

國立交通大學

財務金融研究所

碩士論文

產業競爭市場下股利政策對代理問題與成長機會之取捨

Trade-Off between Agency Problem and Growth Opportunity on

Dividend Payout Policy under Product Market Competition



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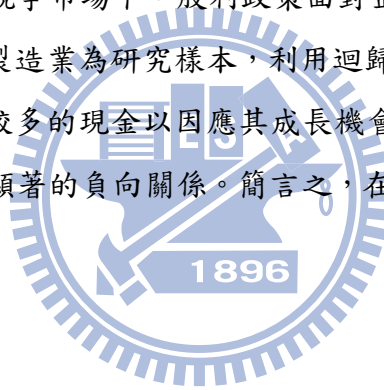
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摘要

本篇論文主要研究產業競爭是否會影響企業的股利政策。文獻上針對股利政策的議題提出兩個對立假說分別為成熟假說與自由現金流量假說，前者認為企業的成長與股利分配呈負向關係，而後者認為企業為了減少代理問題會增加股利的分配。可是在過去的文獻並沒有討論不同的產業競爭市場下，股利政策面對企業成長與代理問題會如何取捨。有鑑於此，本研究以美國製造業為研究樣本，利用迴歸分析進行研究。結果發現產業競爭度愈高，企業傾向保留較多的現金以因應其成長機會，而選擇分配較少股利。此也說明股利政策跟產業競爭呈顯著的負向關係。簡言之，在產業競爭性愈高的情況下企業股利政策與成熟假說一致。



關鍵字：產業競爭市場、代理問題、股利政策

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ABSTRACT

This paper investigates whether or not product market competition affects payout policy. According to literature, issues related to dividend payout policy comprise two competing hypotheses, namely, the maturity hypothesis and the free cash flow hypothesis. The former argues that growth opportunity and dividend payout have a negative relationship, whereas the latter argues that firms tend to increase dividend payouts in order to weaken agency problems. Existing studies seldom discuss the issue, in which dividend payout policy faces the trade-off between growth opportunity and agency problem in different levels of product market competition. Therefore, employing regression analysis, we explored the current issue with U.S. manufacturing firms as samples. The firms show the tendency to retain more cash to expand their growth opportunities and decide to pay fewer dividends in less-concentrated industries. Therefore, the dividend policy of firms is consistent with the maturity hypothesis in less-concentrated industries.

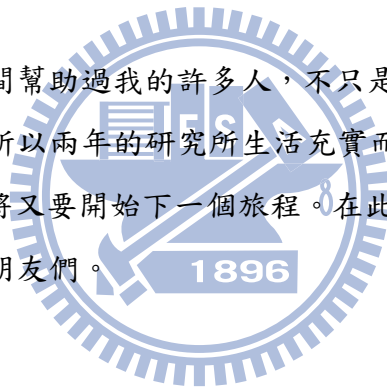
Keywords : Production market competition, agency problem, dividend payout policy

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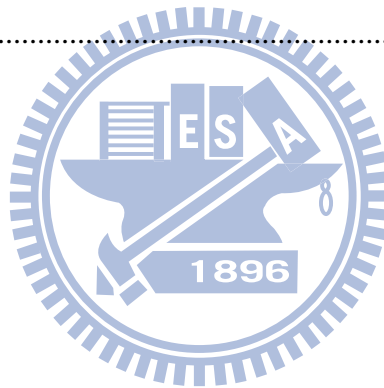


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1. Introduction

A number of factors influence payout policy. For instance, because of the tax difference between institutions and retail investors, firms tend to determine payout policy according to different shareholders (Allen, 2000). Firms that are subject to information asymmetry are less likely to pay dividends (Li and Zhao, 2008). Meanwhile, firms facing high levels of financing constraints choose low dividend payout ratios to reduce the probability of being forced to raise external funds in the future (Fazzari et al., 1988). Although there are numerous factors affecting payout policy, the present paper focuses on the agency problem and growth opportunity when deciding on dividend payout policy.

