Modeling product market competition and reporting quality: the transitional economy of China

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Abstract

Purpose – The purpose of this paper is to examine the role of product market competition in shaping a firm's reporting quality (RQ).

Design/methodology/approach – This research uses an aggregate measure of a firm's RQ, considering both the absolute level of discretionary accruals (DA) and the quality of accruals, using modified Jones model and Francis *et al.* (2005) accruals quality model, respectively. Whereas, the Herfindahl-Hirschman index and the Lerner index are used to measure product market competition. Further, this study considers the transitional economy of China and employs panel data estimation techniques for testing the hypothesized relationships.

Findings – This study finds that firms operating in more competitive industries are associated with higher RQ. This association still prevails when analysis is done using the component measures of RQ (i.e. the absolute level of DA and the quality of accruals). Overall, the empirical results provide evidence on the disciplining role of product market competition among Chinese firms.

Practical implications – Given the complex governance structures and specific kind of agency problems in Chinese corporations, this study suggests that product market competition may play an external disciplining role to improve the corporate information environment.

Originality/value – This research explores the role of product market competition for a firm's RQ in Chinese-listed companies, while the prior studies on the same topic are mostly from the developed countries.

Keywords Product market competition, Reporting quality

Paper type Research paper

1. Introduction

This study aims to explore the role of product market competition in shaping a firm's reporting quality (RQ) considering the specific case of the Chinese transitional economy. Although in the recent few decades, a large body of literature has been developed to highlight the role of product market competition for a firm's information environment. For instance, Verrecchia (1983), Harris (1998), Bamber and Cheon (1998), Botosan and Stanford (2005), Verrecchia and Weber (2006), Li (2010), Ali *et al.* (2014), and Haw *et al.* (2015) focus mainly on the role of product market competition for the quantitative aspects of disclosure and the properties of analysts' forecasts. Similarly, Balakrishnan and Cohen (2013), Cheng *et al.* (2013), Laksmana and yang (2014), and Markarian and Santaló (2014) study the relationship between product market competition and various earnings quality measures. Nonetheless, the literature on the topic is still inconclusive due to the mixed findings and arguments of the aforementioned theoretical and empirical studies.

The literature identifies several factors that may lead to such mixed evidences regarding the role of product market competition. One potential factor may be that researchers are

using different measures of product market competition based on different sample firms and their own specific inclusion exclusion criteria. For instance, Ali *et al.* (2009) in their study "the limitations of industry concentration measures constructed with Compustat data: implications for finance research" demonstrate that the industry concentration measures computed using Compustat data, do not measure the actual industry concentration and hence are poor proxies. They also argue that the results of most of the prior studies in the accounting and finance research that use Compustat based measures of industry concentration are sensitive to those of studies that use US census based industry concentration measures, which use data from both public and private firms. Another potential factor for the conflicting evidence may be the country specific-effects that emerge in the form of market, cultural, and institutional differences. Recently, the researchers have investigated and have also emphasized upon the replication of the important studies in the economics, finance, and accounting literature using different contexts to explore the role of the country's culture, institutions, and laws, etc. (see e.g. La Porta *et al.*, 1997; Pandey, 2004; Gaud *et al.*, 2007; Almeida and Dalmacio, 2015).

In a similar way, the authors' perspective is that product market structures and the regulatory environment are not universal, thus results in one context may not be fully generalizable to others. In order to further explore this inconclusive relationship between product market competition and RQ, this study considers the case of China. China is the world's largest transitional economy and has experienced rapid fundamental economic reforms, since the start of Chinese economic reforms in 1978. It has evolved into a market economy from a state monopolized central planned economy. Before the reforms started, the state was controlling almost all the economic activities and the business sectors were operating under state ownership. Imports and exports, product and service price determination, and industry entry were all monopolized by the state. Within the first decade of the reforms (i.e. 1980s), Chinese economy experienced a slice of market competition in the form of reduction in entry barriers for the non-state companies, loosening of price control, and permission of foreign investment and free trade (Lin and Liu, 2000). The later decades observed even more rapid changes and exhibited considerable variations in the product market competition. This variation in competition ranges from zero competition (i.e. monopoly) in some periods or industries to intense competition in other periods or industries, and hence makes China a natural laboratory to test the relationship between product market competition and a firm's RQ. However, despite of this rapid transition, state monopoly is still there, and hence there are still barriers in the way of fair market competition in China.

