

# Ecological Research of the Voluntary Disclosure about Listed Companies

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**Abstract.** In the paper, the research subject is the ecological relationship between the Small and Medium-sized Enterprises(SMEs) and the Large-scale Enterprises(Les). From the perspective of ecology, setting up the competitive model basic on the Logistic model, and carrying out further analysis about the voluntary information disclosure of listed company, then getting the strategic choice about the voluntary information disclosure and the ecological explanation of false information, and the dynamic mechanism and strategy of the voluntary information disclosure of listed company.

**Keywords:** voluntary information disclosure, Logistic model, stability analysis.

## 1 Introduction

Since the 1980s, foreign scholars did a great deal of research about different countries and regions of the company voluntary disclosure of information acts through a variety of empirical methods, and have already achieved many important results. However, in China, the beginning date of the research about this theme is very late, and the quality and level of this research have a relative distance compared to the Western countries'. The great difference between the Chinese market background and the international environment especially the developed countries have led to the special nature of the voluntary disclosure of information in China. The research about voluntary disclosure of information has mainly four categories: The first is to search for the relevant of the changes in stock prices with the voluntary disclosure of the information. Healy (Contemporary Accounting Research, Fall, 1999)[1] from the Harvard Business school took his attention to whether the increase of voluntary disclosure of information is relates to the stock prices and liquidity by selecting 97 listed companies, then got that the investors reduce the uncertainty while the liquidity of the stock enhance. The second category links the voluntary disclosure of information to the governance structure of listed companies. Aboody and Kasznik (2000)[2] thought that the company would be delayed disclosure of good news and speed up disclosure of bad news before the expiration of stock options in order to increase the stock-based compensation. The third category put bets in the eyes of the relationship of voluntary disclosure and financial aspects. The research of Eng

and Mak (2003) [3] showed that there is an obvious positive relationship between the degree of corporate governance and information disclosure of listed companies through inspected 158 companies in Singapore. The fourth type focused on the relevance of the demonstration about the voluntary disclosure of information with a number of variables. The empirical research by Hossain (1995) [4] to the New Zealand listed companies showed that the impact factors to voluntary disclosure of information include: company size, financial leverage, the proportion of possession of assets, audit institutions of authority and different places listed. Meek (1995)[5] took his view of that company size, country or region where the company is located, listed and trade made very important affection to the company voluntarily disclose information through his empirical research, while voluntary information is divided into three parts: strategic, non-financial information and financial information. Gerald and Sidney (2002) [6] to 62 industrial companies listed in Hong Kong and Singapore on that outside shareholders stake in the company and the level of voluntary disclosure of information is positive proportional and the family business and voluntary disclosure of information significantly less than Non-family businesses. Elisabeth Dedman(2008)[7] find that there are significantly more 'good news' voluntary announcements than 'bad news' announcements. Among them, it is also a basic and important study to the dynamic mechanism of foundation about listed companies' voluntary disclosure of information. This stage of its research mainly from the perspective of adverse selection and the principal-agent theory analysis: adverse selection from the point of view of the company's management and outside investors asymmetry of information between the mainly reflected in the spreads on the company's disclosure of information quality, To deal with this phenomenon of adverse selection and in addition to the provisions of the mandatory disclosure of information, the excellent performance of listed companies choose the implementation of the voluntary disclosure of information to enhance investment and external communication of information to outside investors reveal their core competitiveness, So that investors understand the company now or potential competitive advantage. Therefore they will believe the company's future prospects and make better investment decisions; Principal-agent theory from the point of the company's management and shareholders of companies within the asymmetry of information between the main incentive mechanism and reflected in the remuneration of managers, shareholders of listed companies and operators exist between the principal-agent relationship, and there is information asymmetries among them, especially in China, state-controlled companies listed on the Government and the Department of shareholders — operation between more serious is the information asymmetry, government departments only through the operation of the relevant information to determine the operator's level of hard work, And the operators of listed companies in order to show their hard work and the level of company performance, get more revenue, through voluntary disclosure of information, keep the company in charge of departments and the company shareholders signal transduction. This paper would make the research the listed companies voluntary disclosure mechanism basic on ecology theory, make maximizing profit

of the company and administrators' reward as the gauge of decision-making on information disclosure process, while do some qualitative analysis due to the limit on both method and technology at present. However, this is still a new research perspective, and it mainly reflects on the securities market including SMEs and large enterprises in the ecological relationship aspects.

