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Correlation Test of Accounting Surplus Information on Macroeconomic Forecast

-- With the Whole Social Fixed Assets Investment as the Intermediary Variable Empirical

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Abstract

Since Ball and Brown first introduced the empirical paradigm, the usefulness of accounting information has long been the attention of empirical accounting research. Most of the current research focuses on exploring the impact of micro-level accounting information on investment subjects, and ignores the functional transformation of accounting information from micro-data to macro prediction. In this paper, the financial data of Shanghai and Shenzhen A-share listed companies from 2003 to 2021 are selected as the research sample to conduct an empirical study on the correlation test of the aggregate accounting surplus on the future GDP forecast, and analyze the intermediary effect of fixed asset investment in the whole society. The results show that the growth rate of aggregate accounting surplus has a significant positive relationship with the future GDP growth rate, and the fixed asset investment of the whole society can promote the micro enterprise surplus to empower the macro GDP growth, and the intermediary effect is obvious. Based on this, this paper suggests to improve the operation vitality of enterprises, reduce the cost of investment and financing of enterprises, and transform into the continuous driving force of national economic growth.

Keywords

Accounting Surplus Information; National Economic Growth; Fixed Assets Investment of the Whole Society.

1. Foreword

From the micro point of view, accounting information is a record of the economic activities of enterprises, which can truthfully reflect the various intertwined changes and characteristics of the value movement. Since 1968 Ball and Brown pioneering accounting surplus information content into the empirical paradigm[1], the study of accounting surplus information content become a key breakthrough point in the field of accounting, follow-up research based on the correlation with the basic paradigm, extended to the accounting information quality, relevance, sustainability and comparability of classic empirical problems. The relationship between enterprise behavior and capital market has always been the key issue in the accounting field, but accounting research pays less attention to the macroeconomic consequences of enterprise accounting behavior and accounting information. From a macro point of view, since China joined the WTO in 2001, GDP has attracted worldwide attention.gross domestic product (GDP), as the core index of national economic accounting, can effectively reflect Chinas macroeconomic development. Chinas traditional GDP prediction methods mainly include ARIMA model prediction method, BP neural network prediction method, grey prediction method (GM), combined model prediction method and other[2],but the information used in the above methods does not include accounting information.The GDP under the expenditure method is

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mainly composed of four parts: operating surplus, labor remuneration, taxation and depreciation of fixed assets. From the perspective of the composition of GDP,the micro accounting information of enterprises is strongly related to the macro GDP statistics[3]. Therefore, it builds an internal bridge for the construction of "micro-macro" mode research between accounting surplus information and GDP.

Konchitchki and Pataouks (2014) used the data of the US capital market to point out that the accounting surplus has a forecast effect on the future GDP growth rate[4]. Therefore, it inspires a lot of discussion on the information content characteristics and internal mechanism of summarizing accounting surplus, and gradually formed the emerging research direction of "macro accounting".The subsequent research is mainly carried out along two routes: one is to provide theoretical explanation for the different performance of the information content of summarizing accounting surplus;the other is to seek the empirical evidence of the information content of summarizing accounting surplus from the level of macroeconomic operation[5].Accounting is to influence and reflect the whole macro-economy from the most micro level. The macro economy as a whole is a collection of corporate activity, with most companies taking tightening measures on the basis of their balance sheets when the economy is in decline. It can be seen that the interpretation of macro economy on the basis of balance sheet is different from the interpretation of investment, consumption and export, which indicates that it may provide a new perspective, that is,to explain the interpretation of macro economy from the micro level.