Jensen (1986) proposes the free cash flow hypothesis, which implies that managers of firms are likely to undertake low-benefit or even value-destroying decisions when firms have a large free cash flow. Free cash flow refers to cash flow in excess of that required to invest all projects with positive net present values when discounted at the cost of capital. Based on this definition, it can be stated that managers have conflicts when firms generate free substantial cash flow. The problem is how to induce managers to disgorge the cash rather than invest on a project, which is below the cost of capital. Easterbrook (1984) and Jensen (1986) point out that dividends and debts are substitute mechanisms for controlling the agency cost of free cash flow. Zwiebel (1996), Fluck (1999), and Myers (2000) highlight the idea that dividend payout policy can solve agency problems between inside managers and outside shareholders. Managers tend to invest surplus cash unproductively if left to their own device (Richardson, 2006; Dittmar and Mahrt-Smith, 2007). From the research above, we infer that the best way to solve agency problems is either to pay cash dividends or increase debts.

In the early years of a company, when firms pay few dividends, investment opportunities exceed their internally generated capital. As firms become more mature, the investment opportunity becomes smaller, thus facilitating the firm's transition from a high growth phase

to a low growth phase. Firms pay out the excess funds to mitigate the possibility that the free cash flow would be wasted or overinvested when internal funds exceed investment opportunities. Some studies refer to this explanation as the maturity hypothesis (Grullon et al., 2002). Smith and Watts (1992) argue that if firms have a high investment opportunity, they are likely to pursue a low dividend payout policy. Jones (2001) and Abor (2010) find out that high growth firms are associated with significantly low dividend payout policy. Fama and French (2001) as well as Grullon et al. (2002) argue that firms optimally alter payout policy through time according to the evolution of their opportunity set.

We know that growth opportunity and payout policy have a negative relationship. However, agency problems and payout policy have a positive relationship. Thus, if firms want to grow quickly, they must retain large cash to invest in the future. If firms want to solve agency problems, they have to pay more dividends. Moreover, firms have to make a choice as to whether they should face the trade-off between growth opportunity and agency problems. In this paper, we highlight not only the relationships among growth opportunity, agency problems and payout policy, we also examine the relationship between product market competition and payout policy. We want to know whether or not there are different degrees of agency problems and growth opportunities in different levels of product market competition. In this paper, we also aim to discuss the relationship between payout policy and production market competition.

The literature confirms the positive relationship between competition and managerial incentives. If managers have more incentives, there will be less agency costs in firms. This concept can be traced back to the influential book, *Wealth of Nations*, written by Adam Smith. In this work, the author states that monopoly is actually an enemy of good management. In the past years, numerous studies have tried to prove this argument in different ways. For example, Hart (1983) shows that greater competition provides strong implicit managerial

incentives by modeling the effect of competition on the agency problems between a firm's owners and managers. Nickle (1996) examines productivity directly to support his view that competition reduces managerial slack. Likewise, Schmidt (1997) shows that an increase in competition reduces managerial slack. Likewise, Schmidt (1997) shows that an increase in competition increases the possibility of liquidation, which has a positive effect on managerial effort. In such a case, managers are motivated to work harder in order to retain their jobs. Ravi (2000) proves this view using the indirect method. He argues that an unanticipated increase in cash flow due to high past returns can cause an unnecessary reduction, hence, a lowering of returns in less competitive environments. Finally, Kruna (2007) provides a direct test of the relation between competition and incentives based on three dimensions of competition, given the level of industry concentration (i.e., greater product substitutability, greater market size, and lower entry costs reflect greater price competition). In summary, competition can reduce managerial slack from the points of the productivity, liquidation, and cash flow. We support this concept from the point of free cash flow. In order to solve agency problems and provide strong managerial incentives, firms prefer to pay more dividends in order to reduce their free cash flow and encourage managers to work hard. If free cash flow decreases, these managers must have to work hard and avoid wasting resources by overinvesting.