## 2 The Mechanism of Voluntary Disclosure from the Ecological Angle

### 2.1 The Competitive Model of SMEs and Large Enterprises

Consider the SMEs and large enterprises as the two populations, when they are alone in a natural environment to survive, the output levels (corresponding to the listed company or the proceeds of external investors) are subject to the evolution of Logistic. We supposed  $x_1(t)$ ,  $x_2(t)$  as the average level of output (income) of the SMEs and large enterprises respectively, assumed that it is a function of time,  $r_1$  and  $r_2$  are the average growth rate of output levels in their survival in an independent state (corresponding to that is, when they did not enter the securities market),  $N_1$  and  $N_2$  are the average maximum output in their independent state, Thus, for SMEs and large enterprises, there is

$$\frac{dx_i(t)}{dt} = r_i x_i \left[ 1 - \frac{x_i}{N_i} \right] \quad i = 1, 2 \tag{1}$$

When  $t \rightarrow \infty$ ,  $x_i(t) \rightarrow N_i$ ,  $i = 1, 2$ ,  $\frac{x_i}{N_i}$  is the actual output potential account for the largest proportion of output, called the independent output saturation. When SMEs and large enterprises in the same environment survive, they will have a mutual influence. In the securities market,  $\sigma_1$  shows that the upgrading the level of output influence of the independent output saturation of large enterprises to the SMEs;  $\sigma_2$  shows that the upgrading the level of output influence of the independent output saturation of the SMEs to large enterprises ( $\sigma_1, \sigma_2 > 0$ ).

There are four relationships between the two groups: predatory relationship, mutual symbiotic relationship, competition, and parasitic relationship. In the securities market, the relationship between SMEs and large enterprises mainly is competition, and the competition ecological model. At this point it can be expressed as:

$$\begin{cases} \frac{dx_1(t)}{dt} = r_1 x_1 \left[ 1 - \frac{x_1}{N_1} - \sigma_1 \frac{x_2}{N_2} \right] \\ \frac{dx_2(t)}{dt} = r_2 x_2 \left[ 1 - \sigma_2 \frac{x_1}{N_1} - \frac{x_2}{N_2} \right] \end{cases} \tag{2}$$

In order to study the outcome of competition model of the SMEs and large enterprises as the two populations, or when  $t \rightarrow \infty$ , the trend of  $x_1(t)$ ,  $x_2(t)$ , we just need analyze the balance point of stability of the equations (2).

To SMEs and large enterprises, it has practical significance only when the balance in the plane coordinates of the first quadrant ( $x_1, x_2 \geq 0$ ). According to

**Table 1.** The points of balance and stability conditions in competitive model

points of balance	stability conditions
$P_1(N_1, 0)$	$\sigma_1 < 1, \sigma_2 > 1$
$P_2(0, 0)$	unstable
$P_3(0, N_2)$	$\sigma_1 > 1, \sigma_2 < 1$
$P_4[N_1 \frac{(1-\sigma_1)}{1-\sigma_1\sigma_2}, N_2 \frac{(1-\sigma_2)}{1-\sigma_1\sigma_2}]$	$\sigma_1 < 1, \sigma_2 < 1$

the method of determine the stability of the balance point, it gets four points of balance and stability conditions (Table 1).

