumental variable that is correlated with *Top100* at the firm level, but uncorrelated with firms' financing decisions. Our instrumental variable is the 5-year lagged value of firms' per employee welfare expenses, which is calculated as the 5-year lagged value of firms' overall welfare expenses divided by employee number (*Welfare_5*). According to previous studies, a firm's per employee welfare expenses are relatively persistent over time, and therefore is highly correlated with employee treatment. Furthermore, the long-term lagged value of per employee welfare expenses is unlikely to correlate with current leverage for the following two reasons. First, in a perfect capital market, firms can rebalance their capital structure rapidly whenever it deviates from the optimal leverage level (Bae et al., 2011). Thus, the long-term lagged per employee welfare expenses and current leverage should have no effect on each other. Second, even in a non-perfect market, where past employee welfare expenses affect current leverage, the capital structure adjustment is not immediate. Flannery and Rangan (2006) show that it takes about 1.6 years for a firm to rebound from a shock that affects its leverage. Huang and Ritter (2009) find that the time is longer, closer to 3.6 years. Thus, using 5-year lagged per employee welfare expenses as an instrumental variable should be sufficient to remove any effects of past welfare expenses on current leverage.

In our estimates, we allow for the possibility that the selection of firms receiving the Best Employers Award may be caused by firm characteristics that are unobserved by the researchers but observed by the evaluation committee or employees. In particular, we assume that a firm obtains the award ($Top100 = 1$) if it meets certain criteria in evaluation dimensions, such that the linear function of information observed by researchers and the proprietary information observed by the evaluation committee or employees exceeds a certain threshold. Thus, $Top100 = 1$ if

$$\alpha_0 + \beta_1 Welfare\_5_{i,t} + \beta_2 Controls_{i,t} + \delta_t + \tau_i + \varepsilon_{i,t} > 0, \quad (3)$$

where $\varepsilon_{i,t} \sim (0, \sigma^2)$ is proprietary information observed by the evaluation committee and employees. Equation (3) is referred to as the selection or treatment equation and forms the first stage of a two-stage selection model. Equation (4) forms the second stage:

$$Leverage_{i,t} = \alpha_1 + \gamma_1 Top100 + \gamma_2 Controls_{i,t} + \delta_t + \tau_i + \lambda + \varepsilon_{i,t} \quad (4)$$

The instrumental variable, *Welfare_5*, does not affect a firm's leverage, and hence is not included in the second stage. Thus, it serves as an identifying variable in Equation (4). We first obtain estimates of the selection equation, and from these estimates compute the non-selection hazard λ (inverse of the Mills ratio) for each observation. λ is an estimate of the evaluation committee's or employees' private information that affects the firm selection. The regression Equation (4) is then augmented with the estimate of the selection bias, the non-selection hazard, λ.

In Table 8, we report the regression results of the Heckman two-stage model. To more thoroughly eliminate the selection bias concern, we use the two-stage model in the 1:1 PSM sample. In column (1), in the first-stage model, we find that the variable *Welfare_5* has a significantly positive association with *Top100*, indicating that

Table 8
Baseline results (Heckman 2SLS).[a]

	(1) First-stage *Top100*	(2) Second-stage *Book_lev*
Welfare_5	0.234***	
	(2.631)	
Top100		−0.108**
		(−2.350)
Size	0.183*	0.037***
	(1.868)	(6.585)
Roa	1.525	−0.305***
	(1.009)	(−4.929)
Tangible	−3.870***	0.114**
	(−3.705)	(2.049)
M/B	0.060	0.001
	(0.709)	(0.277)
Ndts	30.117***	−0.285
	(2.749)	(−0.472)
Ind_lev	0.738	0.203
	(0.199)	(1.554)
Lambda		0.058**
		(2.157)
_cons	−8.027***	−0.832***
	(−3.116)	(−6.266)
Year FE	Y	Y
Ind FE	Y	Y
N	719	714
Pseudo R^2	0.225	–
adj. R^2	–	0.544

