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Co integration analysis of macroeconomic policies on stock market returns of industrial enterprises

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ABSTRACT

Macroeconomic policies can produce corresponding influence for stock market of China's industrial enterprises, which is the certain mutual relationship between the two. From the policy perspective view of macroeconomic, since there are some loopholes and defects in the operation system of the early stock market, making corresponding structural contradictions in the establishment process of the stock market. However, in today's society, with the establishment of China's securities market institution, the macroeconomic policies can generate the decisive role to the stock market gains of industrial enterprises, which can promote the stock market to promote China's economic development. This paper combined vector auto regression model, cointegration test and vector error correction model to make the effective analysis for the cointegration that macroeconomic policies on stock market returns of industrial enterprises, which can provide a solid theoretical foundation for long-term development of China's stock market.

KEYWORDS

Macroeconomics; Stock market returns; Establishment of the model; Cointegration econometric analysis.



INTRODUCTION

In the research course, this paper takes the scientific finishing combined stock data from May 1997 to November 2006. We take corresponding optimization to the data and scientific references for the Lamont assumptions. Also we take scientific construct for the vector auto regression model, cointegration test and vector error correction model. In this paper, we make the assumptions for the main model, and further excavation for variable selection and data processing. We take the effectively analysis for the empirical results, the accuracy of the cointegration by the process of data optimization continuous improved, specifically in the following aspects. First, we make the averaging process for a day's closing stock price, and calculate the exact average, then are the summary at the end of month. Secondly, we take the effectively adjust of the true value about the initial statistics of the Y and Z of the end of the month summary and the central bank quarterly collated ^[1]. Finally, we take the seasonally adjusted through the X-11 algorithm for the actual value of the sequence Y and R. After adjustment, when chosen the natural logarithm of each sequence, then it is possible to obtain the value of the difference between the upper and lower two months, and its projected growth values will be calculated directly. In the course of this paper, applying the relevant models can make research ideas with more "rational". Also it can make the analysis process of the measurement of macroeconomic policies on industrial enterprises cointegration of stock market returns has a corresponding "comprehensive", which can provide favorable conditions for the effective conduct for its follow-up research process.

MAIN MODELS AND VARIABLE SELECTION AND DATA PROCESSING

The principal assumptions

Based on the scientific references of Lamont assumption during the research and discussion process, the aim is to maximize the relevance of future macroeconomic variables y which is not expected return on assets portfolio. From the perspective of macroeconomic variables, the target variable is the basic situation of the expected change of the macro variable y_{t+k} , such as industrial growth, $t+k$ is represented by changes in expectations, the specific expression of the formula can be written as:

$$\Delta E_t [y_{t+k}] \equiv E_t [y_{t+k}] - E_{t-1} [y_{t+k}] \quad (1)$$

As to a set of hypothetical case, for example, between May 2007 to April 2008, kinds of indications of the market determine the expected changes of the industrial growth rate in April 2008. However, return on assets variables used to predict can make the definition by the related following formula:

$$R_{t-1,t} \equiv R_{t-1,t} - E_{t-1} [R_{t-1,t}] \quad (2)$$

From equation 2, it can obviously see that the efficiency of the forecast assets earnings equal to the actual efficiency gains minus the expected efficiency gains. The difference between the two is the efficiency of forecast capital gains, which is the unexpected assets change in the above. Thereby we use H1 as the first basic assumption in this document. Specific assumptions are as follows:

$$\Delta E_t [y_{t+k}] \equiv \alpha R_{t-1,t} + \lambda_t \quad (3)$$

From the above discussion and equations, as to the calculation process of non-anticipatory gains changes early, it has been fully included related information of the change of the future macro arguments, and thus also has the corresponding basic features. And i represents part of the information unrelated with non-anticipatory benefits, which can able to explain the unexpected assets can be considered the sum of the relevant information of cash flow and related information discounted flow ^[2]. Therefore, variables of the relevant information of cash flow and related information discounted flow are unlikely to 0. Continue to look down, y_{t+k} can be considered as the sum of expectations and random error, we can derive the following equation by Equation 1:

$$y_{t+k} = E_t [y_{t+k}] + e_{t,t+k} = E_{t-1} [y_{t+k}] + E_t [y_{t+k}] + e_{t,t+k} \quad (4)$$