In light of the relevant literature, this study proposes two competing hypotheses. First, product market competition overcomes managerial slack and agency problems, which decreases the managers' propensity to manipulate information. And hence, brings forth high quality financial reports. The first hypothesis is in line with the studies by Hart (1983), Schmidt (1997), Giroud and Mueller (2010), Cheng *et al.* (2013), and Laksmana and Yang (2014). Second, product market competition exacerbates managerial slack and agency problems, which increases the managers' propensity to manipulate information. And thus, brings forth poor quality financial reports. The second hypothesis is in line with the studies by Rotemberg and Scharfstein (1990), Hermalin and Weisbach (2007), Balakrishnan and Cohen (2013), and Markarian and Santaló (2014).

This research uses a composite measure of a firm's RQ, considering both the absolute level of discretionary accruals (DA) and the quality of accruals using modified Jones model and Francis *et al.* (2005) accruals quality (AQ) model, respectively. The Herfindahl-Hirschman index (HHI) and the Lerner index are used to measure product market competition. Using a sample of Chinese-listed companies, this study finds that firms operating in more competitive industries are associated with higher RQ. This association is robust across various measures of RQ (i.e. the absolute level of

DA and the quality of accruals). Overall, the results of this study are consistent with the intuition that firms operating in concentrated industries release poor quality financial reports in an attempt to protect their competitive advantage, and hence evidence the disciplining role of product market competition in Chinese firms.

This research contributes to the literature by exploring the disciplinary role of product market competition for financial RQ. This finding supports the view that firms operating in concentrated industries incline to create an opaque information environment to outperform their rivals. To the best of the authors' knowledge, this is the first study to be conducted on the role of product market competition on financial RQ in China.

The rest of this research is organized as follows. Section 2 reports the relevant literature and hypotheses development, while Section 3 presents econometric models, variables measurement, and hypothesis testing. Section 4 reports the empirical results and their discussion. Section 5 reports the robustness analysis, while Section 6 provides the conclusion.

2. Prior literature and hypothesis development

Almost all the theoretical and empirical studies in the domain of product market competition suggest that product market competition influences managers' incentives, the agency problems between owners and management, and finally the managers' propensity to manage earnings. However, there is no consensus among the researchers on the nature of this influence. One stream of research argues in favor of the disciplining role of product market competition, while the other argues for the opposite. The first stream of research argues that product market competition overcomes managerial slack and agency problems, which reduces the managers' propensity to manipulate earnings, and results in high quality financial reporting. The second stream of research argues that product market competition increases managerial slack and agency problems, which enhances managers' propensity to manipulate earnings, and results in poor quality financial reporting. Below we present under separate headings, the most important and relevant theoretical and empirical studies that investigate and support the two competing views presented above.

2.1 Studies supporting the bright side of product market competition

Alchian (1950), Hart (1983), Scharfstein (1988), and Schmidt (1997) advocate the disciplining role of product market competition. They argue that product market competition is an external disciplining mechanism and overcomes managerial slack and principal-agent agency conflicts. Further, "competition is probably the most powerful force towards economic efficiency in the world" (Shleifer and Vishny, 1997). Similarly, Raith (2003), Baggs and Bettignies (2007), Grullon and Michaely (2007), Giroud and Mueller (2010), and Guadalupe and Perez-Gonzalez (2010) demonstrate that product market competition enhances incentives for management to align their interests with those of the shareholders and hence to serve and protect shareholders' interests. Also, product market competition enhances information availability to shareholders that increases their ability to evaluate their firms' performance relative to industry performance and to more effectively monitor the agents (Holmstrom, 1982). Guadalupe and Perez-Gonzalez (2010) for instance, document an inverse association between product market competition and private benefits of managerial control. Furthermore, Grullon and Michaely (2007) report that firms operating in highly competitive industries, instead of investing the excess funds in negative NPV projects, more likely distribute them among the shareholders.

