Simulation Optimization on the Identification of Competitive Strategy

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Abstract
A central problem in strategic management is how to scientifically identify competitive strategies. The even more importance is that how to utilize simulation analysis to optimize strategy identity methodology. In this article, per the prior research, we reconstruct an asymmetric Bowley utility functions for the firms pursing cost leadership strategy and the firms pursing differentiation strategy as well. Furthermore, we utilize Cournot duopoly model to solve the Nash equilibrium for the prices, outputs, and profits of these two strategic firms. Then, by applying the price elasticity of demand hypothesis and equilibrium performance condition of competitive strategies, we prove that Palepu assumptions can be recognized as strategy identity indicators from pure mathematical derivations. After that, we use simulation analysis methodology to further confirm that setting median of indicators in a specific industry as critical point is reliable and scientific. Finally, the paper concludes with a summary of the proposed model and simulation optimizations for future theoretical development of Palepu assumptions.

Key words: Palepu Assumptions, Simulation, Cournot Duopoly Model, Competitive Strategy.

1. INTRODUCTION

Until the 1960s, Strategy is first introduced into the business level in the economic field, stated strategy as decisions, actions and efficient resources allocation to achieve long-term goals for enterprises (Chandler, 1962). From that moment on, strategic management formally becomes an important branch in the research field of management, reveals an inherent implication between strategy and business (organization): like the sails specify the travelling direction for the ship, strategy runs through influences on the survival and development of enterprises (Lin and Wang, 2015). Specifically, some scholars point out that as a forward-looking plan and conscious action, strategy create sustainable competitive advantages and good performance for enterprises, which can be divided into three levels—the overall strategy, competitive strategy, and functional strategy (Mintzberg, 1978).

In the above divisions of strategy, competitive strategy proposed by Porter (1980) from an industrial perspective for the first time, always has stayed at the frontier position of academic researches both in economics and management cycles since 1980s. Considering an attractive industry designed by Five Forces Model (including bargaining power of suppliers, bargaining power of buyers, threat of new entrants, substitutes, and rivalry), Porter’s strategy theory insists that the enterprises must or have to select one of three strategies (overall cost leadership, differentiation, and focus) to establish competitive advantages so as to gain a long-term performance more than the industrial average. Undoubtedly, the competitive strategy theory makes great contributions to construct representative strategic analysis framework to be the core of strategic management. However, the generalizations produced from above approaches are not comprehensively tested or even widely supported, which need to be addressed.

Due to the Porter’ ambiguous statements of competitive strategy identity, scholars have drawn different viewpoints about strategy identification using diversified methodologies from various perspectives. Some scholars stress on the cognitive data from subjective scales, verifying competitive strategies the enterprises are planning to process (Dess and Davis, 1984; Spanos, et.al, 2004; Kim and Nam, 2004). Some others utilize cluster or factor analysis methods to identify competitive strategy which the business is processing based on objective financial data (Davis, et.al, 2002). Compared with subjective data, this methodology seems more sophisticated, while limited to the artificial and blind choice on data, the identified results are often lack of generality and not consistent or persuade; The other scholars apply frontier approaches (including SFA and DEA) to study on competitive strategy identity based on the efficiency of inputs-outputs (Schefczyk, 1993; Majumdar and Venkataraman, 1998; Durand and Vargas, 2003).
Under such a situation, the objective of this paper is to extend the relevant literature of competitive strategy identification, which can be verified and supported based on pure mathematical derivations. This work seeks to make several theoretical and methodological contributions. First, our study develops a new approach based on game theory to mathematically derivate and validates that Du Pont indicators can be generally used for competitive strategy identity. Second, this paper focuses on competitive strategy rather than corporate strategy, to lead a better guideline for business level.

2. MATHEMATICAL DERIVATIONS ON STRATEGY IDENTIFICATION

Specifically, the paper in this part: 1) Proposes basic hypotheses per Porter’s strategy viewpoints and other related economic theories. 2) Constructs an asymmetric Bowley utility function of two typical firms separately represented for cost leadership and differentiation strategy, to obtain the inverse demand function. 3) Adopts Cournot gaming model to compute the equilibrium solutions (including equilibrium price and equilibrium output) of first-order conditions for profit-maximization in these two firms. 4) Utilizes price elasticity of demand hypothesis and equal performance condition to derivate and verify that Palepu assumptions can be scientifically used for competitive strategy identification, which is compatible with the nature of Porter’s strategy classification.