[a] As we use the 5-year lagged value of firms' per employee welfare expenses as the instrumental variable, we lose some observations due to some omitted data for this variable. Consequently, only 719 observations are used for the regression presented in Table 8.

a firm's per employee welfare expenses positively affect job satisfaction. In column (2), we add the inverse of the Mills ratio (λ) to the second stage to control for the private information driving the selection decision. We find that *Top100* is still negative and significant at the 5% level. The results provide evidence that the significantly negative relationship between job satisfaction and firm leverage remains valid after we eliminate the selection bias concern.

4.2.3. Tests of reverse causality

Our baseline estimates may also suffer from reverse causality. Myers (1977) predicts that a firm's capital structure may affect its investment in employees; for example, firms with higher leverage tend to underinvest in employee benefits. To eliminate this concern, we follow Bae et al. (2011) and use the change in job satisfaction between year *t*-1 and year *t* as the dependent variable and regress it on the changes in firm leverage between year *t*-1 and *t*, between year *t*-2 and *t*-1, and between year *t*-3 and *t*-2. Table 9 shows the results. We find no evidence that past changes in firm leverage affect changes in job satisfaction. Overall, our baseline results do not seem to suffer from reverse causality.

4.3. Robustness checks

In this section, we conduct several tests to examine the robustness of our baseline results. We conduct the robustness checks using the PSM method and the Heckman two-stage model, respectively. First, we further control for firm-fixed effects to capture across-firm variation in firm characteristics. The inclusion of firm-fixed effects removes the effect of omitted time-invariant firm characteristics that could cause a spurious relationship between job satisfaction and firm leverage, and thus partially alleviates the endogeneity concern.

Table 9
Causal effect of change in leverage on change in job satisfaction.

	(1) PSM	(2) Heckman 2SLS
	Change in job satisfaction between year *t*-1 and year *t*	
$\Delta leverage_{t-1,\ t}$	−0.403	−0.082
	(−1.413)	(−0.716)
$\Delta leverage_{t-2,\ t-1}$	−0.071	−0.166
	(−0.296)	(−1.227)
$\Delta leverage_{t-3,\ t-2}$	−0.163	−0.044
	(−0.732)	(−0.446)
$\Delta Size_{t-1,\ t}$	0.021	0.007
	(0.397)	(0.308)
$\Delta Roa_{t-1,\ t}$	−0.427*	0.131
	(−1.703)	(1.106)
$\Delta Tangible_{t-1,t}$	−0.307	−0.388***
	(−1.408)	(−3.318)
$\Delta M/B_{t-1,\ t}$	0.017	0.004
	(0.750)	(0.534)
$\Delta Ndts_{\ t-1,\ t}$	−0.707	3.506**
	(−0.275)	(2.537)
$\Delta Ind\_lev_{t-1,\ t}$	0.160	0.117
	(0.585)	(1.168)
Lambda		0.584***
		(32.261)
_cons	−0.044	0.427**
	(−1.244)	(2.403)
Year FE	Y	Y
Ind FE	Y	Y
N	728	651
adj. R^2	0.074	0.844