Balakrishnan and Cohen (2013) examine the association between product market competition and earnings restatements. They report that product market competition and earnings restatements are negatively correlated, suggesting that the level of competition in a particular industry constrains financial accounting misreporting. Overall, they report a

disciplining effect of product market competition for a firm's information environment. Recently, Cheng *et al.* (2013) investigate the impact of product market competition on firms' earnings quality. Using various proxies of earnings quality, their results show a positive impact, suggesting that firms operating in concentrated industries create an opaque reporting environment in order to avoid competition from their rivals and to enjoy their monopolistic advantage. Similarly, Laksmana and Yang (2014) explore the relationship between competition and earnings management (both real-activity manipulation and DA). Their results show that firms in less competitive industries were more engaged in both accrual-based and real-activity based earnings manipulation than those in highly competitive industries, thus suggesting that competition decreases the managers' propensity to engage in earnings management.

The above-mentioned studies show that product market competition speeds up information flow to the market and enhances the monitoring ability of the owners. Also, product market competition overcomes the agency problems by aligning the interests of both the owners and managers. Further, the level of product market competition constrains window dressing activities by firms. In the light of these arguments, we propose our first hypothesis as follows:

H1a. Product market competition positively influences the RQ of Chinese-listed firms.

2.2 Studies supporting the dark side of product market competition
Although, the literature reviewed above acknowledges the bright side of product market competition showing how competition disciplines the information environment. Nonetheless, there also exist studies that show the dark side of competition and blame it for worsening managerial slack and agency conflicts (e.g. Horn *et al.*, 1994; Markarian and Santaló, 2014; Scharfstein, 1988). Competition can also increase bias by stimulating opportunistic behavior, as competition makes it difficult for firms to achieve superior performance and abnormal profits. In the labor market for top executives, managers may be more concerned with their personal performance and may take actions to sacrifice firm's value in the long run for boosting short-term performance (Narayanan, 1985). Consistent with this view, Karuna (2007) argues that executives' performance is more closely monitored in the strong competition industries than in the weak competition industries. This close monitoring in the competitive industries puts more pressure on the executives to manipulate financial reports disclosed to the market (Hermalin and Weisbach, 2007). Similarly, in their model, Rotemberg and Scharfstein (1990) propose that managers' propensity to manipulate financial information for signaling superior future performance increases with increase in competition. Competition provides opportunity for managers to evaluate performance of their peer firms and compare with their own. This relative performance evaluation stimulates managers to window-dress their financial reports in order to match with peer firms in terms of performance.

Higher competition means a greater number of firms competing for limited funds in the funds market. Thus, managers in highly competitive industries try their best to beautifully dress up their earnings reports and present to the capital market in an attempt to attract funds from investors. Balakrishnan and Cohen (2013) examine the relationship between competition and financial accounting misreporting and suggest that, apart from other implications, competition also raises capital market pressures.

The above studies report the dark side of competition and suggest that competition provides managers incentives to manipulate financial information for achieving superior performances and attracting funds from the capital market. This strand of empirical literature leads us to formulate our second hypothesis as follows:

H1b. Product market competition negatively influences the RQ of Chinese-listed firms.

3. Methodology

3.1 Research design

The following econometric models are developed in order to empirically test our hypothesis:

$$RQ_{it} = \beta_0 + \beta_1 NegHHI_{it} + Controls_{it} + Yr.Dummies + Ind.Dummies + \varepsilon_{it} \tag{1}$$

$$RQ_{it} = \beta_0 + \beta_1 LI_{it} + Controls_{it} + Yr.Dummies + Ind.Dummies + \varepsilon_{it} \tag{2}$$

Equation (1) estimates the impact of product market competition (*NegHHI*) on RQ. Where RQ_{it} represents a firm's RQ and is an aggregate measure of the two earnings attributes, namely DA and AQ. $NegHHI_{it}$ is our main independent variable and represents the degree of product market competition based on the HHI. Similarly, Equation (2) estimates the relationship between product market competition and RQ based on an alternative measure (i.e. *LI*) of product market competition.

Following Francis *et al.* (2005), Cheng *et al.* (2013), and Laksmana and Yang (2014), we also include a set of control variables in our models. Operational definitions of all the variables are given in Table I.

