Empirical Study on Work Pressure, Regional Differences and Audit Quality Based on Big Data

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Abstract. As an important monitoring mechanism for company management, the quality of audit affects the achievement of audit business objectives. In this paper, we selected A-share listed companies in China from 2015–2019 as the research sample, used the analysis method of multiple linear regression, and conducted correlation analysis and robustness test by stata 16 software to empirically study the impact of work pressure and regional differences on audit quality. The main findings are as follows: (1) Work pressure of signing CPA has negative impact on audit quality. (2) Regional differences in signing CPA have negative impact on audit quality. (3) Regional differences in signing CPA enhance the negative impact of work stress on audit quality. Finally, the paper makes recommendations from three aspects: accounting firms, government at all levels and audited entities.

Keywords: Audit Quality · Work Pressure · Regional Differences · Signing CPA

1 Introduction

In recent years, a series of corporate financial fraud cases have erupted, seriously shaking the public's trust in the authenticity and reliability of accounting information, as well as calling into question the practising ethics and competence of certified public accountants. As a result, the audit quality of financial statements of listed companies has attracted much attention. In the existing research literature, most of them study its impact on audit quality at the level of listed companies and accounting firms, but there is little literature to study its impact on audit quality at the level of signatory accountants. Based on this, this paper will study the impact of work pressure and regional differences of signing CPA on audit quality in China, and make up for the inadequacy of the existing literature in studying audit quality solely from the perspective of work pressure.

2 Literature Review

In studying the factors influencing audit quality, most domestic and international scholars have explored the three aspects audit subject, audit object and audit environment. Gardner (1986) [1] studied the relationship between time pressure and audit quality based on

activation theory and found that there was an inverted U-shaped relationship between the two, which could be either positively or negatively correlated. Agoglia (2010) [2] found that that teams of auditors often take measures such as continuous overtime and extended working hours to perform audit procedures, which forces signing CPA to produce audit reports in a high-pressure environment and undoubtedly reduces efficiency and effectiveness significantly. Lopez, Peters (2012) [3] showed that if signing CPA spend more time and effort on other audit engagements, they will devote less time to the audit report, thus affecting the reliability of audit quality. In this regard, hypothesis H1 is proposed.

H1: Work pressure of signing CPA negatively affects audit quality.

Yao Zhenye (2009) [4] divided firms into east-west and north-south directions according to regions, and the study showed that there is a relatively significant relationship between firm regional differences and audit quality. Kan Jinghua and Wang Hui (2016) [5] calculated the geographical distance between the firm and the audited entity by manually collecting data, and found that audit quality is more significantly affected by geographical location when the administrative regions are consistent. Therefore, this paper proposes hypothesis H2 from the perspective of differences caused by different levels of economic development between different regions.

H2: Regional differences in signing CPA negatively affect audit quality.

The above study has analysed the impact of two factors, namely work pressure and regional differences of signing CPA, on audit quality alone from a single factor perspective. However, in the process of handling audit engagements, economic, political, social and cultural differences between different geographical areas may cause audit difficulties and increase audit costs and work pressure. A higher economic level may indirectly enhance the work pressure of signing CPA and reduce the quality of audits. Therefore, this paper further investigates whether regional differences moderate work stress and audit quality in terms of the geographical location of the city where the CPA firm is located. Thus, this paper proposes hypothesis H3.

H3: Regional differences of signing CPA will enhance the negative effect of work stress on audit quality.

3   Empirical Research Design

In this paper, 12,245 A-share listed companies in China from 2015–2019 were selected as the research subjects, and with reference to the study by Firth et al. (2012) [6], audit quality was set as the dependent variable in this paper, and work pressure, regional differences and the cross-product of the two were the explanatory variables. Referring to the work stress measure proposed by Yan & Xie (2016) [7], the mean of the natural logarithm of the asset size of the companies audited by signing CPA in the year is measured by the following formula.

$$WS = \frac{\sum\limits_{i=1}^{m} \sum\limits_{j=1}^{n} SIZE_{ij}}{M} \qquad (1)$$

In the above equation, the magnitude of WS value reflects the degree of work pressure of signing CPA. Through the survey statistics of M signing CPA, the WS value of i

Table 1. Definition and description of variables

Variable symbols	Description
Opinion	Dummy variable. 1 if the auditor issues an unqualified opinion, 0 otherwise
WS	LN (sum of total assets of clients signed by n signatory accountants)/n
Local	Dummy variable, according to the level of economic development of the region (province) where the audited entity is located, we select the value of the most economically developed area as 1, otherwise it is 0
WS*Local	The cross-product of work pressure and regional differences
Size	Measured as the natural logarithm of total assets
Loss	Dummy variable. Loss = 1 if the company's net profit for the year is negative, 0 otherwise
Roa	Net Profit/Total Assets
Lev	Liabilities/Total Assets
Big8	Dummy variable. Audited by eight firms takes the value of 1, otherwise 0
Change	Dummy variable. Current period audited by the changed firm takes a value of 1, otherwise 0
Days	LN (absolute number of days between the end date of the accounting year and the date of the audit report)
Gender	One of the two signing CPAs is female takes the value of 1, otherwise it is 0
Tenture-F	Average of consecutive years the firm has been audited

signing CPA to j A-share listed companies is calculated, thus reflecting the degree of work pressure of signing CPA.