Therefore, this paper will use the Shanghai and Shenzhen A-share listed companies from 2003 to 2021 as samples to study the macroeconomic forecast value of continuous enterprise earnings information. The innovation of this paper is to introduce the element of fixed asset investment as the intermediary variable, and to explore the role of investment in the transformation from "micro-macro" enterprise benefit to economic efficiency. In the academic sense, the study of the correlation between aggregate surplus and economic growth expands the related research of accounting surplus, makes people pay more attention to macro accounting information, and provides a new direction for the research of accounting information. In a practical sense,in view of the actual situation that the current macro forecast is often separated from accounting information and pays attention to time series research, the research of accounting information provides a new information source for macroeconomic forecast.

2. Literature Review

As pioneers of empirical research, Ball and Brown (1968) first used the data of 261 American companies to test the correlation between accounting surplus and stock prices. They found that the companys unexpected surplus could predict the unremarkable returns of stocks, and the companies that received favorable announcements could obtain positive extraordinary returns[1]. Beaver (1979) selected 276 samples and classified the unexpected surplus from 1965 to 1974. The results showed that the direction of stock price change and the same direction of accounting surplus, which again verified the empirical results of Ball and Brown[6]. Arime (1993) examined the relationship between the accounting surplus and the stock return rate through the association research and event research method, and drew the conclusion that the accounting surplus information can affect the investors of American securities companies [7].At the same time, domestic scholars also test the information content of the accounting surplus. Zhao Yulong (1999) used 123 listed companies of the Shanghai Stock Exchange as the research sample to have concluded that there is a positive correlation between the unexpected surplus of the sample enterprises and the abnormal return rate of stocks[8].Chen Xiao et al. (1999) selected Shanghai and Shenzhen A-share companies as A sample, and also reached the

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same conclusion[9].Xue Zuyun (2004) studied the usefulness of quarterly surplus data and showed that quarterly data also had effects with similar information content[10].Similar studies include Wu Shong (2001)[11], Sun Aijun (2002)[12], Zhang Guoqing (2006)[13],etc.

Surplus represents the profitability of the company, and high surplus often causes high returns in the stock market, which is widely accepted by scholars at home and abroad. However, in a study of the overall surplus in the US market, Kothari (2006) found that the accounting surplus was used to predict inflation expand. The study found that the accounting surplus contained future inflation information, but the macro predictor did not take this point into account when forecasting[14].As a result, people began to believe that the overall level of accounting information has its special information content, so scholars are enthusiasm for the overall surplus.Konchutchki and Patatoukas (2014)[4] forecasts the growth of GDP based on the DuPont analysis system with asset turnover and profit margin as incremental information. It points out that accounting information is the main driver of macroeconomic growth, which will not only affect the stock price and monetary policy, but also predict the growth of GDP, providing a paradigm for subsequent research. Domestic scholars have also gradually carried out some studies focusing on the role of corporate financial information in macroeconomic prediction. The empirical study by Fang Junxiong (2015) shows that the quarterly overall financial accounting surplus information of listed companies in China has significant macro forecast value, but there are significant differences among analysts with different experiences in the use of financial accounting surplus information [15].Tang Song (2015) showed that the overall accounting surplus growth rate of listed companies in China is significantly positively correlated with the future GDP growth rate. The research also compared the information content before and after the implementation of the new accounting standards in 2007, and found that the information content after the implementation of the new standards increased [16].Luo Hong (2016) also conducted a similar study, and the above relationship remains[17] after controlling for stock returns. From their research, it is found that the quarterly accounting surplus of listed companies has obvious macro forecast value.

To sum up, as an important accounting information of enterprises, accounting surplus not only has a certain information content at the enterprise level, but also has a certain impact on the stock price, future surplus and other information.At the same time, the overall surplus also has a certain information content.Foreign studies have proved that it has a certain impact on the macro economy and can play a role in predicting the future macro economy.This provides guidance for us to study Chinas overall surplus, and also provides a path to study the relationship between micro enterprise accounting information and macro economy.Therefore, it is necessary to study the future economic growth from the perspective of accounting surplus, and it is also an effective supplement to the study of the linkage effect of macro and micro economy in China.