The relationship between competition and growth opportunity within an industry or country is a topic of policy debate. In a highly publicized book, Michael Porter (1990) strongly argues that companies gain advantage through differentiation against the world's best competitors brought about by pressure and challenge; thus there exists a positive causal relation between competition and growth. Some authors (e.g., Romer, 1990; Aghion and Howitt, 2002) claim that innovation is the engine of growth. Other authors (Lee and Wilde, 1980; Bertschek, 1995; Blundell et al., 1995; Nickell, 1996) point out that competition favors innovation and drives companies to increase their research and development (R&D) efforts. Therefore, market

competition induces companies to innovate to become stronger, and in turn, companies can expect to have more growth opportunities to invest in. However, the theoretical literature on competition and growth is somewhat one-sided. For example, Loury (1979) establishes a patent-race model, whereas Martin (1993) establishes a Cournot principal-agent model, which proves that market competition has a negative effect on firms' incentives to increase their R&D efforts. From the point of growth bottleneck, Caballero and Jaffe (1993) obtain the same conclusion when they find that competition raises the elasticity of substitution between goods, thus reducing monopoly rents and destroying a firms' creation at the same time. Grossmann and Helpman (1991) indicate that competition curbs R&D and growth when firms facilitate imitation. It is clear that there are two different opinions to show the effect of market competition on firms' innovation and growth. In this study, we aim to explore whether the relationship between product market competition and growth opportunity is positive or negative.

Different levels of concentrated industries correspond to different levels of agency problems and growth opportunities. We know that agency problems and payout policy have a negative relationship, while growth opportunity and payout policy have a positive relationship. The question is, in less concentrated industries, will firms pay more dividends to solve agency problems, or retain cash to invest in the future? Our issue is to explore the choice firms make in relation to payout policy. We hypothesize that if payout policy and product market competition have a negative relationship, then firms would prefer to invest in the future. In addition, if payout policy and product market competition have a positive relationship, then firms would prefer to pay dividends to solve agency problems.

2. Data, Variable Definitions, and Descriptive Statistics

2.1 Data

The sample data were drawn from the Compustat database for the period of 2001–2007. We constructed a sample of U.S. firms for our empirical tests and chose those operating in any of the industries covered by the Census of Manufacturers (SIC code interval 2011-3990). We also deleted a missing value from the data. To mitigate the effect of outliers, we found the extreme value from the distribution graphs and descriptive statistics. Finally, PAYOUT 1, PAYOUT 2, Tobins' Q, and Leverage were dropped by 1% at the right tail of their distribution, and FCF was dropped by 1% at the left tail of the distribution. The selection process generated a sample of 4,459 firm-year observations for the period of 2001–2007.

2.2 Variable Definitions

2.2.1. Proxy for payout policy

We constructed two measures of corporate payouts. The first measure was dividend payout ratio (PAYOUT 1), defined as dividends scaled by net income. An alternative measure (PAYOUT 2) was defined as dividends plus share repurchases scaled by net income. We considered share repurchases because these surged in the mid-1980s (Bagwell and Shoven, 1989; Dunsby, 1995). Bagwell and Shoven (1989) explain that the increase in share repurchases indicate that firms have learned to substitute repurchases for dividends in order to generate lower taxed capital gains for stockholders. In recent years, firms have gradually substituted repurchases for dividends (DeAngelo et al., 2004; Fama and French, 2001; Skinner, 2008).

2.2.2. Proxy for product market competition

We used two common proxies for product market competition in our paper. Following Farm and French (1997), Grullon and Michaely (2006) and Masulis et al. (2007), the first

proxy was the Herfindahl-Hirschman Index (labeled HHI) from the Census of Manufacturers (SIC code interval 2011-3990). We used three-digit SIC HHIs to mitigate the effect of industry misclassification. The second was the four-firm concentration ratio (labeled as CONC) used as a measure of competition (e.g., Harris, 1998; DeFond and Park, 1999; Engel et al., 2003; Karuna, 2007). Industries with lower HHI or concentration ratio indexes are generally considered industries with high market competition.