3.2 Variable measurements

3.2.1 *RQ*. For measuring a firm's RQ, we consider DA and AQ because lower levels of DA and better AQ represent high earnings quality, and hence are more economically useful decision-wise to users (see Jones, 1991; Francis *et al.*, 2005). To measure DA, we first estimated nondiscretionary accruals (NDA) using the following modified Jones model developed by Dechow *et al.* (1995):

$$NDA_{i,t} = \alpha_1 \frac{1}{Assets_{i,t-1}} + \alpha_2 \frac{\Delta Rev_{i,t} - \Delta Rec_{i,t}}{Assets_{i,t-1}} + \alpha_3 \frac{PPE_{i,t}}{Assets_{i,t-1}} \tag{3}$$

where $NDA_{i,t}$ is the nondiscretionary accruals of a firm i in year t; $\Delta Rev_{i,t}$ the change in revenue of a firm i in year t; $\Delta Rec_{i,t}$ the change in net receivables of a firm i in year t; $PPE_{i,t}$ the gross property, plant and equipment of a firm i in year t; $Assets_{i,t-1}$ the total assets of firm i in year $t-1$; and α_1, α_2 and α_3 the firm-specific parameters.

Estimates for parameters α_1, α_2, and α_3 are generated employing the following original Jones (1991) model for each industry year using the Chinese Securities Regulatory Commission's (CSRC) second level industry classification codes:

$$\frac{TA_{i,t}}{Assets_{i,t-1}} = a_1 \frac{1}{Assets_{i,t-1}} + a_2 \frac{\Delta Rev_{i,t} - \Delta Rec_{i,t}}{Assets_{i,t-1}} + a_3 \frac{PPE_{i,t}}{Assets_{i,t-1}} + \varepsilon_{i,t} \tag{4}$$

Variable	Definition
Reporting quality (RQ)	An aggregate measure of a firm's reporting quality based on both the absolute level of discretionary accruals and the quality of accruals
NegHHI	Indicates level of competition in terms of industry concentration and calculated using negative of the Herfindahl-Hirschman index
LI	Lerner index to measure level of competition at the firm level
SIZE	Natural logarithm of a firm's total assets in year t
GROWTH	Represents growth rate in terms of total assets
LEV	The ratio of total debt to total assets
ROA	Net income scaled by total assets
RETVOL	Standard deviation of the daily stock returns during the current year
VOLUME	Natural logarithm of annual trading volume
LOSS	Dummy variable assuming a value of 1 if net income reported by a firm in previous year is negative and 0 otherwise

Table I.
Variable definitions

where $TA_{i,t}$ is the total accruals of a firm i in year t; a_1, a_2, and a_3 the OLS estimates of α_1, α_2, and α_3.

TA are calculated as net income minus cash flows from operations. Further, we excluded industry years with fewer than ten observations while estimating Equation (4). DA are calculated by subtracting NDA obtained in Equation (3) from TA. As the higher level of DA represents a decrease in RQ, so we multiply it with −1, thus higher values representing higher RQ.

To measure AQ we employed Francis *et al.* (2005) model and estimated Equation (5) for each industry year using the CSRC's second level industry classification codes:

$$TCA_{i,t} = \phi_{o,i} + \phi_{1,i}CFO_{i,t-1} + \phi_{2,i}CFO_{i,t} + \phi_{3,i}CFO_{i,t+1} + \phi_{4,i}\Delta Rev_{i,t} + \phi_{5,i}PPE_{i,t} + v_{i,t}$$

(5)

where $TCA_{i,t}$ is the total current accruals of a firm i in year t; CFO the cash flows from operations; ΔRev the change in revenue; PPE the gross property, plant, and equipment.

$TCA_{i,t}$ is calculated as change in current assets less change in current liabilities less change in cash plus change in short-term debt of a firm i in year t. We dropped industry years where there were fewer than ten observations and scaled all variables with average total assets. Then we calculated AQ for a given firm-year as the standard deviation of firm specific residuals obtained from Equation (3) from year $t−4$ to t. We also dropped from our further analysis firms with less than seven years of available data, as calculating a firm's accruals AQ requires seven years of data (five residuals, one lag, and one next-period value of CFO). As a higher standard deviation of residuals represents a decrease in AQ, we multiply it with −1, thus higher values representing higher AQ and better RQ.

