

Peng, Bo; He, Chen

Article

Does "Internet+Sales" business model help managers improve earnings forecast quality? Based on the data of e-commerce platforms

China Journal of Accounting Studies (CJAS)

Provided in Cooperation with:

Accounting Society of China (ASC), Beijing

Suggested Citation: Peng, Bo; He, Chen (2021) : Does "Internet+Sales" business model help managers improve earnings forecast quality? Based on the data of e-commerce platforms, China Journal of Accounting Studies (CJAS), ISSN 2169-7221, Taylor & Francis, Abingdon, Vol. 9, Iss. 2, pp. 268-288,
<https://doi.org/10.1080/21697213.2021.1992937>

This Version is available at:

<https://hdl.handle.net/10419/338451>

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.



<https://creativecommons.org/licenses/by/4.0/>

ABSTRACTS
Does industrial policy support corporate tax avoidance? – A study on the
relationship of industrial policy and corporate tax avoidance
Huihui Zhang, Xuehui Zhang and Jinghui Wang
Has digitalization been a positive impact on China's financial and economic
development? – A study on the impact of digitalization on China's financial and economic
development
Can corporate tax avoidance be a good thing? – The impact of corporate tax avoidance on
corporate performance
The determinants of corporate tax avoidance: evidence from
China's listed companies
Huihui Zhang, Xuehui Zhang and Jinghui Wang
Does digitalization affect corporate tax avoidance?
Huihui Zhang, Xuehui Zhang and Jinghui Wang
Does digitalization affect corporate tax avoidance?
Huihui Zhang, Xuehui Zhang and Jinghui Wang
Does digitalization affect corporate tax avoidance?
Huihui Zhang, Xuehui Zhang and Jinghui Wang



An International Journal of the Accounting Society of China



ISSN: 2169-7213 (Print) 2169-7221 (Online) Journal homepage: www.tandfonline.com/journals/rcja20

Does 'Internet+Sales' business model help managers improve earnings forecast quality? – Based on the data of e-commerce platforms

Bo Peng & Chen He

To cite this article: Bo Peng & Chen He (2021) Does 'Internet+Sales' business model help managers improve earnings forecast quality? – Based on the data of e-commerce platforms, China Journal of Accounting Studies, 9:2, 268-288, DOI: [10.1080/21697213.2021.1992937](https://doi.org/10.1080/21697213.2021.1992937)

To link to this article: <https://doi.org/10.1080/21697213.2021.1992937>



© 2021 The Author(s). Published by Informa UK Limited, trading as Taylor & Francis Group.



Published online: 25 Oct 2021.



Submit your article to this journal [↗](#)



Article views: 2054



View related articles [↗](#)



View Crossmark data [↗](#)



Citing articles: 5 View citing articles [↗](#)

ARTICLE



Does ‘Internet+Sales’ business model help managers improve earnings forecast quality? – Based on the data of e-commerce platforms

Bo Peng and Chen He

School of Accounting, Southwestern University of Finance and Economics, Chengdu, China

ABSTRACT

Based on the data of firms opening stores on e-commerce platforms and DID regression model, we investigate the impacts of ‘Internet+Sales’ on management forecasts. In the view of accounting information transmission efficiency, ‘Internet+Sales’ can upgrade firms’ information technology and enhance managers’ ability to obtain earnings information, which help improve the timeliness of forecasts. However, in the view of sales uncertainty, ‘Internet+Sales’ will impact firms’ traditional sales activity and raise the difficulty for managers to estimate future earnings performance, which causes a decrease in the accuracy of forecasts. Moreover, we also find a decrease in customer concentration in these firms, and a better performance in forecast accuracy in the e-commerce platforms with less sales uncertainty policy, indicating that uncertainty can affect forecast accuracy. This paper provides specific evidence on how ‘Internet+’ affects management disclosure, and can help stakeholders have a better understanding of ‘Internet+Sales’ business model.

KEYWORDS

‘Internet+’ Business Model; e-commerce platforms; management earnings forecast quality

1. Introduction

Solow (1956) pointed out that innovation is the key source of sustained economic growth. As the most important innovation of technological revolution, Internet technology has changed the society information communication in a high speed and efficiency. Firms gradually start to adopt ‘Internet+’ model actively after the rapid development of Internet. By taking advantage of Internet information technology, many well-known ‘Internet+’ business model firms have been successfully stood out from traditional industries, which brought a great shock on traditional business model. Under this background, literatures have started some studies about the impact of ‘Internet+’ model on firms operation and management. Most of which believe that ‘Internet+’ is playing a positive role, especially in firms’ innovation (Chen, 2013; H. Li et al., 2014; Yang & Liu, 2018) and management efficiency (Lendle et al., 2016; Shi & Li, 2020; Zhao et al., 2020). Some other studies believe that ‘Internet+’ is neutral for firms and capital markets (X. Zhang & Chen, 2020), or even

CONTACT Chen He  chenhe217@163.com  School of Accounting, Southwestern University of Finance and Economics, 555 Liutai Avenue, Wenjiang District, Chengdu 611130, China

Paper accepted by Kangtao Ye.

© 2021 The Author(s). Published by Informa UK Limited, trading as Taylor & Francis Group.

This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0/>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

a destructive innovation (Guo & Luo, 2016; Zhao, 2015). So firms should be aware to the agency problems caused by the new business model (Bushman et al., 2004; Doyle et al., 2007), and find out the way to transform the advantage of business model innovation into firm value.

Different from the indirect definitions of 'Internet+' in existing literatures, we focus on the specific 'Internet+Sales' business model, which can help us to observe the impact of Internet technologies on firm operation and management more directly. 'Internet+Sales' is the most mature and common business model in 'Internet+' business activities. By using online e-commerce platforms, large amounts of firm-customer searching costs can be saved (Sun et al., 2017), thus bringing firms incremental consumers and new driving force for development. Relevant data shows that in 2018, the scale of online shopping users in China accounted for 73.6%, and online sales accounted for 18.4% of total sales. These two ratios are still rising, suggesting a customer siphon effect of online sales market on traditional sales market. Therefore, to exploit online sales market, large numbers of firms are actively trying 'Internet+Sales' transformation. Then, during the transformation and the utilisation of Internet information technologies, will the information environment of these firms be significantly improved?

We assume that firms' information environment can be improved by using 'Internet+' through information production, transmission and processing, which can be finally observed in the improvement of information disclosure quality. Based on this, we examine the relationship between 'Internet+Sales' and management earnings forecast quality. The reason why earnings forecast is chosen as our research object is that, different from general compulsory information disclosure (such as periodic financial reports), earnings forecast is a forward-looking voluntary information disclosure (Healy & Palepu, 2001; R. Zhang & Zhang, 2011). It is not constrained by accounting standards, but be directly decided by managers, thereby becoming the main channel for managers to deliver private earning information to stakeholders (Ajinkya et al., 2005; Rogers & Stocken, 2005). Moreover, whether to disclose earnings forecasts completely depends on managers' willingness. Considering of reputation management (Guan et al., 2020), convergence of common interests (Yang, 2012), litigation avoidance (Houston et al., 2019), etc., managers have strong incentive to improve earnings forecast quality.

To verify our assumption, we collect the information of firms opening e-shops on the main domestic e-commerce platforms (Taobao.com and JD.com), and construction PSM-DID regression model to test the impact of 'Internet+Sales' on management earnings forecast quality. After controlling firm characteristics, information environment and factors may affect earnings forecasts policy, the regression results show that 'Internet+Sales' affects earnings forecast quality in two different ways. Specifically, 'Internet+Sales' improves the timeliness of earnings forecast, but reduces the accuracy. The positive correlation between 'Internet+Sales' and earnings forecasts timeliness indicates that accounting information environment can be optimised, and managers' ability of obtaining existing earning information can be improved after utilising Internet technologies. The negative correlation between 'Internet+Sales' and earnings forecasts accuracy indicates that business model innovation raises uncertainty to firms' sales activities, which makes it more difficult for managers to estimate future earning performance and leads to a decline in earnings forecasts accuracy.

In additional analyses, we try to use different methods to explain and verify why earnings forecast accuracy decreases. The results show that after using 'Internet+Sales', major-customer concentration decreases significantly, suggesting business model innovation can raise uncertainty in sales activities. We also find that if firms use 'Internet+Sales' on e-commerce platforms with low sales activities uncertainty, their earnings forecast accuracy will not be reduced, suggesting that the negative effect of 'Internet+Sales' on earnings forecast accuracy is caused by the raise of sales activities uncertainty.