2.1. Basic Hypothesis

As Porter (1980) stated: “A differentiation strategy seeks to develop and offer products or services that are perceived as being unique or superior in some way, such as design, brand image, technology etc.”, that is, a firm pursuing differentiation may depend on its uniqueness to obtain premium price or profit. In contrast, a cost leadership strategy can survive and develop by strict cost control and improve managerial ability to provide standard products or services, to realize scale economy. Regarding these two generic strategies, Porter (1980) noted that “whatever strategy, a firm could lead success through diversified competitive advantages in the end”.

For exploring the possibility to gain equal advantages in these two firms who pursue cost leadership and differentiation strategy respectively, selected return on asset (ROA) from Du Pont model as performance variables, we assume:

H1: cost leadership and differentiation strategy can both lead to an equilibrium performance in theory.

Consider a market in an industry with two firms 1 and 2, and let firm 1 be the cost leadership. Thus, if the return on asset (ROA) of the differentiation firm 1 is \(\rho_1\), then the return on asset (ROA) of the differentiation firm 2 is \(\rho_2\). Per Hypothesis 1, there exists an equilibrium performance condition expressed as follows.

\[
\rho_1^* = \rho_2^* = \frac{x_1^*}{A_1} = \frac{x_2^*}{A_2}
\] (1)

For a given schedule, \(x_1^*\) represents the equilibrium profit of firm 1. \(x_2^*\) represents the equilibrium profit of firm 2. Similarly, let \(A_1\) and \(A_2\) respectively represent the asset of firm 1 and firm 2.

According to product differentiation theory, in a duopoly market, the uniqueness of product means that it can hardly be replaced by other competing products. The more uniqueness, the lower price elasticity of demand, and the higher the degree of monopoly. Therefore, considering the discontinuity of strategy category, based on the elasticity concept in economics, we propose another basic hypothesis below.

H2: the price elasticity of demand for differentiation product is much lower than that of cost leadership product.

The above hypothesis can be expressed as follows. Let \(E_1\), \(p_1^*\), \(q_1^*\) respectively represent price elasticity of demand, equilibrium price and equilibrium outputs of firm 1 who is pursuing cost leadership strategy. Similarly, let \(E_2\), \(p_2^*\), \(q_2^*\) respectively represent price elasticity of demand, equilibrium price and equilibrium outputs of firm 2 who is pursuing differentiation strategy.

\[
E_1 = -\frac{\partial q_1}{\partial p_1} \times \frac{p_1^*}{q_1^*} \quad E_2 = -\frac{\partial q_2}{\partial p_2} \times \frac{p_2^*}{q_2^*}
\] (2)

2.2 Modeling

In this paper, referring to Chen’s (2015) approach (Chen, 2011), the original symmetric Bowley (1924) quadratic utility function including two products is developed to a general asymmetric model to describe these two asymmetric products, enable to distinguish and accommodate different strategies. Assume only two firms in a market, firm 1 is pursuing cost leadership strategy, firm 2 is pursuing differentiation strategy. Besides, whatever kind of firms only produce one product and sell out with the single price. The new modified Bowley utility quadratic function is designed as follows.
\[ u = (q_1 + a q_2) - \frac{1}{2} (q_1^2 + 2 \theta_1 q_1 q_2 + q_2^2) + m = (q_1 + a q_2) - \frac{1}{2} (q_1^2 + 2 \theta_2 q_1 q_2 + q_2^2) + m \] (3)

As given above, compared with original Bowley utility function, the obvious differences are the asymmetry of the first-order coefficients as well as second-order coefficients, due to the uniqueness in differentiation products, which can result in premium price. Thus, the one-time utility of a differentiation product is surely more than that of cost leadership product, let parameter \( \theta_1 \) and \( \theta_2 \) represent uniqueness factor of differentiation products, and \( a > 1 \). \( \theta_1 \) and \( \theta_2 \) are parameters for the substitutional factors, \( \theta_1 \) stands for the possibility of product in firm 2 (differentiation) substituting product in firm 1 (cost leadership), vice versa is \( \theta_2 \) , where \( \theta_1 \) and \( \theta_2 \) are both restricted to the internal \((0,1)\). Besides, let \( m \) represent the utility of all other products.