The reason why the existing aggregate accounting surplus can predict GDP growth is mainly because the accounting process of enterprise surplus under the standard system is highly compatible with the national economic accounting system, which not only constitutes an important component of GDP under the income method, but also is closely related to other components of GDP. Therefore, as the output information at the enterprise level, the accounting surplus "naturally" has the link function of connecting the micro enterprise and the macro economy. Corporate surplus is not only part of the mechanical GDP revenue accounting method, but also a core driver of economic growth. As an important part of the economic system, companies will also have a profound impact on other economies in the process of economic development. From the perspective of economic growth source, according to the theory of cob-Douglas production function, total output is determined by capital investment, labor investment and comprehensive technology level, the increase of corporate profits may encourage enterprises to use surplus funds to expand production scale, further into capital,

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labor, technology, etc.,so as to further increase the company output, promote economic growth[18]. From the perspective of Keynesian national income decision theory,investment, consumption and export are the three carriages to promote economic development.The increase of corporate profits may promote investment,increase residents personal income,promote consumption, and stimulate domestic demand.Surplus, as a representative of profit, may promote a variety of economic factors, and then promote the future economic growth.Based on the above theoretical analysis and path research,in view of the question of whether the surplus can reflect the macro economy,we first study and summarize the correlation relationship between accounting surplus and macroeconomic growth, and propose hypothesis 1:

H1: Summary of accounting surplus information is positively correlated with future macroeconomic growth.

On the basis of the above assumptions, the whole society fixed asset investment is included as the intermediary variable to investigate the intermediary effect of the whole society fixed asset investment,and hypothesis 2:

H2:The fixed asset investment of the whole society can play an intermediary effect in the process of summarizing accounting surplus and predicting macroeconomic growth.

3. Research Design

3.1. Model Construction

According to the above assumptions, this paper refers to Konchitchki and Patatoukas (2014) [4], select data and build a model to test the correlation of the accounting surplus information to the macroeconomic forecast, that is, whether there is a significant correlation between the accounting surplus information and the future macro GDP growth rate. The research model is shown in equations (1) and (2):

$$\Delta \mathrm{GDP}_{t+k} = \alpha_k + \beta_k \Delta PRO_t + \varepsilon_{t+k} \quad (1)$$

$$\Delta \mathrm{GDP}_{t+k} = \alpha_k + \beta_k \Delta PRO_t + \varphi \Delta \mathrm{GDP}_t + \varepsilon_{t+k} \quad (2)$$

Among them, ΔGDP_{t+k}as the explained variable, indicating the nominal GDP growth rate, the selection of nominal GDP is based on the adjustment of the current accounting measurement is not included in the price changes. Setting k= {1,2,3,4} indicates the different quarters, including the forecast for the next four quarters from the following quarter. The calculation formula is ΔGDP_{t+k} = (nominal GDP increment in k period of the current year-nominal GDP increment in k period of the previous year) nominal GDP increment in k period of the previous year. The main explanatory variables ΔPRO_t represent the growth rate of aggregate accounting surplus. First, calculate the a-share listed companies (the net profit generated in the current year k-the net profit generated in the previous year k) and the net profit generated in the previous year , and then consider the influence of the total market value of the selected companies at the beginning of the period. It represents the correlation coefficient of aggregate accounting surplus information and future GDP growth rate, and represents constant and random interference terms respectively. Model (2) added the current nominal GDP growth rate on the basis of model (1) as the control variable.