Our research may have three contributions. First, we study how business model transformation affects information disclosure from the perspective of earnings forecasts. Business model innovation is an important way for firms to survive and develop. Especially after the COVID-19, many firms have been realising the importance of digital transformation. However, in the process of transformation, firms do not always succeed. Many firms fell into transformation trap and hardly can find the way out. Therefore, business model transformation is not only a strategy for development, but also a decision with certain risks (J. Yang et al., 2018). In this case, it is particularly important for managers to try their best to transfer information to stakeholders. However, existing literatures mostly focus on how business model transformation affects innovation ability or management efficiency instead of information disclosure quality. Therefore, by studying earnings forecast quality under 'Internet+Sales', this paper explores the impact of business model transformation on information disclosure, expecting to supplement and expand current literatures on digital transformation, new business model and 'Internet+'.

Second, we explore the reason why 'Internet+Sales' negatively affect earnings forecasts accuracy and its mechanism. Existing literatures on 'Internet+' and information disclosure only pointed out that managers increase references to 'Internet+' in financial reports for exaggeration (Zhao et al., 2020), but have not mentioned the effect of 'Internet+' on managers' ability of making earnings forecasts. Internet technologies can influence managers in different ways, including changing their willingness to make disclosure by attracting more investors, as well as their ability to estimate earning information by reforming sales environment. We find that after using 'Internet+Sales', major-customer concentration is reduced while managers' disclosure strategy has no change, which verifies that sales uncertainty can influence managers' ability of making forecasts. The conclusion is helpful for regulatory authorities and investors to recognise the information quality of earnings forecasts in 'Internet+' firms.

Finally, we choose the specific 'Internet+Sales' as our research object, so we can make sure that the firms in our research samples are real users of 'Internet+' model. Most existing literatures on 'Internet+' use indirect definitions of 'Internet+', such as the number of keywords relevant to Internet in annual reports (Yang & Bi, 2019; Yang & Liu, 2018; Zhao et al., 2020), or whether a firm uses e-mail, has Internet homepages, opens official microblogs, or the popularity of Internet in its locality (B. Li & Li, 2017; Shi & Li, 2020; Xue et al., 2020). 'Internet+Sales' is the most direct and general way for firms to apply 'Internet+' model. Focusing on 'Internet+Sales' helps us explore the impact of 'Internet+' on firms more specifically, and then clearly reveals the advantages and disadvantages of using 'Internet+'.

2. Literature and hypotheses development

2.1. Stakeholders information acquisition and earnings forecasts

In capital market, information is crucial for all stakeholders as it is their decision base. Among all the information, earnings forecast, as a voluntary forward-looking information disclosure, is an important channel for managers to deliver private information to stakeholders (Ajinkya et al., 2005; Rogers & Stocken, 2005). Many studies have shown that timely and accurate earnings forecasts can help firms reduce information asymmetry (Lennox & Park, 2006), increase information transparency (R. Zhang & Zhang, 2011), release performance risks (Beyer et al., 2010), establish trust relationships (Guan et al., 2020), reduce capital costs (Sandy et al., 2020), increase stock liquidity (Rogers & Van Buskirk, 2009), promote analysts producing private information (Ajinkya et al., 2005), and be conducive to protecting investors' interests and firm value (Lu et al., 2017). Classical information economics point out that adverse selection problem can be relieved through adequate information disclosures. Therefore, forward-looking information disclosures are needed by all investors (Ajinkya et al., 2005; Gigler, 1994; Ke et al., 2020). Firms do not actively disclose information will be negatively evaluated by rational investors (Grossman & Stiglitz, 1980), which is harmful to its operation and development. Under the separation of ownership and management, managers' private interests such as resignation risk (Matsumoto, 2002; Yang, 2012), salary income (Sandy et al., 2020; Skinner, 1994), reputation building (Guan et al., 2020; Lee et al., 2012), etc. are all bound to firm performance. Thus, under the pressure put by investors, managers will disclose information actively, and earnings forecasts is an important channel for them to deliver private earnings information. Therefore, as long as disclosure costs and external risks are controllable, managers are motivated to issue high-quality earnings forecasts (Healy & Palepu, 2001; Hirst et al., 2008) for stock pricing, capital raising, and value creation.

However, unlike assumptions made in information economics that information communication is low-cost and credible (Gigler, 1994; Grossman & Stiglitz, 1980), disclosing information usually have costs and risks (Hirst et al., 2008; Lu et al., 2017). Thus, managers also have incentive to abuse discretionary power and strategically make earnings forecasts to avoid risks, reduce mistakes and attract investors given earnings forecasts are voluntary (Cheng & Lo, 2006; Hirshleifer & Teoh, 2003). Many studies show that managers manipulate earning forecasts information by adjusting disclose frequency (X. Li et al., 2019; Verrecchia, 2001) or forecast deviation (Houston et al., 2019; Rogers & Stocken, 2005) according to different situations, which increases the difficulty for investors to obtain information.

Nonetheless, managers still have to make disclosures as reducing information asymmetry is their prime duty. To maximise their own interests, managers will try their best to reduce disclosing costs and risks with their information processing capability. However, the analytical capabilities and attention of managers are limited (Hirshleifer & Teoh, 2003). Therefore, the objective condition for information processing may have serious impact on earnings forecasts. Some literatures find that management ability improvement and firm information environment optimisation can significantly affect information disclosure. For example, managers' legal background can increase voluntary information disclosures (Xia et al., 2016), hiring high-quality audits can increase earnings forecast reliability (Ball et al.,

2012), appointing independent directors familiar with industry information (DRIs) can improve earnings forecast accuracy (Ke et al., 2020), and electrification of news and announcements can reduce information acquisition costs for investors (Sandy et al., 2020). Similarly, when firms use 'Internet+Sales', the efficiency and convenience of Internet information technology can help managers improve their ability of processing and collecting accounting information, and then strengthen their earnings forecasting ability. Hence, we predict that 'Internet+Sales' have significant impact on earnings forecast.

2.2. *'Internet+' and its economic consequences*

Existing literatures on 'Internet+' mainly focus on the macro economy consequences of Internet (Hjort & Poulsen, 2019; Whitacre et al., 2014; Yan, 2012; Zhou & Liang, 2018). In recent years, with the bloom of Internet technologies, and the promotion of 'Internet+' projects conducted by governments, Internet is playing a more crucial role in firms' operation and development by effecting their technology, production, circulation and consumption. As an important strategy (Yang & Liu, 2018), 'Internet+' can bring both serious transformation risks (H. Li et al., 2014) and big opportunities for firms to gain competitive advantages (Porter & Heppelmann, 2014). Based on existing literatures, the heterogeneous competitive advantages brought by 'Internet+' mainly consist of two parts, which are innovation capability improvement and management efficiency improvement.

Literatures on innovation capability believe that Internet technology has developed series of new business models, which help integrate digital economy with real economy (Zhao, 2015), and deeply affect the way firms create value (Luo & Li, 2015). Moreover, as a technological innovation, Internet can change traditional business patterns (H. Li et al., 2014) by breaking time and space restriction in production and sales activities (Guo & Luo, 2016), which reforms firms organisation and industry competition landscape. Specific to firms innovation activities, using Internet big data can promote firm product innovation (Chen, 2013) and guide firm to technological innovation (Guo & Luo, 2016). Internet can also intensify the dynamic competition in traditional industries (Yang & Liu, 2018). Under competitive pressure, firms will try to use 'Internet+' for big data cloud computing, Internet of things management and ecosystem construction to promote innovation capabilities (H. Li et al., 2014; Yan, 2012; Zhao, 2015).

Literatures on management efficiency believe that using 'Internet+' can reduce costs in manufacturing and operation, thereby increasing production efficiency. Firstly, big data can help firms match employees to their posts and make organisational structure optimal (Thomas et al., 1987), thus reduce production and coordination costs (H. Li et al., 2014). Secondly, Internet can extend the selection range of suppliers, reduce information searching costs and transaction costs among stakeholders (Ju et al., 2020; Lendle et al., 2016), and then help firms focus on their specialised area and major business (Brynjolfsson et al., 1994; Shi & Li, 2020). Thirdly, under the sharing economy developed by 'Internet+', customers no longer have to purchase products to gain the right of use (Lovelock & Gummesson, 2004). It can significantly promote the utilisation rate and reduce the investing risks of specific assets (Yang & Bi, 2019). Meanwhile, it can also enhance the ability of firms to control marginal costs and cost stickiness (Shi & Li, 2020; Zhao et al., 2020).