After finding DA and AQ, we annually standardized their values across the sample and summed together to compute our measure of RQ for our sample firms in a given year, higher value representing higher RQ.

3.2.2 Product market competition. Following Gaspar and Massa (2006), Almeida and Dalmacio (2015), and Haw *et al.* (2015), we use the HHI and the Lerner index to measure competition. The HHI is an industry level measure while the Lerner index is a firm level measure. The HHI for an industry is defined as the sum of the squares of the market shares of all the firms in that industry. In the mathematical form, it can be represented as follows:

$$HHI_i = \sum_{j=1}^{j} s_{ij}^2$$

where S_{ij} is the market share of firm j in the industry i. The HHI measures the degree of concentration in an industry and is inversely related to the degree of competition. We multiply HHI with −1 in order to facilitate the interpretation of our results. Thus, greater HHI means greater competition:

$$NegHHI = HHI*(-1)$$

Our alternative measure of competition is the Lerner index that actually measures a firm market power in terms of its pricing power. Under this approach, we first calculate the price cost margin (PCM) of each firm as follows:

$$PCM_{it} = profit_{it}/sales_{it}$$

Then we subtract the industry mean PCM from a firm's PCM to calculate its industry-adjusted price-cost margin (IPCM). The greater value of IPCM indicates greater market power and low competition.

4. Empirical findings

4.1 Sample, descriptive statistics, and correlations

Our data come from two of the biggest Chinese databases, namely RESSET Financial Research Database (RESSET/DB) and China Stock Market and Accounting Research. Consistent with earlier studies, we exclude financial firms because of their unique financial and accounting characteristics. We consider only A-shares, which are open only to domestic investors, while we exclude B-shares and H-shares, which are subject to different reporting regulations and are open to international investors. Further, we include only those firms whose data are available to compute our various measures of competition and RQ.

Panel A of Table II reports the descriptive statistics of our measures of competition, RQ, as well as control variables. The mean and median values of *NegHHI* are −0.0959 and −0.0831, respectively, indicating that firms are operating in competitive industries. The mean and median values of *LI* further confirm the fact that our sample represents rather competitive industries. Our dependent variable RQ has the mean and median values of 0.0829 and 0.1670, respectively. Panel B of Table II reports the Pearson correlations of all the variables included in the model. *RQ* is positively correlated with *NegHHI* (0.343) and negatively correlated with *LI* (−0.318) suggesting a positive impact of product market competition on RQ, and thus provide initial support for *H1a*. Further, to deal with the issue of multicollinearity, we calculate variance inflation factors (VIF) for each of the explanatory variables and find that even the highest VIF is only 1.17, which is much smaller than the threshold value of 10. These unreported values of VIF show that multicollinearity is not a major concern in this research.

4.2 Regression results

Table III reports the results from regressing *RQ* variable on both the measures of competition along with a set of control variables included in the model. Panel A reports the results from regressing RQ on *NegHHI* (product market competition measured through the Herfindahl index), while Panel B reports the results from regressing RQ on *LI* (product market competition measured through the Lerner index). We use pooled OLS with standard errors clustered by firm to estimate models 1 and 3. For models 2 and 4, we use fixed-effects regressions with standard errors clustered by the firm.