This paper draws on the measurement method of Yao Zhenye (2009) [4] and sets regional differences as dummy variables. Based on the level of economic development of the region (province level) where the audited entity is located, the geographical area where the audited entity is located is divided into developed regions and non-developed regions; we select Beijing, Shanghai, Guangzhou and Shenzhen as the most developed regions with a value of 1, and other regions as non-economically developed regions with a value of 0. The following nine control variables were selected for this paper, as shown in Table 1.

To test the three hypotheses above, three models are developed in this paper as follows.

$$\text{Opinion} = \partial_0 + \partial_1 \text{WS} + \partial_2 \text{ Size} + \partial_3 \text{Loss} + \partial_4 \text{Roa} + \partial_5 \text{Lev} + \partial_6 \text{Big8} \\ + \partial_7 \text{ Change} + \partial_8 \text{ Days} + \partial_9 \text{ Gender} + \partial_{10} \text{ Tenture} - \text{F} + \varepsilon \tag{2}$$

$$\text{Opinion} = \partial_0 + \partial_1 \text{ Local} + \partial_2 \text{ Size} + \partial_3 \text{ Loss} + \partial_4 \text{Roa} + \partial_5 \text{Lev} + \partial_6 \text{ Big 8} \\ + \partial_7 \text{ Change} + \partial_8 \text{ Days} + \partial_9 \text{ Gender} + \partial_{10} \text{ Tenture} - \text{F} + \varepsilon \tag{3}$$

$$\text{Opinion} = \partial_0 + \partial_1 \text{WS} + \partial_2 \text{ Local} + \partial_3 \text{WS} * \text{ Local} + \partial_4 \text{ Size} + \\ \partial_{5 \text{ Loss}} + \partial_{6 \text{ Roa}} + \partial_{7\text{Lev}} + \partial_{8\text{Big}} + \partial_9 \text{ Change} \\ + \partial_{10 \text{ Days}} + \partial_{11 \text{ Gender}} + + \partial_{12} \text{ Tenture} - \text{F} + \varepsilon \tag{4}$$

In the above equation, ∂_0 is the constant term, ∂_0, ∂_1, ∂_2 ... ∂_i ... ∂_j are the coefficients of each variable, and ε is the error term.

4   Empirical Results Analysis

As can be seen from Table 2, the mean value of the explanatory variable Opinion is 0.0529, indicating that the number of companies issued with non-standard audit opinions in the sample data of companies is relatively small, and the proportion is only 5% (the observed value is 648), while the number of companies issued with standard audit opinions is 11,597, which shows the number of standard audit opinion reports is much higher than the number of non-standard audit opinions.

The explanatory variable WS has a minimum value of 0.347, a maximum value of 3.18 and a mean value of 2.491, indicating that there is a wide variation in the work stress of signing CPA during the audit process, with some signing CPA having a heavy workload and being very busy, while others are more laid back, which may be related to the size and location of the firm. The mean value of Local was 0.197, indicating that 19.7% of the firms in the sample were located in the most economically developed regions, while firms located in developed regions accounted for 80.3% of the total sample.

Among the control variables, the mean value of Size is 22.44, the smallest value is 15.98 and the largest value is 28.64, so it can be seen that there is a wide range of size among A-share listed companies. The mean value of Loss is 0.127, and the number of companies with losses is relatively small, accounting for only 12.7% of the total number of companies listed in A-shares. The mean value of Roa was -9.775, indicating that many companies in the sample have been experiencing negative profit growth.

Table 2. Descriptive statistical analysis

Variable	N	Mean	Average	Min	Max
Opinion	12,245	0.0529	0.224	0	1
WS	12,245	2.491	0.518	0.347	3.180
Local	12,245	0.197	0.398	0	1
Size	12,245	22.44	1.344	15.98	28.64
Loss	12,245	0.127	0.333	0	1
Roa	12,245	-9.775	471.0	-36,206	7,310
Lev	12,245	0.453	0.413	0.008	30.68
Big8	12,245	0.666	0.472	0	1
Change	12,245	0.105	0.306	0	1
Days	12,245	4.574	0.220	2.485	6.387
Tenture-F	12,245	8.001	5.862	0	35
Gender	12,245	0.488	0.500	0	1

Table 3. Multiple regression linear analysis

Model (1)		
Variable	**Coef.**	**P**
WS	-0.012**	0.025
Size	-0.025***	0.000
Loss	0.181***	0.000
Roa	-0.000***	0.000
Lev	0.088***	0.000
Big8	-0.001***	0.883
Change	0.026**8	0.000
Days	0.079***	0.000
Tenture-F	0.001***	0.006
Gender	0.009**	0.012
Cons	0.224***	0.000
R²	16.43%	
F	240.79	

Note: *, **, *** denote the 10%, 5% and 1% significance levels respectively.