As can be seen from equation 4, y_{t+k} can be represent by the sum (new message expected changes in period t from $t-1$ expectation value + expected changes new information to $t+k$). So we can deduce the second assumption when taking into the above formula, represented by H2, specific assumptions formula H2 is as follows:

$$E_{t-1} [R_{t-1,t}] = dZ_{t-1} \quad (5)$$

As can be seen from equation 5, the expectation assets of $t - 1$ can embodied by controlling variable Z_{t-1} linear, and Z_{t-1} is the column vector of control variable in $t - 1$. Finally, making specific assessment through the intrinsic link between y and Z can come to the third assumption, which was expressed by H3. H3 formula is as follows:

$$E_{t-1}[y_{t+k}] = fZ_{t-1} + \mu_{t-1} \tag{6}$$

Then we take equation 5,3,2 into equation 4. The following equation can be obtained by further consolidation of the formula:

$$y_{t+k} = aR_{t-1} + (f - ad)Z_{t-1} + (e_{i,t+k} + \mu_{t,t+k}) \tag{7}$$

Among this, we let $a = b$, and $(f - ad) = c$, $(e_{i,t+k} + \mu_{t,t+k}) = \varepsilon_{t,t+k}$. The final regression equation is:

$$y_{t+k} = bR_{t-1,t} + cZ_{t-1} + \varepsilon_{t,t+k} \tag{8}$$

In this regression equation, y variable is in the left of the equation, t income and controlled variables $t - 1$ are in the right of the equation. This paper used the rate of financial asset to predict macroeconomic variables according to previous assumptions. The specific ETP model is as follows:

$$\ln Y = \alpha + \beta_i \sum_{i=1}^7 \ln R_{i,t} + \beta_j \sum_{j=1}^4 \ln Z_{j,t} + \varepsilon_t$$

Variable selection and data processing

In the discusses and research process of this paper, the selection process of data focused on selecting the data from May 1997 to November 2006. Because the implementation of the macro-control policy in this the range generated certain influence for China's stock markets, while the stock market has shown some progress. With the reform of China's monetary policy, macroeconomic regulation and control has gradually been implemented, the effect is more obvious, the pace of development of the capital market continues to improve, thus making the market capacity has been continuously expanded, which makes China's economic development has milestone value [3]. In this conducting research process of this paper, the involved monthly data is a total of 116, which can fully meet the requirements of a large sample return.

During the selection process for R , we mainly take in-depth thinking and exploration for the development of China's securities market. Also we take valid select for composite index and scientific selection for its relevant industry index during this process. Although in the 2006 listed companies, share of financial companies continues to increase, however, the financial sector index was began to prepare from 2001, which is still too short compared to the period of this study, because of this reason it will be deleted.

As to the choice of Z , during the research process of this paper, we mainly positive think about the related policy of foreign government, but the currency market is not truly global. So we selected (TABLE 1) $Z1, Z2, Z3, Z4$ four control variables, there is a corresponding intrinsic link between these four control variables among this. Eventually it will lead to the variance of the OLS estimators is increasing, and its confidence is also based on the original widened, while t value does not reflect obviously, as well as $R2$ continues to improve, the symbol between the regression coefficients appears corresponding error. These problems should be further attention in the control variable selection process; the scientific selection of control variables should also mention the height of the attention in the modeling process. In the course of this article, the variables selected are shown in TABLE 1:

TABLE 1 : The studied variables

Y1	Consumer Price Index	R1	Shenzhen index	R5	Real Estate Index	Z1	Personal (business units) RMB current reserve deposit rates
Y2	Industrial added value	R2	Shanghai index	R6	Utilities Index	Z2	One-year lending rate to financial institutions
Y3	Consumer goods retail sales	R3	Industrial Index	R7	Fund Index	Z3	The statutory reserve ratio
Y4	Disposable income of urban residents	R4	Business Index			Z4	The rediscount rate

In the course of the study in this paper, the data corresponding optimization is specifically in the following aspects: First, we make the averaging process for a day's closing stock price, and calculate the exact average, then are the summary at the end of month. Secondly, we take the effectively adjust of the true value about the initial statistics of the Y and Z of the end of the month summary and the central bank quarterly collated. Finally, we take the seasonally adjusted through the X-11

algorithm for the actual value of the sequence Y and R. After adjustment, when chosen the natural logarithm of each sequence, then it is possible to obtain the value of the difference between the upper and lower two months, and its projected growth values will be calculated directly.

The empirical results

In the process of research and discussion in this article, the estimating results by VAR models can fully draw such a conclusion that the asset returns variables and macro variables will not reflect the more significant relationship in the short term. But whether there is a corresponding long-term relationship between the variable need to perform testing, and the co-integration test should carry out among this process. We select the X-11 algorithms to take the scientific computing, take seasonally adjusted for the original value between the Y, Z and R. Finally we take the overall adjustment for the real value of its variables, then we can get valid data needed in this study^[4]. By ADF test, it can fully reflect the variables through tested are relatively stable, can be fully protected for the validity of Johnson co-integration test, and then come to the co-integration equation is as follows:

$$\begin{aligned}
 Y1SA = & 0.001435^* Y2SA + 0.002468^* Y3SA + \\
 & 0.003345^* Y4SA - 0.021039^* R1SA + \\
 & 0.000204^* R2SA - 0.000927^* R3SA - \\
 & 0.000185^* R5SA + 0.01370^* R7SA
 \end{aligned}$$

2.8E-05 5.5E-05
0.00445 2.7E-05
0.00019 8.0E-05
3.3E-06 0.000353

In the course of this article, this paper effectively identified specific of linear sub-type and the value of uncertainty equations problem is -1357.778 based on C criteria and AIC criteria. However, from the process of establishing co-integration equation, we can conclude that between macroeconomic variables and variable income assets exists more stable cointegration relationship, but the co-integration relationship between the two is not very clear with smaller intrinsic link. The cointegration coefficient is not more than 0.005 basically. During the process of applying the vector error correction model, we take corresponding cointegration and take the co-integration vector as the main subject about the choice of the error correction term, so the results can be drawn with highly consistent. The following are systematic listed of error correction coefficient (as shown in TABLE 2), the standard error in parentheses, square brackets for the t statistic.

TABLE 2 : Error correction coefficients

Error correction	D (Y1SA)	D (Y2SA)	D (Y3SA)	D (Y4SA)	D (Y1SA)
CointEq1	-4.25267 (2.04108) [-2.07992]	323.4766 (240.273) [1.34629]	45.07568 (119.572) [0.37698]	50.20774 (29.6960) [1.69073]	-0.981124 (0.73944) [-1.32685]
Error correction	D (R1SA)	D (R2SA)	D (R3SA)	D (R4SA)	
CointEq1	1827.138 (646.920) [2.82436]	376.6228 (218.206) [1.72599]	4151.294 (1716.09) [2.41905]	348.24494 (217.4483) [1.96265]	

The t statistic shows that the coefficient in front of the error correction term is majority significant. As can be seen, in addition to D (Y1SA) and D (R1SA) equation, the equation error correction factors of other items are very large, the D (R5SA) equation even to the 4151.294. Visible, the adjustment of dependent variable on deviation balance is very large^[5]. This suggests that long-term equilibrium relationship between the variables is relatively stable, if slightly off, the dependent variable will make a very big adjustment to make it back to a balanced state. Where, D (Y1SA) and D (R1SA) adjust the negative direction, the other adjusting the variable positive direction.