At the same time, the investment is an important part of the measurement of GDP income method, and the accounting surplus can affect the capital cost of enterprises, thus affecting the investment expenditure of enterprises. The investment is taken as the intermediary effect

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between the surplus content of micro enterprise accounting information and the macro nominal GDP growth rate. Further construct the following measurement model:

$$\Delta \mathrm{GDP}_{t+k} = \alpha_k + \beta_k \Delta PRO_t + \beta_k \Delta PRO_t \times \mathrm{M}_{\mathrm{kt}} + \varepsilon_{t+k} \quad (3)$$

$$\Delta \mathrm{GDP}_{t+k} = \alpha_k + \Delta PRO_t + \beta_k \Delta PRO_t \times \mathrm{M}_{\mathrm{kt}} + \varphi \Delta \mathrm{GDP}_t + \varepsilon_{t+k} \quad (4)$$

In the formula, M_{kt} represents the growth rate of fixed asset investment of the whole society, $\Delta PRO_t \times \mathrm{M}_{\mathrm{kt}}$ is the transfer of accounting surplus information and fixed asset investment of the whole society, reflecting the intermediary effect of investment in summarizing the accounting surplus information to predict macroeconomic growth. The meaning of the other variables is shown above.

3.2. Data Source

Since the quarterly financial reports of Chinas listed companies disclosed in the first quarter of 2003 began,this paper takes the data of the first quarter of 2003 as the data source. For the need to calculate year-over-year changes, the available sample interval.The time span studied in this paper is from the first quarter of 2004 to the fourth quarter of 2021, with a total of 72 quarterly observations in 18 years. The quarterly nominal GDP is from the database of the National Bureau of Statistics, the year-on-year growth rate of fixed asset investment and the quarterly financial data of listed companies are from the National Taian CSMAAR database. Due to the consideration of the predictable correlation in this paper, the financial indicators of the selected listed companies are partially eliminated: and the following samples are excluded: ① samples in the abnormal trading state such as ST, PT and delisting; ② financial data and missing total market value; ③ is to control the influence of outlier, and the year-on-year growth of company surplus in each quarter is outside the 1% quartile and 99% quartile.

4. Empirical Analysis

4.1. Descriptive Analysis of the Variables

Table 1. Descriptive statistics of the variables are presented

variable	mean	standard error	crest value	least value	sample number
ΔGDP_{t+k}	0.126	0.057	0.239	-0.055	72
ΔPRO_t	0.217	0.194	0.675	-0.193	72
ΔM_{kt}	0.183	0.109	0.478	-0.161	72

Table 1 is the descriptive statistical results of the main variables. The average year-on-year growth rate of nominal GDP (ΔGDP_{t+k})is 12.6%, and the standard deviation is 0.057. It can be seen that Chinas GDP growth rate ranges from 2004 to 2021, maintaining a stable growth rate with a small fluctuation range. Since 2004, the minimum year-on-year nominal GDP growth rate was-0.055, occurring in the first quarter of 2020, possibly due to the economic development hindered by the epidemic. The average growth rate of the consolidated accounting surplus(ΔPRO_t) was 0.217, the maximum value was 0.675, the minimum value was-0.193, and the standard deviation was 0.194. The average growth rate of fixed asset investment in the whole society(ΔM_{kt}) is 18.3, the maximum value is 47.800, and the minimum value is-0.161. The standard deviation of the growth rate of the growth rate of the fixed asset investment in the whole society, which can reflect the fact that the volatility of the financial information of the micro enterprise is larger compared with that of the macroeconomic data.

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4.2. Empirical Results and Analysis

4.2.1. Empirical Results Analysis of the Correlation between Accounting Surplus Information and Macroeconomic Forecast

Using Eviews10.0 software, the above formula (1) (2) is used to analyze the correlation of the relationship between accounting surplus information and macroeconomic forecast. Table 2 is the analysis results of the correlation between accounting surplus information and macroeconomic forecast.

As can be seen from the analysis results of model (1), the consolidated accounting surplus by quarters has a significant positive relationship with the nominal GDP growth rate in the next four quarters. The coefficients of the growth rate of the consolidated accounting surplus are 0.179,0.165,0.158 and 0.142 respectively, and the regression coefficient of the four quarters is significant at the significant level of 1%. According to model (1), from 0.372 in the first quarter to 0.243 in the fourth quarter, showing a gradual downward trend, it can be seen that with the forecast time, the forecast correlation of the overall accounting earnings information on the future GDP growth rate will gradually weaken.