2.3. How does 'Internet+Sales' affect the information quality of the earnings forecast?

By using 'Internet+' model, firms can easily apply advanced information technology to accounting information transmission. 'Internet+Sales' can help firms realise automated accounting information generation from basic sales activity, then accelerating the transmission of earning information. As a result, the hardest mission in constructing digital accounting information system is solved, and the ability of managers to obtain private earning information is enhanced as well. Specifically, firms can integrate the multiple sub-systems of 'Internet+' model¹ into current internal information environment by using 'Internet+Sales'. In this way, any business data produced in each activity can be recorded digitally and automatically in the Internet. Comparing with the traditional way to generate accounting information consists of the three steps of 'voucher, collecting and documenting', 'Internet+Sales' can automatically produce accounting information more accurately and conveniently.

Secondly, it is easier for firms to communicate with subsidiaries and suppliers by using 'Internet+Sales', which then simplify the traditional steps of collecting and documenting accounting information, thereby enhancing managers' ability of obtaining information from sales activities timely by optimising information environment. Thirdly, earning information can be delivered to managers instantly in digital information environment, which means managers can collect earning information at any time they need. By this way, managers' ability of obtaining earning information in time can be further enhanced. Finally, benefit from information technologies such as big data and cloud computing, managers can also dig and analyse earnings information from multiple perspectives, which extends the content of earning information and thereby enriches the private information owned by managers.

Except from enhancing managers' ability to obtain earnings information, 'Internet +Sales' can also lower the risks of managers disclosing instant earnings information. 'Internet+Sales' and digital information environment increase the outflow of firms' private earning information into external market, which mitigate the risks of revealing proprietary information via disclosures. This is because Internet can both deliver and store information. For example, online sales data of firms using 'Internet+Sales' can be collected on e-commerce platforms. By using these data, competitors and investors can easily estimate online sales status and even the whole sales revenue of firms, which means they can access part private information owned by managers. Hence, when part of online sales information be observed in external markets, managers' private information is no longer exclusive, then risks for managers to disclose earning information will be reduced. Moreover, to decrease information asymmetry and revise the information that has been exposed to external markets, managers will prefer to disclose earning information as soon as possible instead of waiting for stakeholders to estimate by themselves through incomplete online sales data.

¹The multiple sub-modules of the Internet include Internet websites, mobile apps, intelligent terminal interactive machines, OA office systems, accounting information systems, and cloud conference system, big data, online training, etc.

In conclusion, we predict that compared with traditional business model, managers utilising 'Internet+Sales' can take full advantage of accounting information digitisation and big data to improve the internal information environment and the efficiency of accounting information transmission. Moreover, 'Internet+Sales' can also help managers lower risks of revealing proprietary information via earnings forecasts disclosures, and then relieve their concern about disclosing earning information. When managers have the ability to access private information more quickly and more timely, in order to reduce information asymmetry, they will disclose earnings forecasts with higher timeliness. Based on the above analysis, we propose the following hypothesis:

H1: Timeliness of management earnings forecasts will be improved after utilizing 'Internet+Sales' business model.

Among all the accounting information, earning information is the core concern of stakeholders. Not only the timeliness is what they require of earning information, but also the accuracy. However, while 'Internet+Sales' can bring benefits to accounting information transmission, it can also affect the estimate of managers on future earnings. X. Zhang and Chen (2020) took Luckin Coffee's financial fraud as an example, pointing out that business model innovation is neutral for firms. Firms have to explore how to use it to create extra value, otherwise it may cause high potential risks to firms. In the process of 'Internet+' transformation, original value creation system of firms will be challenged (Xiao & Li, 2019). And the conflict derived from resource reallocation can also raise performance uncertainty (Luo & Li, 2015; Shackleton et al., 2004). Therefore, even though the ability of managers to obtain existing earning information can be promoted by Internet information technology, their estimation on future earning performance may also be disturbed by higher uncertainty. Thus, from the perspective of earning uncertainty, 'Internet+Sales' may result in a lower accuracy of management earnings forecasts.

First, 'Internet+Sales' can increase the complexity of firms' sales activities, thereby affecting the accuracy of managers' estimation on future performance. According to the theory of network externality (Metcalfe's Law), the gain from Internet is marginal increasing, which means by using Internet, firms will have higher sales volume and much more customers than before. Higher sales volume may bring huge commercial value to firms, but it also can cause intense competition. For example, purchasing habits of online customers are different from those of traditional offline customers. Online customers have a wider range of purchasing options and poor demand stability, which can result in higher sales expenses, goods returns and exchanges, price competition, etc. This situation will pose a great challenge to management, such as reducing the efficiency of inventory management or accounts receivable collection. Therefore, under 'Internet+Sales', even though managers can obtain sales information with higher timeliness, this information is only limited to existing data, and it is more difficult for the managers to accurately estimate future sales performance. This may have a negative impact on the accuracy of earnings forecasts.

Second, earnings forecasts accuracy can also be affected by customer concentration. High customer concentration means stable sales volume as the products are mainly sold to one or several major customers. Stable sales from major customers can keep the profitability stable and sustainable, and thus make the profitability more predictable (Wang & Peng, 2016). However, as customers are increasing with 'Internet+Sales'

utilisation, the proportion of sales to major customers will decrease at the same time. This may bring more difficulty for managers to estimate future earning performance. Moreover, with the decreases of customer concentration, business development of firms no longer relies on the transaction with major customers, which greatly reduces the sunk costs of specific customers or specific markets (Freund & Weinhold, 2002). Therefore, major customers may pay less attention on supervising and governing the accounting information of firms (Armstrong et al., 2010; Hui et al., 2012). In this case, managers will have less incentive to make efforts on keeping earnings forecasts accurate. In another word, after using 'Internet+Sales', managers will concern more about transferring existing earning information, instead of learning how to estimate future earning performance accurately with high sales uncertainty because of their lack of incentive.

Finally, it will be harder to control selling costs once firms use 'Internet+Sales', and the uncertainty of selling costs may have negative effects on managers' earnings forecast. A survey carried by PWC on financial executives (CFO Publishing 2011) shows that the uncertainty of external business environment can result in earnings forecast deviation in firms. When selling on the Internet, firms may be affected by varied sales promotion policies implemented by e-commerce platforms or vicious competition among homogeneous products. Therefore, to promote products and attract customers, firms usually choose to cooperate with e-commerce platforms to offer discounts irregularly. But as the consequence, operating costs such as sales expenses and advertising expenses will be hard for firms to control. Hence, unstable expenses will make it more difficult for managers to accurately estimate future earnings performance.

Based on the above analysis, we predict that 'Internet+Sales' may bring uncertainty to sales activities of firms, thereby weakening managers' ability to estimate future earning performance, and results in a negative impact on earnings forecasts accuracy. Thus, we propose the following hypothesis:

H2: Accuracy of management earnings forecasts will be decreased after utilizing 'Internet+Sales' business model.

3. Sample selection and research design

3.1. Sample selection and data sources

We use data of China's listed firms from 2005 to 2018 as our samples. The data mainly includes the use of 'Internet+Sales', the details of earnings forecasts and the basic financial information in sample firms. Data about the use of 'Internet+Sales' was manually collected from Taobao and JD platforms. Data about earnings forecasts and the basic financial information are from CSMAR database and Wind database. We have made the following definitions of earnings forecasts disclosure and the use of 'Internet+Sales' in firms:

- (1) We select the earnings forecasts disclosed before the end of accounting periods as our research objects. Current policies do not strictly require firms to disclose earning forecasts before the end of accounting periods. However, previous research believes that earning forecasts disclosed after the end of accounting periods are pre-

announcements, which can only reflect the ability of managers to process earning information that have occurred objectively and thus cannot be used as research objects of earning forecasts (Ajinkya et al., 2005; Houston et al., 2019; Rogers & Stocken, 2005). Our paper mainly studies managers' ability of forecasting earning performance instead of pre-announcement. Thus, we select earning forecasts disclosed before the end of accounting periods as our research objects, and make robust tests with all earnings forecasts as empirical samples.