As shown in Panel A, the coefficients of *NegHHI* in both models 1 and 2 are positive and statistically significant, suggesting that competition positively influences a firm's RQ. This finding confirms *H1a*. The pooled OLS results in model 1 show that a one unit increase in *NegHHI* is associated with a 0.267 increase in the quality of financial reports a firm discloses. Similarly, the fixed-effects regression results in model 2 show that a one unit increase in *NegHHI* is associated with a 0.252 increase in the quality of financial reports a firm discloses. As seen in Panel B, the coefficients of *LI* in both models 3 and 4 are negative and statistically significant, suggesting that an increase in a firm's market power negatively influences its RQ. In other words, higher market power and lower level of competition are negatively associated with the quality of financial reports a firm discloses. This alternative measure of competition further confirms *H1a*. The pooled OLS results in model 3 show that a one unit increase in *LI* is associated with a 0.114 decrease in the quality of financial reports a firm discloses, while the fixed-effects regression results in model 4 show that a one unit increase in *LI* is associated with a 0.122 decrease in the quality of financial reports a firm discloses. Overall, our results of regressing RQ on various measures of competition using alternative estimation techniques provide evidence on the disciplinary role of competition for a firm's financial RQ in Chines-listed manufacturing firms. Our findings are in line with the earlier theoretical and empirical studies on the disciplinary role of competition in

Panel A: descriptive statistics

Variable	Obs.	Mean	Median	SD	Min.	Max.
RQ	10,644	0.0829	0.1670	0.3349	-0.1138	0.5248
NegHHI	10,644	-0.0959	-0.0831	-0.0666	-0.3364	-0.0249
LI	10,644	0.1652	0.4010	0.0321	-0.2873	1.2240
SIZE	10,644	21.6209	1.1064	21.6420	16.8712	23.2402
GROWTH	10,644	0.1511	0.2646	0.0919	-0.1660	1.1908
LEV	10,644	0.5255	0.1907	0.5376	0.1168	0.8300
ROA	10,644	0.0656	0.1228	0.0256	-0.0610	0.5125
RETVOL	10,644	0.0345	0.0273	0.0102	0.0196	0.5133
VOLUME	10,644	25.9963	25.2351	1.5715	21.3350	28.7312
LOSS	10,644	0.1227	0.1015	0.3119	0.0000	1.0000

Panel B: correlation matrix

	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]
RQ [1]	1									
NegHHI [2]	0.343	1								
LI [3]	-0.318	0.099	1							
SIZE [4]	0.332	0.032	-0.040	1						
GROWTH [5]	0.087	-0.002	0.021	0.227	1					
LEV [6]	-0.033	0.007	-0.023	-0.137	-0.133	1				
ROA [7]	0.213	-0.018	0.112	0.194	-0.152	-0.056	1			
RETVOL [8]	0.036	-0.053	0.007	0.047	0.168	0.019	-0.034	1		
VOLUME [9]	0.191	-0.052	0.074	0.473	0.063	0.089	0.037	0.316	1	
LOSS [10]	0.057	-0.054	0.035	-0.217	0.021	0.291	-0.433	0.066	-0.018	1

Notes: *RQ,* denotes an aggregate measure of a firm's reporting quality based on both the absolute level of discretionary accruals and the quality of accruals; *NegHHI,* negative of the Herfindahl-Hirschman index Indicating level of competition in terms of industry concentration and calculated based on market shares of companies in a particular industry; *LI,* Lerner index to measure level of competition at the firm level; SIZE, natural logarithm of a firm's total assets in year *t*; GROWTH, growth rate in total assets; LEV, ratio of total debt to total assets; ROA, net income scaled by total assets; RETVOL, standard deviation of the daily stock returns during the current year; VOLUME, natural logarithm of annual trading volume; LOSS, dummy variable assuming a value of 1 if net income reported by a firm in previous year is negative and 0 otherwise. This table reports descriptive statistics and correlation coefficients for our sample that consists of 10,644 firm-year observations for Chinese-listed non-financial firms over the period from 1998-2014