From table 1, we know that there is 3 points of balance  $P_1, P_3$ , the stability condition of point  $P_1$  is  $\sigma_1 < 1, \sigma_2 > 1$ . Here  $\sigma_1 < 1$  stands for the output of fluency of large enterprises to SMEs is smaller than the SMEs to large enterprises for their own role on the block,  $\sigma_2 > 1$  means that the output of fluency of SMEs to large enterprises is more than the large enterprises to SMEs for their own role on the block. It is clearly that this situation is less in real life, that is, the competitive advantages of large-scale enterprises is worse than of SMEs, this situation just occurs in some areas and local industry, and in the securities market, the emergence of such a situation only appears for all shareholders in listed Companies are not aware of the circumstances, this is almost impossible under the national policy of mandatory information disclosure requirements. Therefore, it is not easy that the point  $P_1$  to achieve the stability of conditions. Similarly, the stability of conditions of point  $P_4$  is  $\sigma_1 < 1, \sigma_2 < 1$ , that large enterprises and SMEs have not advantages in competition either. In the early stage of the securities market, information disclosure in its infancy period, with the constantly improve of the securities market, the policy of mandatory disclosure of information generated, so that this situation is fast disappearing, go to a more stable state, or emerging industry just start to enter the securities market, investors do not understand them. However, with the industry's growth, this gap will gradually narrow. The stability condition of point  $P_3$  is  $\sigma_1 > 1, \sigma_2 < 1$ , it indicates that the general situation in the stock market, therefore, this condition is easy to achieve, at this time that the competitiveness of SMEs is in a significant disadvantage in the securities market, the negative impact SMEs to large enterprises is much smaller than that of large enterprises in its competition.

## 2.2 The Competitive Model of SMEs and Large Enterprises with the Impact Factor of Voluntary Disclosure of Information

Now we add the impact factor of voluntary disclosure of information. We supposed  $\alpha$  as the impact factor of SMEs disclosure to their development,  $\beta$  as the impact factor of large enterprises disclosure to their own development, here we assume that SMEs and large enterprises on the impact of each other are symmetrical, so the function of SMEs to the impact of large-scale enterprises is  $-\alpha$ , while large enterprises to SMEs for the impact is  $-\beta$  ( $0 < \alpha, \beta < 1$ ). According to the assumption above, we get

$$\begin{cases} \frac{dx_1(t)}{dt} = r_1x_1[1 + \alpha - \beta - \frac{x_1}{N_1} - \sigma_1\frac{x_2}{N_2}] \\ \frac{dx_2(t)}{dt} = r_2x_2[1 - \alpha + \beta - \sigma_2\frac{x_1}{N_1} - \frac{x_2}{N_2}] \end{cases} \tag{3}$$

Here  $\alpha > \beta$  shows that the impact of SMEs to large enterprises in voluntary disclosure is more than large enterprises to SMEs.

In order to study the outcome in competitive model of SMEs and large enterprises as two populations, that is, when  $t \rightarrow \infty$ , the trend of  $x_1(t), x_2(t)$ , we just need to analyze the stability of the point of balance of equation (3). According to (3), it yields

$$\begin{cases} f(x_1, x_2) = r_1x_1[1 + \alpha - \beta - \frac{x_1}{N_1} - \sigma_1\frac{x_2}{N_2}] = 0 \\ g(x_1, x_2) = r_2x_2[1 - \alpha + \beta - \sigma_2\frac{x_1}{N_1} - \frac{x_2}{N_2}] = 0 \end{cases} \tag{4}$$

Based on the determine method of the stability of the point of balance, there are four points of balance and stability conditions (Table 2).

**Table 2.** The point of balance and stability conditions in competitive model with the voluntary disclosure of information

points of balance	stability conditions
$P_1(0, 0)$	unstable
$P_2[N_1(1 + \alpha - \beta), 0]$	$\sigma_1 < \frac{1+\alpha-\beta}{1-\alpha+\beta}, \sigma_2 > \frac{1-\alpha+\beta}{1+\alpha-\beta}$
$P_3[0, N_2(1 - \alpha + \beta)]$	$\sigma_1 > \frac{1+\alpha-\beta}{1-\alpha+\beta}, \sigma_2 < \frac{1-\alpha+\beta}{1+\alpha-\beta}$
$P_4[N_1\frac{1+\alpha-\beta-\sigma_1(1-\alpha+\beta)}{1-\sigma_1\sigma_2}, N_2\frac{(1-\alpha+\beta-\sigma_2(1+\alpha-\beta))}{1-\sigma_1\sigma_2}]$	$\sigma_1 < \frac{1+\alpha-\beta}{1-\alpha+\beta}, \sigma_2 < \frac{1-\alpha+\beta}{1+\alpha-\beta}$

There are three points of balance  $P_2, P_3, P_4$ , we will discuss them at two situations following:

When  $\alpha > \beta$ , it shows that the impact of voluntary disclosure of information for AMEs to large enterprises is more than that of large enterprises to SMEs. The stability condition of point  $P_2$  is  $\sigma_1 < 1 < \frac{1+\alpha-\beta}{1-\alpha+\beta}, \sigma_2 > \frac{1-\alpha+\beta}{1+\alpha-\beta}$ , and  $\sigma_1 < 1$  means that the output of fluency of large enterprises to SMEs is smaller than the SMEs to large enterprises for their own role on the block, It is clearly that this situation is less in real life, that is, the competitive advantages of large-scale enterprises is worse than of SMEs, this situation just occurs in some areas and local industry, with the distance of  $\alpha$  and  $\beta$  increasing, the competitiveness of SMEs enhanced, the SME profit increase in the point of balance, In this case, large enterprises increase the voluntary disclosure of information can reduce the competitiveness of SMEs, and in the securities market, the emergence of just such a situation for all shareholders in listed companies are not aware of the circumstances, this in a national policy of mandatory information disclosure requirements under almost impossible, therefore, it is not easy to achieve this

stability of conditions. In the same way, the stability condition of  $P_4$  is  $\sigma_1 < \frac{1+\alpha-\beta}{1-\alpha+\beta}$ ,  $\sigma_2 < \frac{1-\alpha+\beta}{1+\alpha-\beta}$ , that large enterprises and SMEs have not advantages in competition either, so it is also not to achieve this condition. With the distance of and increasing, the competitiveness of SMEs enhanced, it can make their own disadvantage circumstances and achieve the optimum results. In this case, large enterprises increasing the voluntary disclosure of information can also reduce the competitiveness of SMEs, and have better achieve their own profit. The stability condition of  $P_3$  is  $\sigma_1 > \frac{1+\alpha-\beta}{1-\alpha+\beta}$ ,  $\sigma_2 < \frac{1-\alpha+\beta}{1+\alpha-\beta}$ , it reflects the general situation in the stock market, so the stable condition of point  $P_3$  is easy to achieve. At this point shows that the competitiveness of SMEs in the securities market in a significant disadvantage, SMEs to large enterprises is much smaller than the negative impact of large-scale impact on the competitiveness of its enterprises. With the distance of  $\alpha$  and  $\beta$  increasing, SMEs had increased the profits of large enterprises to deal with this situation, and they will also choose a voluntary disclosure of information to enhance their own competitiveness.

When  $\alpha < \beta$ , analyzing with the same way before, at this time the impact of SMEs voluntary disclosure of information to large enterprises is more than large enterprises voluntary disclosure to SMEs. This is general situation in real life. Under such circumstances, with the reduction of the distance of  $\alpha$  and  $\beta$ , large-enterprises effect up the voluntary disclosure of information. Point  $P_3$  shows the common situation in stock market, and  $\alpha < \beta$  also reflects the general situation, That is, in real terms, during the same quality of information disclosure, large enterprises to SMEs are often greater than the impact of SMEs on the impact of large enterprises, in this case, with deducing of  $\alpha < \beta$ , it is more detrimental to SMEs, at this time of SMEs need to increase their own competitiveness in addition, it also should be conducive to the proper conduct of its own voluntary disclosure of information to reduce or mitigate such adverse effects.

### 3 Conclusion

Through the model analysis, we can see clearly that in the securities market, the options of SMEs and large enterprises in the competition between the profit and strategic. In the securities market competition, large enterprises increase voluntary disclosure of information, that is a rational choice to outside investors in order to correct its own judgment of the market value, SMEs is at a disadvantage in the competition, and in the long run, may be facing mergers and acquisitions and even the risk of collapse, so SMEs will be conducive to appropriate more of their own to disclose the information to increase their own income. In these competitive conditions, some enterprises in order to increase voluntary disclosure of the favorable effects may be exaggerated to take their own performance or even disclosure of false information to increase the competitiveness of enterprises, which directly led to the occurrence of a financial scandal. In recent years the ongoing financial scandal occurred also to the entire stock market has brought huge losses. Therefore, SMEs and large enterprises have led to the competition between the voluntary disclosures of information generated,

and as competition intensifies, the voluntary disclosure of information system will become more perfect.

There is just some qualitative analysis done in this paper. Quantitative analysis has still an unresolved problem in this case because of the scarcity of the basic academic limitation, and it is the next important theme in the following research stage.

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