- (2) We select the first earnings forecasts disclosed in every accounting period as our research objects. Exchanges allow firms to revise their earnings forecasts by issuing revision announcements. However, there are differences between the information quality in revision announcements and initial earnings forecasts. To avoid the bias caused by these differences, we choose to use initial earnings forecasts as our research objects, and use all earnings forecasts including revision announcements as our samples to make robust tests.
- (3) We select the firms who have opened stores on e-commerce platforms as the standard to identify whether they have adopted 'Internet+Sales'. Specifically, we select the firms (or their subsidiaries) with e-commerce platform stores based on following rules: First, confirm the main products of a firm and if it has opened e-commerce stores that related to those products with a) information about main products, and e-commerce stores information disclosed in annual reports; or b) information about sales on e-commerce platforms disclosed on stock exchange Q&A platforms; or c) social media about firms' e-commerce sales in Baidu search engine. Second, we check the registered licences of these e-commerce stores to make sure they belong to firms or their subsidiaries. The information of subsidiaries of firms are from the corporate structure records in credit investigation system.

Based on above selection, we finally select a total of 453 firms that have opened online stores on e-commerce platforms. Considering the differences in characteristics between firms adopt 'Internet+Sales' and firms do not, which may affect their management and earnings forecasts, we adopt the method of propensity scores matching (PSM) to minimise the differences that may influence empirical results. We follow Johnston and Petacchi (2017) and Xin et al. (2018), firstly establish a PSM model to match the samples, and then use matched samples to regress. In PSM model, we control the factors that may influence the decision of firms using 'Internet+Sales', including asset size, financial leverage, ROE, cash holding level, operating cash flow, working capital, total asset turnover, nature of ownership, number of employees, establish time and industry chain position. After PSM matching, we finally get 8452 firm-year earnings forecast observations as our samples.

3.2. Model construction and variable definition

To further control other factors that may interfere earnings forecasts, we use difference in difference model (DID) with PSM samples to test the impact of 'Internet+Sales' on earnings forecasts timeliness and accuracy. Following models are used

$$Timeliness = \beta_0 + \beta_1 eshop + \beta_2 Post + \beta_3 eshop \times Post + \sum Controls + \sum Industry + \sum Year + \varepsilon \quad (1)$$

$$Acc_mean = \beta_0 + \beta_1 eshop + \beta_2 Post + \beta_3 eshop \times Post + \sum Controls + \sum Industry + \sum Year + \varepsilon \quad (2)$$

First, explained variables *Timeliness* and *Acc_mean* respectively represent earnings forecasts timeliness and accuracy. Some firms did not disclose earnings forecasts in observation years as they are voluntary, and the distribution of continuous variables *Timeliness* and *Acc_mean* is concentrated. To avoid the interference of data truncation and uneven distribution, we follow Houston et al. (2019) to score forecast timeliness or accuracy with their quartile distribution, and transform these two variables into ordered data. The specific calculation methods are shown in Table 1. In addition, considering that some literatures think that the lower limit of earnings forecasts is often 'defensive', while the upper limit is actually closer to the real forecasts of managers (Ciconte et al., 2014), we use both the average and the upper limit of earnings forecasts to measure earnings forecasts accuracy.

Second, our explanatory variable is *eshop*, which is a dummy variable of whether a firm adopt 'Internet+Sales' model. *Post* is a dummy variable of whether a firm has adopted 'Internet+Sales' model. The variable of our most interest is the interaction of *eshop* and *Post*.

Thirdly, we select control variables following previous literatures (Ajinkya et al., 2005; Hutton, 2005), including firm characteristics and external information environment. Finally, following Ke et al. (2020), we add Fix-Effect of Year, Industry and Area into regression models. All regressions have applied firm-level clustering method. To avoid the influence of extreme values, all continuous variables are winsorised at the 1% and 99% levels.

3.3. Descriptive statistics

Sample distribution and main variables descriptive statistics are reported in Table 2.² Panel A reports the sample distribution in each year. We select 8542 firm-year earnings forecast observations from 2005 to 2018 as our research sample after matching. Panel B reports earnings forecasts timeliness before and after firms adopt 'Internet+Sales'. With time goes by, earnings forecasts timeliness in controlled group falls significantly, while that in treated group has no significant change, suggesting that 'Internet+Sales' can optimise information environment and reduce the negative influence from business expansion, thereby keeping managers' ability of timely disclosing earnings forecasts. Panel C reports earnings forecasts accuracy before and after firms adopt 'Internet+Sales'. It shows an increasing trend of earnings forecasts accuracy in both treated group and controlled group, but the trend is more obvious in firms without 'Internet+Sales'. It indicates that 'Internet+Sales' may raise the difficulty for managers to estimate earning information, and results in a lower improvement in earnings forecasts accuracy.

²As the length limit, descriptive statistics are not completely reported in manuscript. Please contact authors via email if necessary.

Table 1. Variable definition and measurement.

Variable	Definition and Measurement
Timeliness	The timeliness of earnings forecasts. Following Houston et al. (2019), we calculate the number of days between the deadline of accounting period and the date managers disclose earnings forecasts, and then scored this number in quintile. If the number belongs to first quintile, Timeliness equals to 1, and if it belongs to second quintile, Timeliness equals to 2, and so on. The highest score is 5. Timeliness equals to 0 if managers did not disclose earnings forecasts. The larger value of Timeliness represents managers disclose earnings forecasts more timely.
Acc_mean	The accuracy of earnings forecasts (measured with average). We calculate the error of earnings forecasts, and also scored the error in quintile. Following Rogers and Stocken (2005), forecast error = mean value of forecast-practical value of financial report $\times (-1)$ /asset. If the error belongs to first quintile, Acc_mean equals to 1, and if it belongs to second quintile, Acc_mean equals to 2, and so on. The highest score is 5. The larger value of Acc_mean represents managers disclose earnings forecasts more accurately.
Acc_upper	The accuracy of earnings forecasts (measured with upper limit). The measurement is the same as Acc_mean, excepting forecast error = upper limit of forecast-practical value of financial report $\times (-1)$ /asset (Ciconte et al., 2014).
eshop	Dummy variable. If a firm has opened or will open online stores on e-commerce platforms, eshop equals to 1, otherwise equals to 0.
Post	Dummy variable. For treat group firms, if the sample date is after the online store opening year, Post equals to 1, otherwise equals to 0. For control group firms, if the sample date is after the online store opening year of its matching firm, Post equals to 1, otherwise equals to 0.
Asset	The log of total assets.
ROE	Operating income/total net assets.
Leverage	Total liabilities/total assets.
Growth	Growth rate of operating revenue.
Cash	Net cash flow from operations/gross operating income.
Anaatt	The number of analysts track on the firm.
Institution	Institutional shareholding ratio.
Litigation	The log number of lawsuits filed against the firm.
Big4	A dummy variable of whether a firm is audited by Big Four accounting firms.
SOE	A dummy variable of whether a firm is controlled by state-owned capital.
Age	The log of the years the firm has been established.
Cash	Cash & cash equivalents/(total assets-cash & cash equivalents).
Holdings	
Industry Chain	A dummy variable of whether a firm is in the downstream of industry chain.
CL	A dummy variable of whether a firm received comment letters.
CLNum	The number of comment letters received by a firm.
Fix	A dummy variable of whether a firm issued earnings forecasts revision announcements.
FixNum	The number of earnings forecasts revision announcement issued by a firm.
Force	A dummy variable of whether a firm is required to disclose earnings forecasts.
ForceNum	The number of compulsory earnings forecasts disclosures of a firm.
ForceRatio	The number of compulsory earnings forecasts/the number of all earnings forecasts.

4. Empirical results and analysis

4.1. Basic hypothesis test

We use model (1) and model (2) to test the impact of 'Internet+Sales' on earnings forecasts timeliness and accuracy respectively. As we adopt quantile score method to measure earnings forecast quality, our explained variables are non-negative integer, which are ordered discrete data. Therefore, we adopt Poisson regression model. The main regression results are reported in Table 3.

