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Analysis of Factors Influencing the Business Performance of Dairy Enterprises—Taking Yili as an Example

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Abstract: *In this paper, Inner Mongolia Yili Industrial Group Co., Ltd. is selected as the target enterprise, and the return on net assets is used as the key indicator to explore the factors influencing the operating performance of dairy enterprises. Firstly, the indicators measuring the financial operation of the enterprise are selected from four dimensions: profitability, development ability, solvency, and operation ability, and the index system related to the return on net assets of the enterprise is constructed; secondly, the operating profit margin, shareholders' equity turnover, fixed asset turnover, and operating cost turnover are screened out by using the multivariate step-by-step regression to find out four important influencing indexes; next, the measurement model of the growth of the enterprise's return on net assets is established, and the results are analyzed.*

Keywords: *Business performance, Return on net assets, Multiple stepwise regression analysis, Measurement model, Dairy companies*

1. Introduction

As an important part of the food industry, the business performance of the dairy industry is not only related to the survival and development of enterprises, but also has a far-reaching impact on the improvement of the level of national nutrition and health and the growth of the agricultural economy. Enterprise performance (ROE) is the core explanatory variable in this paper, and the current common enterprise performance measures mainly include Tobin's Q-value, return on total assets and return on net assets. Among them, the market performance representation method, that is, the Tobin$Q$ value is used to measure the performance of the enterprise, that is, the ratio of the market value of the existing capital to its replacement cost, and the higher the Tobin$Q$ value, the higher the development potential of the enterprise in the future [1]. However, the Tobin$Q$ value focuses more on the market investment opportunities; the return on total assets can visualize the overall profitability of listed companies, which is measured by the ratio of net profit to total assets at the end of the period. The main difference between return on total assets and return on net assets is whether corporate liabilities are taken into account or not, but there are basically no listed companies without liabilities in China's market [2]. Therefore, this paper refers to the measurement methods of Liu Chun et al [3] and Zhu Jingting et al [4], and selects the return on net assets, which has a strong comprehensiveness, directly reflects the level of return on shareholders' equity, measures the efficiency of the enterprise's use of its own capital, is easy to calculate and obtain, and is closely related to the long-term value of the enterprise to reflect the enterprise's operating performance, and selects Inner Mongolia Yili Industrial Group Co. Traditional research on business performance in the dairy industry tends to focus only on one or two major influencing factors, such as market share and cost control. However, as a resource-intensive industry, the business performance of the dairy industry is jointly influenced by many factors. Moreover, in the current academic research on the business performance of dairy companies, there is less literature focusing on specific companies and quantitative analysis using statistical and econometric methods. In this study, we will analyze the operating performance of dairy firms in a more comprehensive way by taking into account the influencing factors of multiple dimensions, including the turnover of shareholders' equity, fixed assets, and operating costs.

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2. Establishment of Indicators of Factors Influencing the Business Performance of Dairy Enterprises

The return on net assets of enterprises is affected by many factors, and how to select the indicators is directly related to whether the model can be reasonably constructed and the results can be accurately analyzed. According to the characteristics of the dairy industry, this paper constructs the enterprise business performance evaluation index system by selecting indicators in four dimensions: profitability, development ability, solvency and operating ability. Dairy enterprises with strong development capability can improve overall operational efficiency, market competitiveness, brand image and internationalization through integrating industrial chain resources, meeting market demand, promoting technological innovation, realizing green production, and expanding international markets, thus bringing better operational performance; dairy enterprises with strong solvency can ensure financial stability, improve financing capability, optimize supply chain management, resist risks, and win investors' confidence, etc. Dairy enterprises with strong solvency can ensure financial stability, improve financing capability, optimize supply chain management, resist risks, and win investors' confidence, Dairy enterprises with strong solvency can better respond to market challenges, enhance competitiveness and market share by ensuring financial stability, improving financing ability, optimizing supply chain management, resisting risks and gaining investor confidence, thus achieving sound development; dairy enterprises with strong operating ability can better respond to market challenges, enhance competitiveness and profitability and achieve long-term stable development by optimizing capital management, improving production efficiency, managing supply chain, making full use of resources and seizing market opportunities.