Table 10
Robustness checks.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	PSM 1:1				Heckman 2SLS			
	Firm FE	Placebo test	*Market_lev*	Other controls	Firm FE	Placebo test	*Market_lev*	Other controls
Top100	−0.014*		−0.038**	−0.019**	−0.140***		−0.078*	−0.101**
	(−1.860)		(−2.036)	(−2.571)	(−2.702)		(−1.864)	(−2.086)
Top100_fal		0.001				−0.004		
		(0.198)				(−0.778)		
Size	0.026***	0.019***	0.115***	0.021***	0.038***	0.027***	0.033***	0.038***
	(3.045)	(3.392)	(6.406)	(3.530)	(6.181)	(5.828)	(5.583)	(6.331)
Roa	−0.212***	−0.251***	−0.501***	−0.212***	−0.267***	−0.325***	−0.290***	−0.273***
	(−2.722)	(−3.058)	(−2.757)	(−2.604)	(−3.661)	(−5.192)	(−6.736)	(−4.324)
Tangible	0.158**	0.138**	0.224*	0.101	0.078	0.165***	0.037	0.119**
	(2.156)	(2.150)	(1.653)	(1.552)	(1.373)	(2.750)	(0.769)	(2.036)
M/B	−0.001	−0.003	0.004	−0.002	0.002	−0.001	−0.007***	0.002
	(−0.146)	(−0.887)	(0.653)	(−0.510)	(0.468)	(−0.335)	(−2.812)	(0.801)
Ndts	−1.040	−1.217**	−0.277	−0.892	0.206	−1.293**	−0.024	−0.192
	(−1.584)	(−2.116)	(−0.257)	(−1.639)	(0.259)	(−2.406)	(−0.043)	(−0.314)
Ind_lev	0.127*	0.258***	1.461***	0.252**	0.087	0.180**	0.112	0.312**
	(1.897)	(3.082)	(4.800)	(2.479)	(1.371)	(2.402)	(1.007)	(2.186)
Manage_share				−0.023				0.001
				(−0.523)				(0.061)
Risk				0.001				0.001
				(0.719)				(1.037)
Soe				−0.014				−0.012
				(−1.252)				(−1.225)
lambda					0.078**	−0.003	0.038	0.052*
					(2.578)	−(0.859)	(1.562)	(1.839)
_cons	−0.526**	−0.463***	−3.186***	−0.495***	−0.800***	−0.618***	−0.717***	−0.926***
	(−2.553)	(−3.300)	(−7.119)	(−3.299)	(−5.401)	(−5.761)	(−4.422)	(−6.888)
Year FE	Y	Y	Y	Y	Y	Y	Y	Y
Ind_FE	N	Y	Y	Y	N	Y	Y	Y
Firm FE	Y	N	N	N	Y	N	N	N
N	1111	1111	1091	1006	714	1243	698	676
adj. R^2	0.235	0.454	0.506	0.484	0.130	0.534	0.649	0.563

Table 10, columns (1) and (5) report the results. We find that the coefficients of *Top100* are still negative and significant at the 5% and 1% levels, respectively.

Second, we conduct a placebo test, in which we randomly choose the same number of firms from the sample as *Top100* firms, then reset the event years and re-estimate the baseline specification. As shown in columns (2) and (6), the coefficients of *Top100* are nearly zero and there is no significant relationship, indicating that our baseline results are driven by inclusion on the BE list, and not other factors.

Third, we use market leverage ratio (the long-term debt divided by the sum of total debt plus market value of equity) as the dependent variable and re-estimate our baseline specification. As shown in columns (3) and (7), we find that the coefficients of *Top100* are still negative and significant.

Lastly, we include other control variables drawn from previous studies (Yang et al., 2017), namely management ownership (*Manage_share*), operational risk (*risk*), and ownership structure (*Soe*). As shown in columns (4) and (7), our basic results hold even after including these control variables.

Generally, our baseline results are robust when we control for firm- and year-fixed effects, conduct a placebo test, change the main dependent variable, and add other control variables.

5. Cross-sectional analysis

In Section 4, we show that job satisfaction is negatively related to firm leverage. In this section, we further examine the validity of our baseline results by using several subsamples. Specifically, we first divide our sample

into subsamples based on the factors that may affect the relationship between job satisfaction and leverage. Next, we rerun the baseline regression in these subsamples to investigate whether these factors affect the relationship between job satisfaction and leverage. We base our empirical tests on the theory of Maksimovic and Titman (1991), which predicts that firms that have strong incentives to maintain higher job satisfaction also have higher incentives to maintain low leverage. Therefore, we develop several testable predictions in the following subsections.