Column (1) of Table 3 reports the impact of 'Internet+Sales' on earnings forecasts timeliness. DID regression results show that the coefficient of eshop*Post is significantly positive at 1% level, suggesting that managers will disclose earnings forecasts in a more timely manner after using 'Internet+Sales'. This result is consistent with our

Table 2. sample distribution and descriptive statistics of main variables

Panel A : Sample Distribution

Year	Number of Samples	Percent of Samples
2005	379	4.48%
2006	396	4.69%
2007	422	4.99%
2008	448	5.30%
2009	469	5.55%
2010	556	6.58%
2011	624	7.38%
2012	655	7.75%
2013	656	7.76%
2014	684	8.09%
2015	727	8.60%
2016	759	8.98%
2017	832	9.84%
2018	845	10.00%
Total	8452	100%

Panel B : Descriptive Statistics of Earnings Forecasts Timeliness

Types of Firm	Mean Value of Timeliness		Test for Difference	
	Post=0	Post=1	Difference	T-vale
Firms with "Internet+Sales" (eshop=1)	1.342	1.407	0.065	1.14
Firms without "Internet+Sales" (eshop=0)	1.736	1.341	-0.395***	-6.92

Panel C : Descriptive Statistics of Earnings Forecasts Accuracy

Types of Firm	Mean Value of Timeliness		Test for Difference	
	Post=0	Post=1	Difference	T-vale
Firms with "Internet+Sales" (eshop=1)	0.645	1.179	0.534***	11.06
Firms without "Internet+Sales" (eshop=0)	0.609	1.160	0.551***	11.86

previous analysis, indicating that Internet technology can improve firms' information environment and information transmission efficiency. This gives managers greater ability to obtain earning information and disclose earnings forecasts timely, which verifies H1. Moreover, the coefficient of $eshop*Post$ is 0.121, which suggests that benefit from management ability improvement under 'Internet+Sales', earnings forecasts timeliness increases by 6%. Given that the overall level of forecasts timeliness is less than 2 points, the improvement brought by 'Internet+Sales' are considerable.

Column (2)(3) in Table 3 report the impact of 'Internet+Sales' on earnings forecasts accuracy. We use both mean value and upper limit to measure earnings forecasts accuracy and report in columns (2) and (3) respectively. Regression results shows that the coefficient of $eshop*Post$ is significantly negative at 1% level, which suggests that 'Internet+Sales' reduces earnings forecasts accuracy. These results indicate that 'Internet+Sales' can bring changes to sales activities and make firms face more operating uncertainty, which then leads to a lower ability of managers to estimate future earning performance and cause negative impacts on earnings forecasts accuracy.

Table 3. Impact of 'Internet+Sales' on management earnings forecasts.

	Timeliness	Acc_mean	Acc_upper	Range
	(1)	(2)	(3)	(4)
eshop	−0.042 (−1.17)	0.179*** (3.40)	0.181*** (3.38)	0.194*** (3.17)
Post	−0.069* (−1.78)	0.017 (0.35)	0.058 (1.13)	0.066 (1.30)
eshop*Post	0.121*** (2.62)	−0.184*** (−3.02)	−0.192*** (−3.01)	−0.252*** (−3.68)
Year FE	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES
Area FE	YES	YES	YES	YES
N	8452	8452	8452	8452

The T-value is based on standard errors adjusted for firm-level clustering. *, **, *** indicate two-sided significance levels of 10%, 5%, and 1%, respectively. As the length limit, regression results of control variables are not reported in manuscript. Same in following tables.

4.2. Robustness test

To enhance the reliability of research conclusions, the following robust tests are conducted³

- (1) Change the measurement of earnings forecasts accuracy to eliminate potential problems caused by variable measurement. Following previous literatures (Ke et al., 2020; Rogers & Stocken, 2005), we construct a new variable (Range) to measure earnings forecasts accuracy and add it into regression model as the explained variable. The measurement of Range is: the range of forecast interval = |upper limit of forecast − lower limit of forecast| × (−1)/asset. This result is consistent with our main regression results, which shows robustness of our conclusion.
- (2) limit samples to voluntary disclosures to eliminate the influence of firms regularly disclosing earnings forecasts required by compulsory disclosure policies. Considering firms required to disclose earnings forecasts have to disclose in a narrow window period, they may choose to disclose regularly in a stable window period. Thus, we limit our samples to voluntary earnings forecasts disclosures to test the robustness of earnings forecasts timeliness. This result shows that earnings forecasts timeliness in voluntary disclosing firms still significantly increases, which verifies robustness of our conclusion.
- (3) limit samples to compulsory disclosures to eliminate the influence of voluntary disclosing motivation of managers. Voluntary disclosure quality is easily be affected by managers' disclosing motivation, while compulsory disclosures can not be affected the same way as required firms have to disclose in every window period. To control the disclosing motivation of managers, we also limit our sample to firms required to disclose earnings forecasts to test robustness. The result is consistent with our main regression results, which indicates that the change of earnings forecast quality is not caused by managers' disclosing motivation.
- (4) limit samples to sustained disclosures to further eliminate the influence of managers' disclosing motivation. Compared with firms disclose unsustainably, sustainably disclosing firms are more inclined to reduce information asymmetry by

³As the length limit, results of robust tests are not reported in manuscript. Please contact authors via email if necessary.

voluntary disclosures. As these firms have more information transparency (Hu et al., 2014; D. Yang et al., 2020), to transfer private information timely, their managers usually have less incentive to selectively disclose. We use firms sustainably disclose in at least three years or firms sustainably disclose at least three times in one year respectively as samples to conduct robustness test. The results are consistent with our main regression results, which indicates that the selective disclosure motivation of managers has little influence on our conclusion.

- (5) use Heckman's two-stage regression model to exclude endogenous problems of self-selection. Follow Heckman (1979), first, we use logit regression model to test the effect of operation and disclosure environment on earnings forecasts disclosure decisions,⁴ and estimate the IMR ratio. Second, we add the IMR ratio into the second stage regression model. The result shows that the coefficient of IMR in the second stage model is not significant, suggesting the selection bias has little influence on our regression results. The coefficient of our main explanatory variables remain significant under Heckman's two-stage model, which verifies robustness of our conclusion.
- (6) Test the parallel trend hypothesis to exclude natural growth trends driven by other factors. First, we set a series time dummy variable based on the year in which firms start using 'Internet+Sales' and the time interval is from five years before and after this year. Second, we multiply each of these time-dummy variables with variable eshop to form new interaction terms. Finally, by replacing variable Post to time dummy variables and replacing variable eshop*Post to new interaction terms in previous DID model, we built a dynamic analysis model. The result shows that the difference of earnings forecast quality between treated group and controlled group only be significant when firms already started using 'Internet+Sales', suggesting that the reason why earnings forecast quality changes is 'Internet+Sales' instead of natural growth trend driven by other factors.
- (7) use Tobit regression model to eliminate the influence of censored data. Considering some firms did not disclose earnings forecasts, to avoid self-selection problem caused by data truncation, we value explained variable zero for firms without disclosures and use censored data to regress. To exclude the interference from censored data, we use Tobit regression model to conduct robust test. This result is consistent with our main regression results, which shows robustness of our conclusion.
- (8) redefine earnings forecasts by extending the deadline of earnings forecasts to the date annual reports be disclosed. Some literatures consider that forecasts issued after accounting period are actually pre-announcement (Houston et al., 2019; Rogers & Stocken, 2005) and can not be regard as earnings forecasts, while some literatures think the opposite (Bamber et al., 2010; Ciconte et al., 2014). To weaken the impact caused by different definitions, we extend the research objects to all performance announcements of firms issued before financial disclosures. The regression results are still consistent with our conclusion.

⁴In the first stage of Heckman, we add asset size, establish time, income level, growth rate, cash holding level into regression model to control the information required by owners, and financial leverage, nature of ownership, industry chain position to control the information required by creditor and investors, and tracking analysts, institutional shareholding ratio, Big4 to control the information required by external environment.

- (9) Use samples including revision announcements to eliminate the influence of definitions. Considering managers can deliver more private information via revision announcements, which may further affect earnings forecast quality, we add revision announcements into our samples. The regression results are consistent with our conclusion, indicating low impact of revision announcements.

5. Additional analysis

5.1. *Why do earnings forecasts accuracy decrease?*

Based on our analysis, managers' ability to obtain earnings information being affected by 'Internet+Sales' is the key reason why forecasts quality changes. However, during the process of business model innovation, managers' motivation of disclosing earnings forecasts also could be changed. It has been pointed out that managers' disclosure strategy can be directly affected by their disclosure motivation (X. Li et al., 2019; X. Li & Yang, 2016). Disclosure strategy includes disclosing frequency and optimistic bias. For example, managers may overpublicize their Internet utilisation for investors attraction (Zhao et al., 2020), disclose frequently to avoid regulatory risks and improve market response (X. Li et al., 2019), or disclose optimistically to send positive signals to investors (Cicconte et al., 2014; Rogers & Stocken, 2005). Thus, we further test the earnings forecasts disclosing motivation of managers. The results reported in Table 4 show that after using 'Internet+Sales', managers make no significant change on forecasts disclosing frequency or optimistic bias. The results indicate that managers will not change their disclosing strategy because of 'Internet+Sales', which excludes the possibility that the change of earnings forecast quality is caused by disclosing motivation.