In order to comprehensively reflect the impact of on-balance sheet operations on return on net assets, this paper selects a total of 17 indicators based on the above four directions, as shown in Table 1. The following is based on the indicators in Table 1 and analyzed with the values of the indicators of Inner Mongolia Yili Industrial Group Co. in the CCERDATA database in each year from 2003 to 2022.

Table 1: Return on Equity Influencing Factors Indicator System Table

Dimension	Indicator		
Profitability	Operating margin	Net profit margin on total assets	Return on net assets
	Net operating profit margin	Net profit margin on fixed assets	Equity multiplier
Development capacity	Rate of capital accumulation	Capital preservation and enhancement ratio	Net cash flow from operations per share
Solvency	Quick ratio	Asset-liability ratio	
Operating capacity	Fixed asset turnover	Working capital turnover ratio	Shareholders' equity turnover ratio
	Accounts receivable turnover ratio	Total asset turnover	Accounts payable turnover

3. Optimization of the Indicator System of Business Influencing Factors in the Dairy Industry Based on Stepwise Regression

3.1 Research ideas

Based on domestic and international references, the above has constructed an indicator system for the factors influencing Erie's return on equity. However, although the above indicator system has a solid logical foundation in theory, in practical application, its effect may vary due to the characteristics and limitations of a particular data set, and thus may not be able to produce a substantial statistical impact in all cases, and there is a certain degree of multiple covariance among the selected indicators, which makes it unsuitable for constructing an econometric model directly. The stepwise regression method can automatically identify and retain those independent variables that have significant predictive value to the model, while excluding those variables that contribute less or insignificantly to the model, and to a certain extent can solve the problem of multicollinearity. Therefore, with the help of SPSS software, this paper applies the stepwise regression method to screen the main explanatory variables in order to more accurately reveal the key factors affecting Erie's return on net assets.

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3.2 Research methodology

Stepwise regression method [5] is to introduce variables one by one, each time after the introduction of a new variable, all the selected variables are tested one by one, if the significance of the original introduced variable is changed from "yes" to "no" after the addition of the latter variable, then it is necessary to exclude the latter variable from the test. The introduction of variables. At the same time, in order to ensure that there are only significant variables in the existing regression equation before each introduction of a new independent variable, an F-test must be performed for each introduced or excluded variable. The above procedure is repeated until no new significant independent variables enter or exit the regression equation. The subset at this point is the optimal regression subset. In the stepwise regression method, the significance level of the introduced independent variable is labeled as α_{in}, and the significance level of the excluded independent variable is labeled as α_{out}, and the condition $\alpha_{in} < \alpha_{out}$ must be satisfied, otherwise the introduced variable may be caught in a "dead cycle" of being introduced and excluded continuously.

3.3 Analysis

In this paper, stepwise regression analysis was performed using SPSS software by setting a significance level of 0.05 for the introduced variables and 0.1 for the excluded variables so as to exclude the variables one by one. Table 2 shows the detailed results of the model summary derived using SPSS software. Table 2 outputs a total of four models, of which the 4th model is the optimal model, which has a goodness of fit of 0.957 and small residuals, indicating that this model basically contains most of the important variables [6], and therefore it is feasible to explain the growth of Erie's NAV with the variables in the 4th model.

Table 2: Model summaries

Model	R	R-square	Adjusted R-square	Errors in standardized estimates
1 Predictor variable: (Constant), Operating margins	0.836	0.700	0.683	2.4406836
2 Predictor Variables: (Constant), Operating margin, Shareholders' Equity Turnover Ratio	0.957	0.915	0.905	1.3335074
3 Predictor Variables: (Constant), Operating margin, Shareholders' Equity Turnover, Fixed Assets Turnover	0.976	0.954	0.945	1.018345
4 Predictor Variables: (Constant), Operating margin, Shareholders' Equity Turnover, Fixed Asset Turnover, Working capital turnover ratio	0.983	0.966	0.957	0.8936082

4. Modeling of Erie's Return on Equity Growth Measures

4.1 Research ideas

Using the above stepwise regression, operating profit margin x_1, shareholders' equity turnover x_2, fixed asset turnover x_3, and working capital turnover x_4 are selected to explain the growth of return on net assets in Erie year. Next, a quadratic regression model is constructed based on these four variables, aiming to find out the functional relationship between these four variables and the return on net assets, and to quantify the effect of each variable on the change of return on net assets using a mathematical modeling approach. In view of the fact that the regression model needs to be verified by a number of tests to verify the feasibility of the model, the heteroskedasticity test, autocorrelation test, and multiple covariance test of the regression model were conducted for the fourth model mentioned above using STATA software.