Model (2)		
Variable	**Coef.**	**P**
Local	-0.010**	0.031
Size	-0.024***	0.000
Loss	0.180***	0.000
Roa	-0.000***	0.000
Lev	0.089***	0.000
Big8	-0.011***	0.007
Change	0.025***	0.000
Days	0.078***	0.000
Tenture-F	-0.001***	0.002
Gender	-0.009**	0.016
Cons	0.189***	0.000
R²	16.42%	
F	239.54	

Note: *, **, *** denote the 10%, 5% and 1% significance levels respectively.

Model (3)		
Variable	**Coef.**	**P**
WS*Local	-0.005***	0.007
Size	-0.024***	0.000
Loss	0.181***	0.008

Table 3. (*continued*)

Roa	-0.000***	0.003
Lev	0.088***	0.000
Big8	-0.010**	0.013
Change	0.026***	0.000
Days	0.078***	0.000
Tenture-F	0.001***	0.002
Gender	-0.008**	0.018
Cons	0.187***	0.000
R^2	16.44%	
F	241.05	

Note: *, **, *** denote the 10%, 5% and 1% significance levels respectively.

As can be seen from Table 3, the coefficient of model (1) for work pressure is -0.012, which is significantly negatively correlated at 5% statistical level, indicating that job stress has a significant impact on audit quality, and the regression results support hypothesis H1.

The coefficient of model (2) for regional differences is -0.010, which is significantly negative at the 1% level. This indicates that regional differences can, to some extent, adversely affect audit quality, validating H2.

Model (3) The cross product term of job stress and regional differences is -0.005, which is significantly positively correlated at the 1% statistical level, indicating that regional differences enhance the negatively effect of job stress on audit quality, and the regression results support hypothesis H3.

To further validate the findings of the study, "work pressure" was replaced by the average of the number of firms audited by the accounting firm as a proxy indicator. After replacing the measure of work pressure, research hypotheses H1, H2 and H3 were regressed and the regression results are shown in Table 4 below.

As can be seen from Table 4, the adjusted R2 for models (1) (2) and (3) were 16.43%, 16.42% and 16.44% respectively, and the significance of the regression equations were all 0.000, indicating that the overall fit was good and there was no multicollinearity. The direction and significance of the coefficients of the various variables remained largely unchanged, indicating that the regression results were robustly tested and the research hypotheses were validated.

Table 4. Robustness test results for model (1) (2) (3)

Model (1)		
Variable	**Coef.**	**P**
WS	-0.011***	0.000
Size	-0.025***	0.000
Loss	0.181***	0.000
Roa	-0.000***	0.000
Lev	0.088***	0.000
Big8	-0.001***	0.000
Change	0.026**8	0.000
Days	0.078***	0.000
Tenture-F	0.001***	0.006
Gender	0.009**	0.009
Cons	0.224***	0.000
R²	16.44%	
Sig	0.000	

Note: *, **, *** denote the 10%, 5% and 1% significance levels respectively.

Model (2)		
Variable	**Coef.**	**P**
Local	-0.010**	0.031
Size	-0.024***	0.000
Loss	0.180***	0.000
Roa	-0.000***	0.000
Lev	0.089***	0.000
Big8	-0.011***	0.007
Change	0.025***	0.000
Days	0.078***	0.000
Tenture-F	-0.001***	0.002
Gender	-0.009**	0.016
Cons	0.189***	0.000
R²	16.42%	
Sig	0.000	

Note: *, **, *** denote the 10%, 5% and 1% significance levels respectively.

Model (3)		
Variable	**Coef.**	**P**
WS*Local	-0.001**	0.043
Size	-0.024***	0.000
Loss	0.181***	0.000
Roa	-0.000***	0.000

Table 4. (*continued*)

Lev	0.088***	0.000
Big8	-0.011**	0.007
Change	0.026***	0.000
Days	0.078***	0.000
Tenture-F	0.001***	0.002
Gender	-0.008**	0.016
Cons	0.187***	0.000
R^2	16.42%	
F	241.05	

Note: *, **, *** denote the 10%, 5% and 1% significance levels respectively.

5 Conclusion

The main findings of this paper are as follows: (1) Signing CPA work stress is significantly and negatively related to audit quality. (2) Regional differences in signing CPA have negative impact on audit quality. (3) All other things being equal, the work pressure of signing CPA will have much negative impact on audit quality due to regional differences.

In this regard, this paper makes the following recommendations: (1) improve the working environment by improving the management system of the accounting firm and reduce the work pressure of signing CPA. (2) Strengthen the supervision and guidance of government departments at all levels on the audit market, create a good legal environment, and gradually reduce regional differences. (3) optimise the corporate governance structure of audited entities. Adjust the structure of the board of directors, hold regular board meetings and strengthen the independence of the board of directors.

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