It can also be observed in Table 4 that major-customers concentration and sales area concentration have both significantly dropped after using 'Internet+Sales', suggesting a great increase in sales activity uncertainty. Complex sales structure can not only have serious impact of the predictability of future earning performance (Wang & Peng, 2016), but can also intense sales markets competition (Krasnokutskaya et al., 2020), and weaken the governance on accounting information quality from major customers (Armstrong et al., 2010; Hui et al., 2012). In the case, managers may have lack incentive to make extra effort to improve estimating accuracy during their adaption to new business model. This result verifies our previous analysis that 'Internet+Sales' increases the difficulty for managers to estimate future earning performance, and then leads to a decrease in forecasts accuracy.

5.2. *How does sales uncertainty impact on forecast quality: differences in JD and TM platforms*

To further study the impact of sales activity uncertainty on earnings forecasts, we try to classify e-commerce platforms according to their different sales policies, and observe the earnings forecast quality under different degrees of sales activity uncertainty. There are two main e-commerce platforms in China, which are 'Taobao' and 'JD.com'. 'Tmall flagship store' in Taobao and 'official flagship store' in JD.com have similar sales policies, which is called 'qualification' mode. First the platforms will verify firms' sales qualification, and then

Table 4. Impacts of “Internet+Sales” Business Model

Panel A : Changes on Management Earnings Forecasts Disclosing Strategy					
	(1)	(2)	(3)	(4)	
eshop	-0.067 (-0.71)	-0.123*** (-3.14)	-0.088 (-0.92)	0.042 (0.99)	
Post	-0.372*** (-3.49)	-0.033 (-1.09)	-0.373*** (-2.99)	-0.016 (-0.43)	
eshop*Post	0.134 (1.08)	-0.007 (-0.21)	0.091 (0.61)	-0.042 (-0.79)	
Controls	YES	YES	YES	YES	
Year FE	YES	YES	YES	YES	
Industry FE	YES	YES	YES	YES	
Area FE	YES	YES	YES	YES	
N	8452	8452	8452	8452	
Panel B : Changes on Firms’ Sales Activity Uncertainty					
	(5)	(6)	(7)	(8)	(9)
eshop	-0.012*** (-3.17)	-3.882*** (-2.68)	-0.008 (-0.39)	-0.929 (-0.57)	1.057 (0.79)
Post	-0.001 (-0.31)	0.974 (0.75)	0.024 (1.43)	1.497 (1.02)	0.246 (0.16)
eshop*Post	-0.011*** (-2.58)	-5.008*** (-3.51)	-0.054*** (-2.66)	-4.550*** (-2.64)	-4.421** (-2.42)
Controls	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES
Area FE	YES	YES	YES	YES	YES
N	4814	8030	8059	8033	3832

Notes: Explained variables of Column (1)-(9) are whether disclosing earnings forecasts, the number of disclosures in different years, the number of disclosures in a year, optimistic bias, major-customers concentration, major-customers sales proportion, sales area concentration, Largest sales area proportion, Local sales proportion, respectively.

firms can deal with individual customers directly on e-commerce stores. Under ‘qualification’ mode, e-commerce platforms are only used by firms to reduce firm-customer searching costs and do not participate in firms’ sales activities. Thus, firms under ‘qualification’ mode have higher sales uncertainty. Another type of sales policy is implemented by ‘JD Self-operated Store’ in JD.com, which is called ‘self-operated’ mode. Under this mode, e-commerce platforms purchase products from firms firstly, and then sell products to individual customers by themselves. Under ‘self-operated’ mode, firms and e-commerce platforms are in supplier-customer relationship. As major customers, e-commerce platforms should purchase firms’ products regularly and quantitatively according to contracts. Thus, firms under ‘self-operated’ mode have lower sales uncertainty.

Table 5 reports earnings forecast quality on different types of e-commerce platforms. Benefit from Internet technology, earnings forecasts timeliness is significantly improved on all types of e-commerce platforms. However, there are significant differences in earnings forecasts accuracy. Under ‘qualification’ mode with high sales uncertainty, earnings forecasts accuracy is significantly decreased, which shows that sales uncertainty does have serious impact on earnings forecast quality.

Table 5. Earnings forecast quality in different e-commerce platforms.

	Timeliness			Accuracy		
	TM-Qualified	JD-Qualified	JD-Operated	TM-Qualified	JD-Qualified	JD-Operated
	(1)	(2)	(3)	(4)	(5)	(6)
eshop	−0.045 (−1.24)	−0.031 (−0.78)	−0.016 (−0.38)	0.179*** (3.27)	0.196*** (3.36)	0.092 (1.28)
Post	−0.076* (−1.95)	−0.082** (−2.14)	−0.090** (−2.27)	0.020 (0.43)	0.016 (0.33)	0.019 (0.39)
eshop*Post	0.125*** (2.69)	0.134*** (2.67)	0.138*** (2.65)	−0.188*** (−3.00)	−0.173*** (−2.59)	−0.108 (−1.39)
Controls	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES	YES
Area FE	YES	YES	YES	YES	YES	YES
N	8284	7148	6721	8284	7148	6721

5.3. Who use 'Internet+Sales' model more efficiently?

Except for sales environment, firms' characteristics can also affect the influence of 'Internet+Sales' on managers and their earnings forecasts. Through cross-sectional analysis of firms with different characteristics, we have following results.⁵ First, compared with loss-making firms and state-owned firms, profit-making firms and private firms have more use efficiency on 'Internet+Sales', indicating that 'Internet+Sales' is more efficient on firms with adequate cash or can make flexible decisions. Second, compared with large-size firms and firms with fewer e-stores, small-size firms and firms with more e-stores have more use efficiency on 'Internet+Sales', indicating that 'Internet+Sales' is more suitable for firms in growth, and firms need to use e-commerce platforms to a high degree to play its role. Finally, compared with firms in low competition industries and low market level areas, firms in intense competition industries and high market level areas have more use efficiency on 'Internet+Sales', indicating that 'Internet+Sales' can only be efficient in firms with capacity to make flexible decisions and having sense of competition.

5.4. Firms' finance status after using 'Internet+Sales' model

Furthermore, we study the impact of 'Internet+Sales' on firms' finance status. We find that 'Internet+Sales' significantly increases the sales expense and operating cost, while financial cost is decreased. It suggests that Internet payment technology can help firms save great amount of financial expense. By studying operating revenue and earnings management, we find that 'Internet+Sales' slows down the operating growth, verifying the fierce competition faced by firms. On the other hand, 'Internet+Sales' improves the earnings information quality by promoting earnings information transparency and reducing real earnings management.

⁵As the length limit, left additional analysis results are not reported in manuscript. Please contact authors via email if necessary.

5.5. The markets reaction of firms using 'Internet+Sales' model

The reaction of capital markets to new business model is concerned by investors and managers. We find that firms attract more analysts and analysis reports by using 'Internet+Sales'. Moreover, stock trading volume can be significantly increased and stock price crash risk can be reduced by using 'Internet+Sales', suggesting that 'Internet+Sales' can improve firms' external information environment.

6. Conclusion

Based on the data of firms who have open stores on e-commerce platforms, we investigate the impact of 'Internet+Sales' on management earnings forecast quality. The research results show that 'Internet+Sales' can improve firms' information environment, increase earning information transmission efficiency, and strengthen the ability of managers obtaining earnings information timely, thus significantly increasing the timeliness of earnings forecasts. However, 'Internet+Sales' can also bring negative impacts. It increases the uncertainties of sales activities, thereby weakening managers' ability to estimate future earning performance and significantly reducing earnings forecasts accuracy. We verify in additional analysis that it is the raise of sales activity uncertainty the reason why earnings forecasts accuracy drops after firms using 'Internet+Sales'.