As can be seen from the analysis results of the model (2), after the introduction of the control effect of the current GDP, the results of the model regression have changed significantly compared with the model (1). Although quarterly summary of accounting surplus and the next four quarters of nominal GDP growth rate still present positive correlation, but the coefficient of summary accounting surplus growth rate of(β_k) 0.030,0.026,0.028,0.013, it can be seen that quarterly summary of accounting surplus and the next four quarters of nominal GDP growth rate correlation, from the corresponding P value, support in 5% in the second quarter and the fourth quarter significant, the significance of the model also decreased. However, from the overall regression effect of the model, the comparison model (1), model (2) R^2 has been significantly improved, which is the quarterly continuity of Chinas GDP is strong, the current period of GDP growth rate and the GDP growth rate in the future quarters have a positive correlation. Therefore, after adding the vacancy effect of the current GDP growth rate, the overall ability of the model to explain the future economic growth is affected, and the model R^2 is significantly improved. This part also affects the ability of the accounting surplus to forecast future GDP, which can be found from the decline of the coefficient, significance level and goodness of fit of the accounting surplus coefficient.

Table 2. Empirical results of the correlation of accounting surplus information on macroeconomic forecast

model	k=1		k=2		k=3		k=4	
	model (1)	model (2)	model (1)	model (2)	model (1)	model (2)	model (1)	model (2)
ΔPRO_t	0.179***	0.030**	0.165***	0.026***	0.158***	0.028**	0.142***	0.013***
	(6.40)	(3.56)	(5.67)	(4.39)	(5.32)	(2.44)	(4.60)	(5.58)
ΔGDP_{t+k}		0.781***		0.781***		0.709***		0.807***
		(8.91)		(9.52)		(9.66)		(9.95)
R^2	0.372	0.712	0.322	0.710	0.300	0.709	0.243	0.700
N	71		70		69		68	

Note *** ** *are significant at significance levels of 1%, 5% and 10%, respectively.

The overall integrated model (1) and model (2) can be seen. The growth rate of aggregate accounting surplus has a significant role in predicting future GDP growth. As one of the multiple interest subjects under the background of market economy, the surplus capacity of enterprises

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is an essential driving force of economic growth, which is closely related to the sustainability of future economic growth. However, with the increase of the time span, the correlation between the aggregate accounting surplus and the future GDP will gradually decrease, and its ability to predict the future economic trends will also continue to decline.

4.2.2. Analysis of the Intermediary Effect of Fixed Asset Investment in the Whole Society

Model (3) After including the increase rate of fixed asset investment in the whole society, the consolidated accounting surplus(β_k)was 0.106,0.054,0.012 and 0.08 respectively, which was lower compared with model (1), and the ability of consolidated accounting surplus to explain future GDP growth in model (3) was lower. However, from the overall perspective of the model, the improvement of the model'R^2 is due to the improvement of the ability of forecasting macroeconomic growth by the addition of the aggregate accounting surplus and the fixed asset investment of the whole society($\Delta PRO_t \times \Delta M_{kt}$). The regression coefficients of the multiplication terms were 0.250,0.386,0.500 and 0.731, respectively, which not only showed significant positive correlation, but also increased with the time span. On the one hand, the reason is the time lag of enterprise accounting surplus into investment and financing, and on the other hand, investment, as one of the main driving forces of economic growth, has a sustainable diffusion effect.