If set \( a = 1 \), \( \theta_1 = \theta_2 = 0 \), equation (3) will degenerate to the original Bowley quadratic function as follows.

\[ u = (q_1 + q_2) - \frac{1}{2} (q_1^2 + 2 \theta_1 q_1 q_2 + q_2^2) + m \] (4)

According to the property of Bowley utility function, we separately give the first-order conditions of utility-maximization for cost leadership product and differentiation product as follows.

\[ \frac{\partial}{\partial q_1} \left[ u(q_1, q_2) - \int_0^q p_1(q_1, q_2) dq_1 \right] = 0 \] (5)

And

\[ \frac{\partial}{\partial q_2} \left[ u(q_1, q_2) - \int_0^q p_2(q_1, q_2) dq_2 \right] = 0 \] (6)

Let \( p_1 \) and \( p_2 \) separately represent the price of cost leadership product in firm 1 and that of differentiation product in firm 2, \( u(q_1, q_2) \) stand for gross utility of product in every firm, \( \int_0^q p_1(q_1, q_2) dq_1 \) stand for the market expenditure spent for the utility of cost leadership product, and \( \int_0^q p_2(q_1, q_2) dq_2 \) stand for the market expenditure spent for the utility of differentiation product. Solving equation (5) and (6), the inverse demand functions of these two products are shown as below.

\[ p_1 = 1 - q_1 - \theta_1 q_2 \] (7)

And

\[ p_2 = a - q_2 - \theta_2 q_1 \] (8)

Furthermore, using equation (7) and (8), let \( c_1 \) and \( c_2 \) represent variable cost per unit of cost leadership product and differentiation product individually, \( F_1 \) and \( F_2 \) stand for fixed cost in firm 1 and firm 2 respectively. Thus, the profit of firm 1 and firm 2 can be separately calculated by equation (9) and (10) as follows.

\[ \pi_1 = (p_1 - c_1) q_1 - F_1 \] (9)

And

\[ \pi_2 = (p_2 - c_2) q_2 - F_2 \] (10)

### 2.3 Nash Equilibrium Solutions

As assumed there only two firms in a duopoly market, we apply the Cournot duopoly model given by equation (11) as below.

\[ \left\{ \frac{\partial \pi_1}{\partial q_1} \right\} = \left\{ \frac{\partial \pi_2}{\partial q_2} \right\} = \{0\} \] (11)

To compute the equilibrium outputs of firm 1 and firm 2, use Cournot model working on the equation (9) and (10), solving results as follows.

\[ q_1^* = \frac{2(c_1 - 1) + \theta_1(a - c_2)}{\theta_1 \theta_2 - 4} \] (12)

And

\[ q_2^* = \frac{\theta_1(c_1 - 1) + 2(a - c_2)}{\theta_1 \theta_2 - 4} \] (13)

Incorporating equation (12) and (13) in equation (7) and (8), provide the two firms’ equilibrium price function as follows.

\[ p_1^* = \frac{\theta_1(a - c_2) + c_1(\theta_1 \theta_2 - 2) - 2}{\theta_1 \theta_2 - 4} \] (14)
And

\[ p_2^* = \frac{-2(a + c_2) + \theta_2(1-c_2 - \theta_1)}{\theta_2 \theta_2 - 4} \]  

(15)

A conclusion can be obviously drawn that, whatever cost leadership firm or differentiation firm, the equilibrium price of its product will come up following the firm’s increasing variable cost per unit, which happens to be contrary to the equilibrium outputs in both firms.

Incorporating these expressions given from (12) to (15) into equation (9) and (10), the equilibrium profit of these two firms can be separately solve as follows.

\[ \pi_1^* = \left( \frac{2c_1 + a \theta_1 - c_1 \theta_2 - 2}{\theta_2 \theta_2 - 4} \right)^2 - F_1 \]  

(16)

And

\[ \pi_2^* = \left( \frac{2a - 2c_2 - \theta_2 + c_1 \theta_2}{\theta_2 \theta_2 - 4} \right)^2 - F_2 \]  

(17)

Likewise, we can easily see that, when \((a - c_2)\) is increasing, the equilibrium profit of firm 2 who is pursuing differentiation follows up, opposite to the firm 1 who is pursuing cost leadership.