Compared with indirect definitions of 'Internet+' in most previous literatures, we use a more direct method to determine whether a firm uses 'Internet+' model and investigate the impact of 'Internet+Sales' on earnings forecast quality from both timeliness and accuracy perspectives. The paper enriches literatures on 'Internet+' and voluntary information disclosure. Moreover, this paper provides empirical evidence for firms to make strategic decisions on 'Internet+' and helps managers deal with specific difficulties they may face in the process of transformation, thus having reference value for firms transforming to 'Internet+' model. It also helps regulators and investors understand and identify the information quality in firms using 'Internet+', reminds them that accuracy is not the only standard to evaluate earnings forecast quality, but also the timeliness. It encourages managers to make full use of Internet information technologies to improve earning information transmission efficiency in capital market.

Disclosure statement

No potential conflict of interest was reported by the author(s).

References

- Ajinkya, B., Bhojraj, S., & Sengupta, P. (2005). The association between outside directors, institutional investors and the properties of management earnings forecasts. *Journal of Accounting Research*, 43(3), 343–376. <https://doi.org/10.1111/j.1475-679x.2005.00174.x>
- Armstrong, C.S., Guay, W.R., & Weber, J.P. (2010). The role of information and financial reporting in corporate governance and debt contracting. *Journal of Accounting & Economics*, 50(2), 179–234. <https://doi.org/10.1016/j.jacceco.2010.10.001>
- Ball, R., Jayaraman, S., & Shivakumar, L. (2012). Audited financial reporting and voluntary disclosure as complements: A test of the confirmation hypothesis. *Journal of Accounting & Economics*, 53(1–2), 136–166. <https://doi.org/10.1016/j.jacceco.2011.11.005>

- Bamber, L., Jiang, J., & Wang, I. (2010). What's my style? The influence of top managers on voluntary corporate financial disclosure. *The Accounting Review*, 85(4), 1131–1162. <https://doi.org/10.2308/accr.2010.85.4.1131>
- Beyer, A., Cohen, D.A., Lys, T.Z., & Walther, B.R. (2010). The financial reporting environment: Review of the recent literature. *Journal of Accounting & Economics*, 50(2), 296–343. <https://doi.org/10.1016/j.jacceco.2010.10.003>
- Brynjolfsson, E., Malone, T.W., Gurbaxani, V., & Kambil, A. (1994). Does information technology lead to smaller firms? *Management Science*, 40(12), 1628–1644. <https://doi.org/10.1287/mnsc.40.12.1628>
- Bushman, R., Chen, Q., Engel, E., & Smith, A. (2004). Financial accounting information, organizational complexity and corporate governance systems. *Journal of Accounting & Economics*, 37(2), 167–201. <https://doi.org/10.1016/j.jacceco.2003.09.005>
- Chen, L. (2013). A Study on Innovation Mechanism of Enterprise Value Network from the Perspective of the Internet Economy. *China Industrial Economics*, (9), 82–94. <https://doi.org/10.19581/j.cnki.ciejournal.2013.09.009>
- Cheng, Q., & Lo, K. (2006). Insider trading and voluntary disclosures. *Journal of Accounting Research*, 44(5), 815–848. <https://doi.org/10.1111/j.1475-679X.2006.00222.x>
- Ciconte, W., III, Kirk, M., & Tucker, J.W. (2014). Does the midpoint of range earnings forecasts represent managers' expectations? *Review of Accounting Studies*, 19(2), 628–660. <https://doi.org/10.1007/s11142-013-9259-2>
- Doyle, J., Ge, W., & McVay, S. (2007). Determinants of weaknesses in internal control over financial reporting. *Journal of Accounting & Economics*, 44(1–2), 193–223. <https://doi.org/10.1016/j.jacceco.2006.10.003>
- Freund, C., & Weinhold, D. (2002). The internet and international trade in services. *The American Economic Review*, 92(2), 236–240. <https://doi.org/10.1257/000282802320189320>
- Gigler, F. (1994). Self-enforcing voluntary disclosures. *Journal of Accounting Research*, 32(2), 224–240. <https://doi.org/10.2307/2491283>
- Grossman, S.J., & Stiglitz, J.E. (1980). On the impossibility of informationally efficient markets. *The American Economic Review*, 70(3), 393–408. <https://www.jstor.org/stable/1805228>
- Guan, Y., Lobo, G.J., Tsang, A., & XIN, X. (2020). Societal trust and management earnings forecasts. *The Accounting Review*, 95(5), 149–209. <https://doi.org/10.2308/tar-2017-0023>
- Guo, J., & Luo, P. (2016). Can the internet improve total factor productivity? *Management World*, (10), 34–49. <https://doi.org/10.19744/j.cnki.11-1235/f.2016.10.003>
- Healy, P.M., & Palepu, K.G. (2001). Information asymmetry, corporate disclosure, and the capital markets: A review of the empirical disclosure literature. *Journal of Accounting & Economics*, 31(1–3), 405–440. [https://doi.org/10.1016/S0165-4101\(01\)00018-0](https://doi.org/10.1016/S0165-4101(01)00018-0)
- Heckman, J.J. (1979). Sample selection bias as a specification error. *Econometrica*, 47(1), 153–161. <https://doi.org/10.2307/1912352>
- Hirshleifer, D., & Teoh, S.H. (2003). Limited attention, information disclosure, and financial reporting. *Journal of Accounting & Economics*, 36(1–3), 337–386. <https://doi.org/10.1016/j.jacceco.2003.10.002>
- Hirst, D.E., Koonce, L., & Venkataraman, S. (2008). Management earnings forecasts: A review and framework. *Accounting Horizons*, 22(3), 315–338. <https://doi.org/10.2308/acch.2008.22.3.315>
- Hjort, J., & Poulsen, J. (2019). The arrival of fast internet and employment in Africa. *The American Economic Review*, 109(3), 1032–1079. <https://doi.org/10.1257/aer.20161385>
- Houston, J.F., Lin, C., Liu, S., & Wei, L. (2019). Litigation risk and voluntary disclosure: Evidence from legal changes. *The Accounting Review*, 94(5), 247–272. <https://doi.org/10.2308/accr-52355>
- Hu, B., Hwang, J.H., & Jiang, C. (2014). The impact of earnings guidance cessation on information asymmetry. *Journal of Business Finance & Accounting*, 41(1–2), 73–99. <https://doi.org/10.1111/jbfa.12061>
- Hui, K.W., Klasa, S., & Yeung, P.E. (2012). Corporate suppliers and customers and accounting conservatism. *Journal of Accounting & Economics*, 53(1–2), 115–135. <https://doi.org/10.1016/j.jacceco.2011.11.007>
- Hutton, A.P. (2005). Determinants of managerial earnings guidance prior to regulation fair disclosure and bias in analysts' earnings forecasts. *Contemporary Accounting Research*, 22(4), 867–914. <https://doi.org/10.1506/6QUR-CR5M-AQXX-KX1A>