4.2 Research methodology

Multiple regression model for random variable y and ordinary variables x_1, x_2, x_3, ..., x_k:

$$y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \cdots + \beta_k x_k + \varepsilon \quad (1)$$

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Where β_0 is the regression constant, β_0, β_1, β_2, ..., β_p are p+1 unknown parameters, and the remaining p parameters are called regression coefficients. When p ≥ 2, the model is a multiple linear regression model [7]. ε is the random error term and satisfies: E (ε) = 0, var (ε) = σ^2. $E(y) = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 \cdots + \beta_k x_k$ is called the theoretical regression equation.

When faced with a real problem, a linear regression model is obtained for the n sets of sample data obtained:

$$\begin{cases} y_1 = \beta_0 + \beta_1 x_{11} + \beta_2 x_{12} + \ldots + \beta_k x_{1k} + \varepsilon_1 \\ y_2 = \beta_0 + \beta_1 x_{21} + \beta_2 x_{22} + \ldots + \beta_k x_{2k} + \varepsilon_2 \\ \cdots\cdots \\ y_n = \beta_0 + \beta_1 x_{n1} + \beta_2 x_{n2} + \ldots + \beta_k x_{nk} + \varepsilon_n \end{cases} \tag{2}$$

Expressed in matrix form as: $Y = X\beta + \varepsilon$. Included among these,

$$Y = \begin{bmatrix} y_1 \\ y_2 \\ \cdots \\ y_n \end{bmatrix} \quad X = \begin{bmatrix} 1 & x_{11} & \cdots & x_{1k} \\ 1 & x_{21} & \cdots & x_{2k} \\ \vdots & \vdots & \vdots & \vdots \\ 1 & x_{n1} & x_{n2} & x_{nk} \end{bmatrix} \quad \beta = \begin{bmatrix} \beta_1 \\ \beta_2 \\ \cdots \\ \beta_n \end{bmatrix} \quad \varepsilon = \begin{bmatrix} \varepsilon_1 \\ \varepsilon_2 \\ \cdots \\ \varepsilon_n \end{bmatrix} \tag{3}$$

4.3 Model solving and result analysis

4.3.1 Model solving results

Solving the model with the help of STATA software yields the model results as shown in Table 3 and the expression of this model is:

$$y = 1.017x_1 + 10.865x_2 + 0.078x_3 + 1.513x_4 + -20.079 \tag{4}$$

From Table 3, at a significance level of 0.05, the p-values of the four explanatory variables are all below 0.05, and therefore all of them can reject the original hypothesis, which can then be inferred that all of these independent variables can explain the changes in the dependent variable to a certain extent. At the same time, the fit of the model is as high as 0.9644, and the overall F-value reaches 107.99, corresponding to a p-value close to 0, reflecting a better overall fit of the model and a higher significance. In order to enhance the reliability of the analysis results, the model will be subjected to the three major tests of heteroskedasticity test, autocorrelation test and multiple covariance test next.

Table 3: Model results

Variant	Ratio	Standard error	t	P	0.95 confidence interval	
Operating margin	1.017	0.059	17.10	0.000	0.890	1.143
Shareholders' Equity Turnover	10.865	1.612	6.74	0.000	7.429	14.301
Fixed Asset Turnover	0.078	0.016	4.75	0.000	0.043	0.113
Working capital turnover ratio	1.513	0.630	2.40	0.030	0.171	2.855
_ cons	-20.079	2.232	-9.00	0.000	-24.836	-15.322

4.3.2 Heteroscedasticity test

One of the assumptions of the classical ordinary least squares estimation method is that there is no heteroskedasticity, and if there is heteroskedasticity in the residuals of the model, it indicates that the model omits important explanatory variables and the model is not set up rationally. In this paper, the Breusch-Pagan test is used to test whether heteroskedasticity exists or not, and the B-P test mainly explores the relationship between the squared residuals of the ordinary least squares method and the level of explanatory variables set in advance. In the B-P test, the variance of the error term is generally regarded as a linear combination of known variables, and the variance of the error term is expressed as a linear regression of i explanatory variables set in advance.