2.4 Derivations for Strategy Identity

As stated above in this paper, the main purpose is to prove that Palepu assumptions based on Du Pont model can be generally used to identify competitive strategy by pure mathematical derivations. Du Pont financial analysis system was initiatively invented by a finance engineer of Du Pont company in 1917, and developed to a newly modified model by Nissim and Penman (2001), reflected by return on asset (ROA) instead of original return on equity (ROE) as follows:

\[ \text{ROA} = \frac{\pi}{pq} = \frac{\pi}{A} \]  

(18)

Where \(\pi/(pq)\) represents net income (profit) to sales ratio, and \((pq)/A\) represents asset turnover ratio, let \(A\) stand for asset of firms.

Per hypothesis 1, there exists an equilibrium ROA between cost leadership firm and differentiation firm. The equation (1) can be extended to following expression as:

\[ \text{ROA}_1 = \text{ROA}_2 = \frac{\pi_1^*}{p_1 q_1} \times \frac{p_1 q_1}{A_1} = \frac{\pi_2^*}{p_2 q_2} \times \frac{p_2 q_2}{A_2} \]  

(19)

If the first term \(\pi_1^*/(p_1 q_1) < \pi_2^*/(p_2 q_2)\), to be equal ROA in these two firms, the second term \((p_1 q_1)/A_1\) in firm 1 must be greater than \((p_2 q_2)/A_2\) in firm 2. Moreover, if we can prove such relationships between firm 1 and firm 2, that means Palepu assumptions stand.

First, incorporating equation (7) and (8) as well as (12) to (15) into equation (2), we separately compute the price elasticity of demand for these two firms as follows.

\[ E_1 = \frac{a \theta_1 - c_1 \theta_2 - 2c_1 - 2 + c_1 \theta_2}{2c_1 + a \theta_1 - c_1 \theta_2 - 2} \]  

(20)

And

\[ E_2 = \frac{-2a - 2c_2 + \theta_2 - c_1 \theta_2 + c_1 \theta_2}{2(a - c_2) + \theta_2 (c_1 - 1)} \]  

(21)

Second, we introduce equation (12) to (17) into equation (19) to solve the net income (profit) to sales of these two firms respectively. Without loss of generality, set \(F_1 = F_2 = 0\), shown as follows.

\[ \frac{\pi_1^*}{p_1 q_1} = \frac{2c_1 + a \theta_1 - c_1 \theta_2 - 2}{a \theta_1 - c_2 \theta_1 - 2c_1 - 2 + c_1 \theta_2} = \frac{1}{E_1} \]  

(22)

And

\[ \frac{\pi_2^*}{p_2 q_2} = \frac{2(a - c_2) + \theta_2 (c_1 - 1)}{-2a - 2c_2 + \theta_2 - c_1 \theta_2 + c_1 \theta_2} = \frac{1}{E_2} \]  

(23)
According to our hypothesis 2, since \( E_1 > E_2 \), we can clearly confirm \( \pi_1^* \left/ \left( p_{1}^{*}q_{1}^{*} \right) \right. < \pi_2^* \left/ \left( p_{2}^{*}q_{2}^{*} \right) \right. \). Thus, another latent conclusion that \( \left( p_{1}^{*}q_{1}^{*} \right) / A_1 \) in firm 1 is greater than \( \left( p_{2}^{*}q_{2}^{*} \right) / A_2 \) in firm 2 can be drawn automatically based on the equilibrium performance condition of these two firms. That means we have totally proved the Du Pont system as strategy indicators by mathematical derivations.