- Johnston, R., & Petacchi, R. (2017). Regulatory oversight of financial reporting: Securities and exchange commission comment letters. *Contemporary Accounting Research*, 34(2), 1128–1155. <https://doi.org/10.1111/1911-3846.12297>
- Ju, X., Zhao, X., & Sun, B. (2020). Internet and trade costs: An empirical analysis based on cross-border e-commerce data from China SME exports. *Economic Research Journal*, 55(2), 181–196. <https://doi.org/CNKI:SUN:JJYJ.0.2020-02-013>
- Ke, R., Li, M., & Zhang, Y. (2020). Directors' informational role in corporate voluntary disclosure: An analysis of directors from related industries. *Contemporary Accounting Research*, 37(1), 392–418. <https://doi.org/10.1111/1911-3846.12522>
- Krasnokutskaya, E., Song, K., & Tang, X. (2020). The role of quality in internet service markets. *The Journal of Political Economy*, 128(1), 75–117. <https://doi.org/10.1086/703990>
- Lee, S., Matsunaga, S.R., & Park, C.W. (2012). Management forecast accuracy and CEO turnover. *The Accounting Review*, 87(6), 2095–2122. <https://doi.org/10.2308/accr-50220>
- Lendle, A., Olarreaga, M., Schropp, S., & Vézina, P. (2016). There goes gravity: eBay and the death of distance. *The Economic Journal (London)*, 126(591), 406–441. <https://doi.org/10.1111/econj.12286>
- Lennox, C.S., & Park, C.W. (2006). The informativeness of earnings and management's issuance of earnings forecasts. *Journal of Accounting & Economics*, 42(3), 439–458. <https://doi.org/10.1016/j.jacceco.2006.05.001>
- Li, B., & Li, R. (2017). Internet and firms' exports: empirical evidence from China's industrial enterprises. *The Journal of World Economy*, 40(7), 102–125. <https://doi.org/CNKI:SUN:SJJJ.0.2017-07-006>
- Li, H., Tian, Y., & Li, W. (2014). Mobile internet thinking and traditional business reengineering. *China Industrial Economics*, (10), 135–146. <https://doi.org/10.19581/j.cnki.ciejournal.2014.10.011>
- Li, X., Rao, P., & Yue, H. (2019). Stock exchange comment letters and management earnings forecast. *Management World*, 35(8), 173–188+192. <https://doi.org/10.19744/j.cnki.11-1235/f.2019.0113>
- Li, X., & Yang, H.I. (2016). Mandatory financial reporting and voluntary disclosure: The effect of mandatory IFRS adoption on management forecasts. *The Accounting Review*, 91(3), 933–953. <https://doi.org/10.2308/accr-51296>
- Lovelock, C., & Gummesson, E. (2004). Whither services marketing?: In search of a new paradigm and fresh perspectives. *Journal of Service Research: JSR*, 7(1), 20–41. <https://doi.org/10.1177/1094670504266131>
- Lu, G., Zhang, J., & Liu, B. (2017). Do voluntary positive earnings forecasts of chinese listed companies benefit public or private interests? Empirical evidence based on the major shareholders' selling of non-tradable shares. *Nankai Business Review*, 20(2), 133–143. <https://doi.org/CNKI:SUN:LKGP.0.2017-02-012>
- Luo, M., & Li, L. (2015). The innovation of business model in internet era: From value creation perspective. *China Industrial Economics*, (1), 95–107. <https://doi.org/10.19581/j.cnki.ciejournal.2015.01.009>
- Matsumoto, D.A. (2002). Management's incentives to avoid negative earnings surprises. *The Accounting Review*, 77(3), 483–514. <https://doi.org/10.2308/accr.2002.77.3.483>
- Porter, M.E., & Heppelmann, J.E. (2014). How smart, connected products are transforming competition. *Harvard Business Review*, 92(11), 64. <https://www.proquest.com/docview/1612370048?accountid=28769>
- Rogers, J.L., & Stocken, P.C. (2005). Credibility of management forecasts. *The Accounting Review*, 80(4), 1233–1260. <https://doi.org/10.2308/accr.2005.80.4.1233>
- Rogers, J.L., & Van Buskirk, A. (2009). Shareholder litigation and changes in disclosure behavior. *Journal of Accounting & Economics*, 47(1–2), 136–156. <https://doi.org/10.1016/j.jacceco.2008.04.003>
- Sandy, L., Chen, L., & Xiaorong, M. (2020). Regtech adoption and the cost of capital. Working Paper on SSRN. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3683046
- Shackleton, M.B., Tsekrekos, A.E., & Wojakowski, R. (2004). Strategic entry and market leadership in a two-player real options game. *Journal of Banking & Finance*, 28(1), 179–201. [https://doi.org/10.1016/S0378-4266\(02\)00403-X](https://doi.org/10.1016/S0378-4266(02)00403-X)
- Shi, B., & Li, J. (2020). Does the internet promote division of labor? Evidences from Chinese manufacturing enterprises. *Management World*, 36(4), 130–149. <https://doi.org/10.19744/j.cnki.11-1235/f.2020.0058>

- Skinner, D.J. (1994). Why firms voluntarily disclose bad news. *Journal of Accounting Research*, 32(1), 38–60. <https://doi.org/10.2307/2491386>
- Solow, R.M. (1956). A contribution to the theory of economic growth. *The Quarterly Journal of Economics*, 70(1), 65–94. <https://doi.org/10.2307/1884513>
- Sun, P., Zhang, J., & Jiang, X. (2017). E-commerce, searching cost and consumer price change: Evidence from the micro retailing market. *Economic Research Journal*, 52(7), 139–154. <https://doi.org/CNKI:SUN:JJYJ.0.2017-07-011>
- Thomas, W.M., Joanne, Y., & Robert, I.B. (1987). Electronic markets and electronic hierarchies. *Communications of the Acm*, 30(6), 484–497. <https://doi.org/10.1145/214762.214766>
- Verrecchia, R.E. (2001). Essays on disclosure. *Journal of Accounting & Economics*, 32(1–3), 97–180. [https://doi.org/10.1016/S0165-4101\(01\)00025-8](https://doi.org/10.1016/S0165-4101(01)00025-8)
- Wang, X., & Peng, X. (2016). Does stable relationship with customers improve the analyst forecasts about suppliers? *Journal of Financial Research*, (5), 156–172. <https://doi.org/CNKI:SUN:JRYJ.0.2016-05-011>
- Whitacre, B., Gallardo, R., & Strover, S. (2014). Broadband's contribution to economic growth in rural areas: Moving towards a causal relationship. *Telecommunications Policy*, 38(11), 1011–1023. <https://doi.org/10.1016/j.telpol.2014.05.005>
- Xia, T., Ning, F., & Li, Y. (2016). Legal knowledge background and voluntary information disclosure. *The Chinese Certified Public Accountant*, (4), 75–81. <https://doi.org/10.16292/j.cnki.1009-6345.2016.07.014>
- Xiao, H., & Li, P. (2019). Ecological governance of platform enterprises' CSR. *Management World*, 35(4), 120–144+196. <https://doi.org/10.19744/j.cnki.11-1235/f.2019.0054>
- Xin, Q., Zhou, J., & Hu, F. (2018). The economic consequences of financial fraud: Evidence from the product market in China. *China Journal of Accounting Studies*, 6(1), 1–23. <https://doi.org/10.1080/21697213.2018.1480005>
- Xue, C., Meng, Q., & He, X. (2020). Network infrastructure and the diffusion of technological knowledge: Evidence from a quasi-natural experiment. *Journal of Finance and Economics*, 46(4), 48–62. <https://doi.org/10.16538/j.cnki.jfe.2020.04.004>
- Yan, C. (2012). Social capital, innovation and long-run economic growth. *Economic Research Journal*, 47(11), 48–60. <https://doi.org/CNKI:SUN:JJYJ.0.2012-11-006>
- Yang, D., & Bi, J. (2019). "Internet Plus", entrepreneurs' external investment and corporate valuation. *China Industrial Economics*, (6), 136–153. <https://doi.org/10.19581/j.cnki.ciejournal.2019.06.008>
- Yang, D., & Liu, Y. (2018). Why can internet plus increase performance. *China Industrial Economics*, (5), 80–98. <https://doi.org/10.19581/j.cnki.ciejournal.2018.05.005>
- Yang, D., Wang, J., & Chen, H. (2020). Management earnings forecast: Market pressure or corporate governance? Evidence from corporate innovation. *Nankai Business Review*, 23(4), 107–119. <https://doi.org/CNKI:SUN:LKGP.0.2020-04-011>
- Yang, H.I. (2012). Capital market consequences of managers' voluntary disclosure styles. *Journal of Accounting & Economics*, 53(1–2), 167–184. <https://doi.org/10.1016/j.jaccedo.2011.08.003>
- Yang, J., Xue, H., & Niu, M. (2018). The conceptualization of business model: A dual dimension typology and research implications. *Foreign Economics & Management*, 40(4), 96–109. <https://doi.org/10.16538/j.cnki.fem.2018.04.008>
- Zhang, R., & Zhang, P. (2011). The management earnings forecast incentives in China. *China Accounting Review*, 9(1), 3–20. <https://doi.org/CNKI:SUN:ZKJP.0.2011-01-007>
- Zhang, X., & Chen, D. (2020). Business model, value co-creation and governance risk of enterprises in the era of mobile internet: Case study on financial fraud of Luckin coffee. *Management World*, 36(5), 74–86+11. <https://doi.org/10.19744/j.cnki.11-1235/f.2020.0071>
- Zhao, C., Cao, W., Yao, Z., & Wang, Z. (2020). Will "Internet Plus" help to reduce the cost stickiness of enterprises? *Journal of Finance and Economics*, 46(4), 33–47. <https://doi.org/10.16538/j.cnki.jfe.2020.04.003>
- Zhao, Z. (2015). Crossover administration of "Internet Plus": Perspective of creative destruction. *China Industrial Economics*, (10), 146–160. <https://doi.org/10.19581/j.cnki.ciejournal.2015.10.011>
- Zhou, G., & Liang, Q. (2018). Internet usage, market frictions and household investment on risky financial assets. *Journal of Financial Research*, (1), 84–101. <https://doi.org/CNKI:SUN:JRYJ.0.2018-01-006>