Table II.
Descriptive statistics
and correlation
analysis

| | Panel A | | Panel B | |
	OLS(1)	FEM(2)	OLS(3)	FEM(4)
NegHHI	0.267 (7.61)***	0.252 (5.98)***		
LI			−0.114 (−5.12)***	−0.122 (−5.71)***
SIZE	0.049 (2.14)**	0.064 (4.65)***	0.051 (2.11)**	0.055 (5.06)***
GROWTH	−0.022 (−1.89)*	−0.023 (−1.91)*	−0.022 (−1.88)*	−0.024 (−2.09)**
LEV	−0.069 (−2.42)**	−0.028 (−1.85)*	−0.061 (−2.17)**	−0.022 (−1.75)*
ROA	0.108 (2.17)**	0.072 (2.07)**	0.091 (7.27)***	0.068 (2.48)**
RETVOL	−0.008 (−1.75)*	−0.011 (−2.21)**	−0.006 (−1.72)*	−0.012 (−2.08)**
VOLUME	−0.002 (−0.87)	−0.002 (−0.76)	−0.077 (−1.87)*	0.003 (−0.97)
LOSS	−0.061 (−9.73)***	−0.072 (−2.47)**	−0.055 (−9.75)***	−0.067 (−2.31)**
Constant	0.238 (3.65)***	0.227 (5.53)***	0.219 (2.28)**	0.243 (2.11)**
Yr. Dummies	Yes	Yes	Yes	Yes
Ind. Dummies	Yes	Yes	Yes	Yes
F-test	33.35***	35.51***	59.42***	38.31***
R^2	0.218	0.255	0.213	0.249

Notes: RQ, reporting quality measured as aggregating both absolute level of discretionary accruals and the quality of accruals; *NegHHI*, negative of the Herfindahl-Hirschman index indicating level of competition in terms of industry concentration and calculated based on market shares of companies in a particular industry; *LI*, Lerner index to measure level of competition at the firm level; SIZE, natural logarithm of a firm's total assets in year *t*; Growth, growth rate in total assets; LEV, ratio of total debt to total assets; ROA, net income scaled by total assets; RETVOL, standard deviation of the daily stock returns during the current year; VOLUME, natural logarithm of annual trading volume; LOSS, dummy variable assuming a value of 1 if net income reported by a firm in previous year is negative and 0 otherwise. This table reports results from regressing reporting quality (RQ) variable on both the measures of competition along with a set of control variables included in the model. The sample consists of 10,644 firm-year observations for Chinese-listed non-financial firms over the period from 1998-2014. Panel A reports the results from regressing reporting quality on *NegHHI* (product market competition measured through the Herfindahl index), while Panel B reports the results from regressing reporting quality on *LI* (product market competition measured through the Lerner index). We use pooled OLS with standard errors clustered by firm to estimate models 1 and 3. For models 2 and 4, we use fixed-effects regressions with standard errors clustered by firm. *,**,***Significance level at 10, 5, and 1 percent, respectively

Table III.
The relation between product market competition and reporting quality

shaping a firm's reporting environment (see e.g. Holmstrom, 1982; Raith, 2003; Grullon and Michaely, 2007; Cheng *et al.*, 2013).

The coefficients of the control variables *SIZE*, *ROA*, and *LOSS* are statistically significant in all the four models. *SIZE* and *ROA* are positively related to RQ, suggesting that larger and well performing firms have more transparency and a better quality reporting system. *LOSS* is negatively associated with RQ, suggesting that firms with poor financial performance manipulate their financial reports. These results are in line with prior studies by Markarian and Santaló (2014) and Keating and Zimmerman (1999).

5. Additional analysis

In this section we employ additional analyses to further explore and provide additional evidence on the association between product market competition and RQ. Table IV reports the analyses examining whether the disciplinary effect of competition still holds when we use the constituent measures of RQ (namely, absolute level of DA and AQ). Panel A reports results from regressing absolute level of discretionary accruals (*AbsDA*) variable on the alternative measures of competition along with a set of control variables. Similarly, Panel B reports results from regressing AQ variable on the alternative measures of competition along with a set of control variables.

	Panel A AbsDA		Panel B Accruals quality	
NegHHI	−0.117 (−5.65)***		0.144 (9.81)***	
LI		0.136 (9.31)***		−0.109 (−3.88)***
SIZE	−0.008 (−6.14)***	−0.003 (−8.65)***	0.016 (2.53)**	0.019 (2.17)**
GROWTH	0.016 (2.09)**	0.022 (2.31)**	−0.051 (−1.56)*	−0.048 (−1.71)*
LEV	0.006 (1.58)*	0.002 (1.85)*	−0.034 (−7.51)***	−0.031 (−5.58)***
ROA	−0.065 (−7.71)***	−0.061 (−5.93)***	0.008 (3.65)***	0.005 (3.77)***
RETVOL	0.013 (0.75)	0.035 (0.81)	−0.011 (−0.92)	−0.018 (−0.55)
VOLUME	0.082 (0.93)	0.093 (0.73)	−0.002 (−0.77)	−0.011 (−0.48)
LOSS	0.038 (3.85)***	0.022 (4.23)***	−0.065 (−11.75)***	−0.074 (−11.31)**
Constant	1.528 (2.38)**	1.337 (2.54)**	0.816 (5.45)***	0.655 (5.11)***
Yr. Dummies	Yes	Yes	Yes	Yes
Ind. Dummies	Yes	Yes	Yes	Yes
F-test	125.70***	66.78***	168.60***	156.98***
R^2	0.118	0.135	0.252	0.258