5.1. Financial distress risk

The negative relationship between job satisfaction and leverage may be stronger in firms with greater financial distress risk. When firms face financial distress, they are more likely to lower costs by cutting employee benefits or firing employees (Serfling, 2016). Consequently, rational employees may ask for higher wages for their labor, and this will result in lower firm value. Thus, firms facing financial distress risk are more eager to maintain high job satisfaction among employees by lowering leverage.

We use two proxies for the likelihood of financial distress. We first use Altman's Z-score, which is also referred to as bankruptcy risk, to proxy for a firm's financial distress (Altman, 2000; Altman et al., 2017). The lower the Z-score, the higher the distress risk. We use the sample median as the cutoff point to divide our samples into subgroups and re-estimate the basic specification. Table 11, Panel A reports the results. In columns (1) and (3), we find that the negative relationship between job satisfaction and leverage is significant in firms with higher bankruptcy risk. However, columns (2) and (4) show that the effect of job satisfaction is not significant for firms with lower bankruptcy risk.

Table 11
Effect of financial distress risk.

Panel A: Altman's Z-score as a proxy for financial distress

	(1) PSM 1:1	(2)	(3) Heckman 2SLS	(4)
	Bankruptcy_high	Bankruptcy_low	Bankruptcy_high	Bankruptcy_low
Top100	−0.020*	−0.020	−0.236***	−0.073
	(−1.722)	(−1.587)	(−2.816)	(−1.613)
Controls	Y	Y	Y	Y
lambda			0.138***	0.036
			(2.958)	(1.415)
_cons	−0.375***	−0.459**	−0.624***	−0.993***
	(−2.838)	(−2.449)	(−2.939)	(−5.171)
Year FE	Y	Y	Y	Y
Ind_FE	Y	Y	Y	Y
N	552	555	311	397
adj. R^2	0.640	0.469	0.579	0.567

Panel B: Firm age as an proxy for financial distress

	PSM 1:1		Heckman 2SLS	
	Age_high	Age_low	Age_high	Age_low
Top100	−0.001	−0.031***	0.042	−0.175***
	(−0.126)	(−3.499)	(0.640)	(−2.860)
Controls	Y	Y	Y	Y
lambda			−0.035	0.101***
			(−0.890)	(2.789)
_cons	−0.435***	−0.410**	−0.612**	−0.840***
	(−2.816)	(−2.256)	(−2.505)	(−5.033)
Year FE	Y	Y	Y	Y
Ind_FE	Y	Y	Y	Y
N	518	525	231	453
adj. R^2	0.558	0.405	0.530	0.678

We also use firm age as a proxy for the likelihood of financial distress. When a firm is at an early stage of development, it often faces significant uncertainty about future growth, which is manifested in higher book-to-market ratios and firm-specific risk (Koh et al., 2015). In addition, young firms often focus on innovation, which increases firm risk. Thus, younger firms face a higher probability of financial distress. We use the sample median of firm age to divide our sample groups and rerun the regression for each subsample. As shown in Panel B, we find that in younger firms, the negative relationship between job satisfaction and leverage is more pronounced.

Table 12
Effect of human capital retention.

Panel A: Effect of industry competition

	(1) PSM 1:1	(2)	(3) Heckman 2SLS	(4)
	HHI_low	HHI_high	HHI_low	HHI_high
Top100	−0.034***	−0.000	−0.208***	−0.105
	(−2.610)	(−0.070)	(−2.932)	(−1.100)
Controls	Y	Y	Y	Y
lambda			0.111***	0.055
			(2.659)	(1.005)
_cons	−0.277*	−0.630**	−1.161***	−0.320*
	(−1.845)	(−2.066)	(−5.627)	(−1.656)
Year FE	Y	Y	Y	Y
Ind_FE	Y	Y	Y	Y
N	545	513	472	242
adj. R^2	0.476	0.356	0.413	0.682