3. SIMULATION ANALYSIS ON STRATEGY IDENTITY

To verify the above theoretical strategy identity methodology, this paper utilizes Chinese automobile manufacturing listed companies from year 2007 to year 2014 as investigated object. With the consideration of accuracy, we further divide the automobile industry into two minor markets: vehicle types and spare parts types. Thus, we finally collect 23 vehicle companies with the amount of 170 copies fiscal year data as well as 34 spare parts companies with the sum of 232 copies fiscal year data. To be mentioned, all the above data including financial and non-financial are originated from their yearly financial report revealed in China Stock Exchange websites. The descriptions of these two sub-divisions by area are shown in Table 1:

<table>
<thead>
<tr>
<th>Sub-divisions</th>
<th>Registered areas</th>
<th>Vehicles</th>
<th>Spare Parts</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SZ</td>
<td>SH</td>
<td>SME</td>
</tr>
<tr>
<td>East China</td>
<td>4</td>
<td>6</td>
<td>—</td>
</tr>
<tr>
<td>South China</td>
<td>1</td>
<td>1</td>
<td>—</td>
</tr>
<tr>
<td>Central China</td>
<td>1</td>
<td>2</td>
<td>—</td>
</tr>
<tr>
<td>North China</td>
<td>1</td>
<td>2</td>
<td>—</td>
</tr>
<tr>
<td>Northwest China</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Southwest China</td>
<td>1</td>
<td>1</td>
<td>—</td>
</tr>
<tr>
<td>Northeast China</td>
<td>1</td>
<td>2</td>
<td>—</td>
</tr>
<tr>
<td>Total</td>
<td>9</td>
<td>14</td>
<td>—</td>
</tr>
</tbody>
</table>

Noted: SZ is short for the main board listed in Shenzhen, SH is short for the main board listed in Shanghai, SME stands for the Medium and Small board listed in Shenzhen.

Per table 1, whatever vehicles or spare parts companies, more than 50 percent of them are in East China area, which is positively related to the opening content and development strength in this East China compared with other areas. With the collected data from year 2007 to year 2014, compute the means and median of net income profit ratio as well as asset turnover ratio respectively in vehicles and spare parts companies by year, which can be seen in Table 2 and Table 3:

<table>
<thead>
<tr>
<th>Index</th>
<th>Values</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asset Turnover</td>
<td>Mean</td>
<td>1.40</td>
<td>1.42</td>
<td>1.29</td>
<td>1.39</td>
<td>1.30</td>
<td>1.06</td>
<td>1.03</td>
<td>0.98</td>
</tr>
<tr>
<td></td>
<td>Median</td>
<td>1.34</td>
<td>1.24</td>
<td>1.26</td>
<td>1.31</td>
<td>1.15</td>
<td>1.03</td>
<td>0.99</td>
<td>0.96</td>
</tr>
<tr>
<td>Income Profit</td>
<td>Mean</td>
<td>0.03</td>
<td>0.01</td>
<td>0.01</td>
<td>0.04</td>
<td>0.03</td>
<td>0.01</td>
<td>0.01</td>
<td>-0.02</td>
</tr>
<tr>
<td></td>
<td>Median</td>
<td>0.04</td>
<td>0.02</td>
<td>0.03</td>
<td>0.04</td>
<td>0.03</td>
<td>0.01</td>
<td>0.02</td>
<td>0.02</td>
</tr>
<tr>
<td>ROA</td>
<td>Mean</td>
<td>0.04</td>
<td>0.02</td>
<td>0.03</td>
<td>0.01</td>
<td>0.06</td>
<td>0.04</td>
<td>0.01</td>
<td>0.01</td>
</tr>
<tr>
<td></td>
<td>Median</td>
<td>0.05</td>
<td>0.03</td>
<td>0.02</td>
<td>0.05</td>
<td>0.04</td>
<td>0.01</td>
<td>0.02</td>
<td>0.02</td>
</tr>
</tbody>
</table>

Per Table 2, there is little difference between in the mean and the median of asset turnover. Similarly, the mean of income profit is little lower than the median of income profit. Thus, we choose the median of these two index as critical point to define the lower or higher level when identifying competitive strategy for investigated companies. As the comprehensive index, the mean of ROA and the median of ROA in vehicle companies reflect the combined effect of asset turnover and income profit totally.