After the inclusion of the control variable of GDP growth rate in the current period, the regression results of model (4) showed that the coefficient of GDP growth rate in the current period was 0.795,0.567,0.329 and 0.138 respectively, which gradually decreased with the passage of seasons. Compared to model (2), the current GDP growth rate in model (4) is also significantly lower. Comparison model (4) in the summary accounting surplus and the whole society investment in fixed ($\Delta PRO_t \times \Delta M_{kt}$)assets by the regression coefficient of 0.343,0.453,0.547,0.698 can be seen ΔGDP_{t+k} with $\Delta PRO_t \times \Delta M_{kt}$ the direction of the two variable coefficient of the reverse relationship, it can be seen that the enterprise under the accounting surplus of fixed assets investment than GDP itself has more sustained economic growth momentum.

Table 3. Analysis of the intermediary effect of the fixed assets investment in the whole society

model	k=1		k=2		k=3		k=4	
	model (1)	model (2)	model (1)	model (2)	model (1)	model (2)	model (1)	model (2)
ΔPRO_t	0.106***	0.076***	0.054***	0.053***	0.012**	0.024**	0.008**	0.009***
	(5.82)	(6.52)	(4.75)	(5.16)	(2.16)	(4.87)	(1.58)	(2.91)
$\Delta PRO_t \times \Delta M_{kt}$	0.250***	0.343**	0.386***	0.453**	0.500***	0.547***	0.731***	0.698***
	(8.79)	(2.35)	(7.58)	(2.34)	(6.16)	(2.89)	(4.24)	(4.31)
ΔGDP_{t+k}		0.795***		0.567***		0.329***		0.138**
		(9.34)		(5.03)		(3.60)		(2.38)
R^2	0.483	0.832	0.428	0.750	0.406	0.744	0.307	0.706
N	71		70		69		68	

Note *** ** *are significant at significance levels of 1%, 5% and 10%, respectively.

The regression results of model (3) and model (4) can show that the fixed asset investment of the whole society can play an intermediary role in the prediction of macroeconomic growth rate by accounting surplus information. Because the micro level accounting surplus will improve the enterprise.The equity capital available for investment results in the reduction of

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the capital cost, thus promoting the investment activities of enterprises. Therefore, accounting surplus can also affect macroeconomic growth through channels to reduce the cost of capital.

4.3. Robustness Test

In order to ensure the robustness of the results, this paper adopts the total market value, circulating market value and total assets at the end as the weight source of the summary accounting surplus calculation, uses the weighted weight and equal weight average method to construct the summary accounting variables, re-test the above model, and the research conclusion is consistent with the above.

5. Conclusion

In this paper, the financial data of Shanghai and Shenzhen A-share listed companies from 2003 to 2021 are selected as the research sample to conduct an empirical study on the correlation test of the aggregate accounting surplus on the future GDP forecast, and analyze the intermediary effect of fixed asset investment in the whole society. The following conclusions are drawn that the growth rate of aggregate accounting surplus has a significant positive relationship with the future GDP growth rate. The fixed asset investment of the whole society can promote the micro enterprise surplus to empower the macro GDP growth, and the intermediary effect is obvious. From the empirical results, the following enlightenment:

The study of the correlation between micro-enterprise accounting information and macroeconomic growth makes us more certain that enterprises play an important role in the macroeconomic operation. As the core part of the economic operation system, the quality of enterprises directly affects the quality of the overall economic development. In economic activities, we should pay more attention to the operation status and profitability of enterprises, so as to improve the operation efficiency of enterprises in essence. Only the improvement of efficiency is the driving force to really promote the development of enterprises and promote economic growth.

Since enterprise information is related to future economic growth and has a certain impact on future economic growth, it can be judged that enterprise information can better predict future economic growth. Therefore, it is necessary to strengthen the supervision of the operation of enterprises, improve the information disclosure system of listed companies, and collect and obtain relevant information in time. At the same time, when predicting the future economic growth trend, consider the operation status of enterprises in this period, and make full use of enterprise information to predict the future economy more effectively.

The effectiveness of summarizing accounting information also reminds us that when considering the individual information of enterprises, we should consider the summarized accounting information at the same time, and combine macro information with micro information, so as to have a more comprehensive understanding of the information reflected by accounting data.

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