Notes: AbsDA, absolute level of discretionary accruals using modified Jones model; accruals quality, accruals quality estimated using Francis et al. (2005) accruals quality model; NegHHI, negative of the Herfindahl-Hirschman index indicating level of competition in terms of industry concentration and calculated based on market shares of companies in a particular industry; LI, Lerner index to measure level of competition at the firm level; SIZE, natural logarithm of a firm's total assets in year t; GROWTH, growth rate in total assets; LEV, ratio of total debt to total assets; ROA, net income scaled by total assets; RETVOL, standard deviation of the daily stock returns during the current year; VOLUME, natural logarithm of annual trading volume; LOSS, dummy variable assuming a value of 1 if net income reported by a firm in previous year is negative and 0 otherwise. This table reports the analyses examining whether the disciplinary effect of competition still holds when we use the constituent measures of reporting quality (namely, absolute level of discretionary accruals and accruals quality). The sample consists of 10,644 firm-year observations for Chinese-listed non-financial firms over the period from 1998-2014. Panel A reports results from regressing absolute level of discretionary accruals (AbsDA) variable on the alternative measures of competition along with a set of control variables. Similarly, Panel B reports results from regressing accruals quality (Accruals quality) variable on the alternative measures of competition along with a set of control variables. We use fixed-effects regressions with standard errors clustered by firm. *,**,***Significance level at 10, 5, and 1 percent, respectively

Table IV.
Product market competition and alternative measures of reporting quality

The negative and statistically significant coefficient on NegHHI (−0.117) in Panel A shows that firms operating in a highly competitive environment are associated with the lower levels of DA and better RQ. Similarly, the positive and statistically significant coefficient on LI (0.136) in Panel A shows that firms with greater market power (low competitive environment) are associated with the higher levels of DA and poor RQ. In Panel B, the variable AQ is positively associated with NegHHI and negatively associated with LI, again suggesting that high competition level and low market power positively affect a firm's quality of accruals. Overall, our additional analysis further confirms the disciplinary role of product market competition for a firm's RQ in Chinese-listed manufacturing firms.

The signs and statistical significance of the control variables are almost consistent in both the main analysis and additional analysis.

6. Conclusion
Motivated by mixed empirical findings and opposing theoretical predictions, we investigate the association between competition in the product market and a firm's RQ. We use an aggregate measure of a firm's RQ, considering both the absolute level of DA and the quality of accruals using modified Jones model and Francis et al. (2005) AQ model,

respectively. Whereas, the HHI and the Lerner index are used to measure product market competition. Based on a sample of the Chinese-listed non-financial firms, our results show a positive impact of product market competition on RQ. Our results are robust across various measures of product market competition and RQ. Overall, our results demonstrate that competition in the product market prevents managers from manipulating financial information disclosed to the market and thus exhibits a disciplining effect.

Our research contributes to the literature by exploring the disciplinary role of product market competition for financial RQ. This finding supports the view that firms operating in concentrated industries incline to create an opaque information environment to outperform their rivals. Our study supports the agency view on how product market competition monitors and disciplines corporate managers. Our findings have implications for future research in this domain. Future researchers can explore the different channels and mechanisms by which competition in the product market can monitor and discipline the financial reporting environment.

Finally, our study has one limitation regarding the measurement of our proxy for competition. The product market competition measure, H-index, is computed based on public firms. However, as we know, product market competition includes a competition among public and private firms. Without private firms, the product market competition measure can contain significant measurement errors.

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