<table>
<thead>
<tr>
<th>Index</th>
<th>Values</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asset Turnover</td>
<td>Mean</td>
<td>0.79</td>
<td>0.80</td>
<td>0.80</td>
<td>0.82</td>
<td>0.77</td>
<td>0.72</td>
<td>0.71</td>
<td>0.71</td>
</tr>
<tr>
<td></td>
<td>Median</td>
<td>0.77</td>
<td>0.84</td>
<td>0.80</td>
<td>0.79</td>
<td>0.70</td>
<td>0.65</td>
<td>0.62</td>
<td>0.63</td>
</tr>
<tr>
<td>Income</td>
<td>Mean</td>
<td>0.06</td>
<td>0.03</td>
<td>0.07</td>
<td>0.11</td>
<td>0.09</td>
<td>0.06</td>
<td>0.05</td>
<td>0.07</td>
</tr>
</tbody>
</table>

338
<table>
<thead>
<tr>
<th>Profit</th>
<th>Median</th>
<th>0.08</th>
<th>0.04</th>
<th>0.08</th>
<th>0.09</th>
<th>0.09</th>
<th>0.06</th>
<th>0.07</th>
<th>0.07</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROA</td>
<td>Mean</td>
<td>0.05</td>
<td>0.03</td>
<td>0.06</td>
<td>0.09</td>
<td>0.07</td>
<td>0.05</td>
<td>0.03</td>
<td>0.05</td>
</tr>
<tr>
<td></td>
<td>Median</td>
<td>0.06</td>
<td>0.04</td>
<td>0.07</td>
<td>0.08</td>
<td>0.07</td>
<td>0.04</td>
<td>0.05</td>
<td>0.05</td>
</tr>
</tbody>
</table>

Per Table 3, quite likely as vehicle samples, there is no curious difference on the mean and the median value both in asset turnover and income profit index for spare parts companies. Therefore, we also choose the median value as critical point to identify competitive strategy for spare parts companies. As the comprehensive index, the mean of ROA and the median of ROA in spare parts companies reflect the combined effect of asset turnover and income profit totally.

To be more accurate and interpretable, the paper applies the data of Table 1 and Table 2 into GM (1, 1) based on grey model, and predict the future values for asset turnover and income profit indexes for vehicles companies and spare parts companies separately. The comparison results of the model are shown in Fig.1 and Fig.2, respectively:

![Figure 1. Actual value and predicted value for vehicle companies](image-url)
Per Fig. 1 above, we can see that the predicted value of asset turnover for vehicle companies is almost the same as the actual value, which shows the reliable evidence to use median of asset turnover to identify competitive strategy for vehicle companies. Although there is some difference between the predicted value and actual value of income profit, it is still under an acceptable minor gap. That is, to some extent, reliable to use the median value of income profit to categorize competitive strategy for vehicle listed companies.

Per Fig. 2 below, it shows very likely as that of vehicle companies both for asset turnover and income profit index, which further prove that it is scientific to use the median of these two indexes as indicators to identify competitive strategy.

![Graphs showing asset turnover and income profit](image)

Figure 2. Actual value and predicted value for spare parts companies

4. CONCLUSIONS

To resolve disputes over the competitive strategy identification, Palepu et al. (2008) suggested adopting Du Pont financial analysis model as a methodology to identify strategy to reflect the nature of Porter’s (1980) competitive strategy, called Palepu assumptions in our paper. To be more specified, Palepu assumptions show
that a firm who has a relative high profitability and a relative low asset turnover in an industry can be
recognized as pursuing differentiation strategy. On the contrary, a firm who has a relative low profitability and a
relative high asset turnover in an industry is assumed to pursue cost leadership strategy.

Indeed, some scholars (Little et al., 2009; Tang et al., 2010; Nicola et al., 2011) have directly applied
Palepu assumptions into the empirical researches on the relationship between competitive strategy and
performance, further drawn some significant conclusion. However, none of literatures till now prove the
generality and appropriateness of Palepu assumptions in strategy identity, which is very necessary and important
to scientific research manner.

This paper advances Palepu assumption into mathematical derivations. Base on the two basic hypotheses
about price elasticity and equilibrium performance, improving asymmetric Bowley utility functions for two
firms pursuing different strategies, we solve the equilibrium price, equilibrium outputs, equilibrium profits of cost
leadership firm and differentiation firm by Cournot duopoly model, further in theory prove that Palepu
assumptions can be used in identifying competitive strategy without loss of generality, which makes up and
consummates the competitive strategy identification in a systematic and extensive manner.

By the way, this paper further applies GM (1,1) based on grey model to prove that taking the median
values of asset turnover and income profit as critical point to verify competitive strategy is scientific and reliable
in some extent.

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