EMPIRICAL RESULT ANALYSIS

Thesplit share structure is the system reasons for the smaller correlation between the stock market and macroeconomic

The certain period of the formation and establishment of China's securities market has the "particularity". When the stock market was originally established, the reform measures do not coincide with it, and securities trading system is not perfect with many problems. However, these problems mainly from the structural contradictions of the establishment process of the stock market, which is the objective factors to limit China's securities market to maximize its function, which mainly reflected on this aspect of the split share issues. Until the early 1990s, China divided state-owned shares so that it can be singled list out, which is in stark contrast with other stocks. More than half stock cannot be widely circulated in the market

among it, and this part of the shares is mostly state-owned shares, so the evaluation role of the transaction process is difficult to get a true value reflection of^[6]. However, this part stock cannot take the valuable dynamic assessment, it will leads to the certain restrictions of the development prospects of China's capital market, while generate a corresponding negative impact for the rational allocation of resources. Among this, the reflection effect of the macro-control policies to dynamic development of China's macroeconomic is gradually reduced, while making it all the way down in the prospects of China's stock market and affected the development of the national economy.

The irrational behavior of the stock market affects the formation mechanism of the stock price

Based on the research process, its theoretical foundation is mainly from the theory concepts that the value of stock is the present value of future expected cash flows. However, among the sources of future cash flows, it is mainly the listed companies stock returns and spreads income of related stocks. However, with the changing of macroeconomic momentum, the development environment of stock market will also be subject to change, which will have a certain impact for companies to create cash flow and make the corresponding change for listed company's own stock price. With the increasing of the stock fluctuations, making inflation, it will reflect the inflation and industrial competitiveness. It also can generate a direct impact on the residents' disposable income, such information are directly reflected by the massive changes of macroeconomic. But among today's real-life, the formation of stock price in China's stock market still exists a lot of irrational factors, thus generate corresponding question arising for the theoretical basis of this paper's own assumption.

Low elasticity of policy control weakened the influence of control variables on the stock market

However, the display can be proved from the study, the influence of LNZ variables on LNY and LNR is not very clear, the variable relationship between production and income is not very tight, the reason should return to the roots of China's basic currency policy. The popularity process of the interest rate of China's stock market is not perfect, the market capacity of the bond was smaller, the number of treasury bonds is not much (especially short-term debt issuance few number), so the scope of government intervention by other countries was smaller. Our monetary policy is mainly achieved by the current deposit interest rates, reserve requirements, the discount rate and re-lending interest rates^[7]. But these benchmark rates can generate more distant influence for China's economy, while there are some shortcomings, which is because the less elastic and cannot be "regular" use of the process. Therefore, taking the variable with a stepped variable LNZ with significant changes every month LNR and LNY to do return, the results will naturally not satisfactory. So, it is not much helpful added these monetary policy variables to the predictive ability of asset returns.

CONCLUSIONS

From the above discussion process, the intrinsic link between financial assets returns and empirical investigation is not tight, which can be fully display from the construction and calculation of VAR models, and its coefficient is not very clear, which is coincides with the empirical results authentication process. However, in the process of building the co-integration model, the coefficients in the balanced equation of ECM are relatively small, and there is a more stable relationship between the two, with this relationship is usually reflected long-term stability. However, during the course of the analysis of the results, the test results are not all negative, mainly display thatthere is long-term and stable intrinsic link between macroeconomic variables and stock assets variables, which is the valid conclusion during the calculated process of cointegration equation. In the VEC model analysis process, it also can fully realizethe related readjustment of deviate relations. From this point,it is not difficult to see the relationship between the two is very stable, even if occurs a trace ofthe deviation, the dependent variables will make significant adjustments to enable it to return to the equilibrium state.

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