Panel B: Effect of R&D investment

	Rd_high	Rd_low	Rd_high	Rd_low
Top100	−0.034***	−0.004	−0.093**	−0.066
	(−2.610)	(−0.525)	(−2.105)	(−0.864)
Controls	Y	Y	Y	Y
lambda			0.052**	0.036
			(2.018)	(0.835)
_cons	−0.2 77*	−0.653**	−0.950***	−0.203
	(−1.845)	(−2.329)	(−6.454)	(−0.960)
Year FE	Y	Y	Y	Y
Ind_FE	Y	Y	Y	Y
N	545	566	472	242
adj. R^2	0.476	0.138	0.395	0.683

Panel C: Effect of high-tech industries

	High_tech	Low_tech	High_tech	Low_tech
Top100	−0.014*	−0.010	−0.108**	−0.162
	(−2.610)	(−0.525)	(−2.105)	(−0.864)
Controls	Y	Y	Y	Y
lambda			0.058**	0.082
			(2.157)	(1.417)
_cons	−0.526**	−0.594***	−0.832***	−1.002***
	(−2.553)	(−3.083)	(−6.266)	(−3.478)
Year FE	Y	Y	Y	Y
Ind_FE	Y	Y	Y	Y
N	399	712	316	398
adj. R^2	0.235	0.250	0.544	0.323

5.2. Human capital retention

According to Maksimovic and Titman's (1991) theory, employees are critical assets in human capital intensive industries, and such firms have stronger incentives to improve job satisfaction to retain current key employees and attract talent. Thus, they are motivated to reduce leverage to maintain their implicit contracts with employees. As a consequence, we may find a more pronounced negative relationship between job satisfaction and leverage in firms in which employee retention is more important.

In this study, we use high industry competition, high R&D intensity, and being a high-tech firm as indicators of a focus on employee retention. First, firms in highly competitive industries are more likely to have difficulty recruiting and retaining talented employees, as such employees have more opportunities to switch employers. Consequently, employee job satisfaction is expected to have higher potential value for these firms. Second, in R&D intensive and high-tech firms, human capital is the most valuable asset, as people are the most critical source of innovation. Thus, firms that rely on human capital for success pay more attention to employees' job satisfaction.

We use the Herfindahl-Hirschman Index (HHI) and R&D expenditure (R&D investment divided by total assets) as proxies for industry competition and R&D intensity and use the sample median to create high and low subgroups. We define the following industries as high-tech industries: telecommunication, computer and software; health care, medical equipment and pharmaceutical; and education. Table 12 reports the regression results. Panel A shows that job satisfaction is significantly negatively related to leverage in competitive firms. However, in firms facing lower competition, the negative effect is not significant. These results are consistent with our assumption. Panel B documents that in firms with higher R&D intensity, job satisfaction is significantly related to firm leverage. Finally, Panel C shows that in high-tech firms, job satisfaction has a significantly negative effect on firm leverage. Overall, our results confirm that firms that rely on their employees tend to value job satisfaction more than other firms, and lower their leverage to maintain their implicit contracts with employees.

6. Conclusions

This study uses China's BE list to explore how job satisfaction affects firm leverage in a representative emerging market. Our results show that job satisfaction is significantly negatively related to firm leverage, which is consistent with Maksimovic and Titman's (1991) theory. Our results are robust when we control for firm- and year-fixed effects, conduct a placebo test, change the main dependent variable, and add other control variables. Moreover, the cross-sectional tests document that the effect is more pronounced in firms experiencing greater financial distress and in firms in more competitive industries. In general, our results provide evidence that stakeholders have a strong influence on firms' capital structure decisions. In particular, in a stakeholder-oriented economy where the information environment is relatively opaque, firms can credibly demonstrate their commitment to stakeholders and re-shape capital structure by improving job satisfaction. Our study has implications for other emerging markets in which debt financing is the major driving force of firm growth.

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