The original and alternative hypotheses for the B-P test are:

$$H_0: \sigma_i^2 = \sigma^2 \quad H_1: \sigma_i^2 = \sigma^2 f(z_{i1}, z_{i2}, \cdots, z_{ij}) \tag{5}$$

Through STATA software, the resultant F-value is 1.61, which corresponds to a P-value of 0.8067 at

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a significance level of 0.05, which is higher than the significance level, and therefore passes the significance level test. The trend of the residuals with the fit is plotted, and it can be seen from Figure 1 that with the change of the fit of the independent variable, the model residuals value does not have an abnormal trend, but is irregularly up and down, so the original hypothesis can not be rejected, i.e., the model does not have heteroskedasticity, and passes the test of heteroskedasticity.

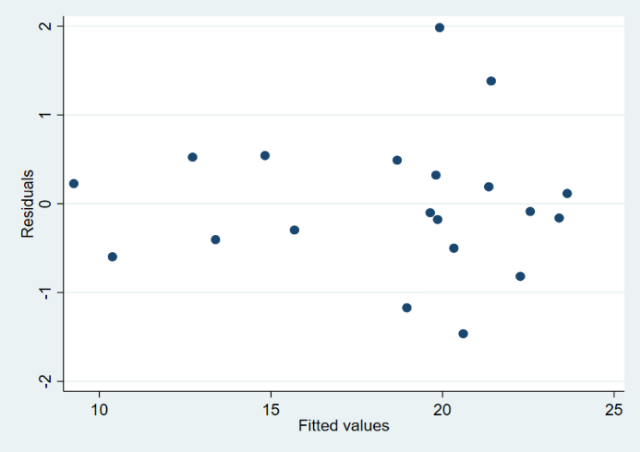

Figure 1: Plot of residuals as a function of goodness-of-fit

4.3.3 Multicollinearity test

In a regression function, if one of the explanatory variables can be expressed as a linear function of the remaining variables, then these explanatory variables are said to be fully multicollinear, while the case of a high degree of covariance among the explanatory variables but not full covariance is multicollinearity. Multicollinearity can seriously affect the predictive and explanatory ability of the regression model and reduce the reliability of the model. In this paper, the variance inflation factor is used to test whether the model has the problem of multicollinearity.

Through the STATA software, the VIF test results were obtained, and from Table 4, the average VIF value is 1.36 < 10, which can be concluded that the model has weak covariance and passes the multicollinearity test.

Table 4: VIF test results

Variant	Operating margin	Shareholders' Equity Turnover	Fixed Asset Turnover	Working capital turnover ratio	Average value
VIF	1.09	1.45	1.28	1.64	1.36

4.3.4 Autocorrelation test

Autocorrelation means that if there is a correlation between the residual terms arranged in time or space, it means that the constructed model is not perfect, some information in the data is not expressed, and the real random interference term is not the error term. In this paper, the D-W test is used to test the existence of autocorrelation in the model. The null and alternative hypotheses of the D-W test are:

$$\begin{cases} H_0: P = 0 \\ H_1: P \neq 0 \end{cases} \tag{6}$$

Through STATA software, a D-W test result of 2.056522 was obtained, indicating that the model does not have autocorrelation and passes the autocorrelation test.

4.3.5 Analysis of results

From the above analysis, it can be seen that the model passed the three tests and it can be presumed that the validity of this model is high, followed by the further establishment of standardized regression equations. In multiple regression analysis, the independent variables may have differences in magnitude due to having different units and value ranges. Standardization eliminates this effect of magnitude and directly compares the degree of influence of the respective variables on the dependent variable. Solving the model with the help of STATA software gives the expression of standardized model as:

$$y = 0.843\, x_1^* + 0.383 x_2^* + 0.255\, x_3^* + 0.146\, x_4^* \tag{7}$$

The model indicates that for every unit increase in operating profit margin, the average return on net

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assets increases by approximately 0.843 units; for every unit increase in shareholders' equity turnover, the average return on net assets increases by approximately 0.383 units. The dairy industry has a high demand for capital and high capital liquidity requirements. Fast capital turnover helps enterprises to seize market opportunities and reduce financial risks. Yili, as a leading company in the dairy industry, its strong turnover ratio of shareholders' equity implies effective utilization and efficient turnover of shareholders' equity. This helps to enhance its profitability because a higher shareholders' equity turnover ratio means that each unit of shareholders' equity can bring more revenue and profit to the enterprise; for every unit increase in net profit margin on fixed assets, the average return on net assets increases by about 0.255 percentage points. The dairy industry has a high demand for fixed assets such as production equipment and storage facilities, etc. The effective utilization of fixed assets is crucial to reducing production costs and improving production efficiency. Yili has improved the efficiency of fixed assets through the construction of large-scale farms and optimization of production lines. This has helped it reduce costs and improve profitability; for every unit increase in operating cost turnover, the average return on net assets increased by approximately 0.146 percentage points. The dairy industry is highly competitive, and cost control and operational efficiency are critical to profitability. An efficient operating cost turnover ratio helps companies reduce operating costs and improve profitability. Yili has achieved effective control and turnover of operating costs by optimizing supply chain management and improving production efficiency. This helps it to reduce costs and improve market competitiveness. The results of the analysis show that improving operating profit margin, shareholders' equity turnover, fixed asset turnover, and operating cost turnover can increase Yili's return on net assets.

5. Conclusions

This paper comprehensively uses SPSS, STATA, EXCEL software, adopts the method of multiple stepwise regression, establishes an econometric model with the four indexes of operating profit margin, shareholders' equity turnover, fixed asset turnover, operating cost turnover, and explores the influence of each index on the growth of return on equity, and concludes that increasing the operating profit margin, shareholders' equity turnover, fixed asset turnover, operating cost turnover can increase Yili's return on equity. It is concluded that increasing operating profit margin, fixed asset turnover, and operating cost turnover can increase Yili's return on equity. Therefore, in order to ensure the healthy development of listed companies in the dairy products industry and improve their business performance, the following policy measures should be taken.

6. Expectations

First, enhance the technological innovation ability and capital strength of listed companies in dairy products industry. Financial strength is the foundation of enterprise creation and operation; technological innovation is the basis of enterprise survival and development. The two complement each other. Dairy enterprises should be committed to the optimization and upgrading of product structure. Through market research and consumer behavior analysis, they can accurately grasp the changing trend of consumer demand and develop high value-added products that meet the market demand. For example, for the trend of healthy diet, you can launch low-fat, low-sugar, high-calcium and other healthy dairy products; for the functional demand, you can research and develop dairy products with enhanced immunity, promote digestion and other functions.

Secondly, according to the industry characteristics of targeted management programs, dairy companies should analyze the composition of assets in detail, identify and clean up inefficient and non-performing assets, and improve the proportion of high-quality assets. For example, for inventory management, a scientific inventory control mechanism should be established to reduce inventory backlogs and slow-moving phenomena, and ensure that the inventory turnover rate matches market demand. At the same time, it should strengthen the management of accounts receivable, optimize the sales credit policy, shorten the collection cycle, and reduce the risk of bad debts, so as to improve the overall liquidity of assets; at the same time, dairy enterprises should pay attention to the improvement of the efficiency of various links such as production and sales. The implementation of these measures will help the enterprise to reduce costs and increase revenues, thus enhancing the turnover capacity of shareholders' equity.

Finally, dairy enterprises should identify inefficient and idle assets by analyzing in detail the composition and use of fixed assets, and make reasonable deployment or disposal. At the same time, according to the changes in market demand and production scale, the investment scale and timing of new

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fixed assets should be reasonably planned to avoid over-investment or under-investment; at the same time, dairy enterprises should reduce raw material procurement costs, labor costs, and overhead costs through refined management.

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