2.2.3. Proxy for agency problems

Based on the free cash flow hypothesis, Jensen (1986) regards free cash flow as the proxy for agency problem. Many studies have proven Jensen's hypothesis using free cash flow as a proxy for agency problems (Agrawal, 1994; Chae, 2009). We also used free cash flow as a proxy for agency problems in the present paper.

2.2.4. Proxy for growth opportunity

We used Tobin's Q as a proxy for growth opportunity. Tobin's Q has been used in many previous studies (Smith and Watts, 1992; Chen and Zhao, 2006; Adam and Goyal, 2008). Particularly, Adam and Goyal (2008) point out four variables as proxies for growth opportunity in their paper. They argue that Tobin's Q is the best variable to proxy for a firm's investment opportunities along several dimensions.

2.2.5. Control variables

Leverage is computed as long-term debt plus short-term debt, scaled by the book value of assets (Bates et al., 2009). Prior studies (Fama and French, 2001) reveal that size affects the payout policy. Thus, we used the natural log of a firm's assets as a proxy for firm size (Masulis et al., 2007). Moreover, we set two dummy variables to represent a firm's product market competition: DUMMYHHI and DUMMYCONC. All variables are defined and shown in Table 1.

Table 1 Definition of Variables

This table reports the definitions of variables in the present study for the period of 2001 to 2007. All data were drawn from the Compustat database.

Variables	Proxy for	Definition
PAYOUT1	Dividend payout	The ratio of dividends to net income
PAYOUT2	Dividend payout	The ratio of dividends plus share repurchases to net income
HHI	Production market competition	Calculate this index by summing up the squares of the individual market shares
CONC	Production market competition	Proportion of sales in the industry accounted for by the four largest firms (by sales) in the industry
FCF	Agency problems	Operating income before depreciation minus interest expenses minus income taxes minus capital expenditures , scaled by the book value of total assets
Tobin's Q	Growth opportunity	Book value of asset plus market value of equity minus market value of equity ,scaled by the book value of assets
Leverage	Firm's leverage	Long-term debt plus short-term debt, scaled by the book value of assets.
Size	Firms' size	Natural log of the book value of assets
DUMMYHHI	DUMMY of HHI	1 if a firm exceeds the within-year median HHI in each year, 0 otherwise.
DUMMYCONC	DUMMY of CONC	1 if a firm exceeds the within-year median CONC in each year, 0 otherwise.

2.3 Descriptive Statistics

Table 2 reports the descriptive statistics for the firms in our samples. We obtained a total of 4,459 firm-year observations during the period 2001–2007. Table 2 shows that PAYOUT 1 and PAYOUT 2 have average value of 0.163 and 0.387, respectively. From the difference between PAYOUT 1 and PAYOUT 2, we know that share repurchases play an important role in determining the payout policy. HHI and CONC have average values of 0.195 and 0.643, respectively. FCF, which proxies for agency problems, has an average of 0.006. Tobin's Q, which proxies for growth opportunity, has an average of 2.095. Leverage has an average of 0.18 , and finally, size has an average of 6.165, which unit is millions of dollars.

Table 2 Descriptive Statistics

Table 2 reports the mean, median, and other descriptive statistics of our variables for the period of 2001–2007. There are 4,459 observations in the present study.

	N	Mean	25 th	Median	75th	Std. Dev.
PAYOUT1	4459	0.163	0	0	0.207	0.421
PAYOUT2	4459	0.387	0	0	0.501	0.771
HHI	4459	0.195	0.075	0.127	0.244	0.19
CONC	4459	0.643	0.443	0.629	0.828	0.216
FCF	4459	0.006	-0.01	0.041	0.082	0.167
Tobin's Q	4459	2.095	1.249	1.642	2.436	1.468
Leverage	4459	0.180	0.013	0.139	0.269	0.214
Size	4459	6.165	4.217	6.181	7.978	2.528

3. Hypothesis and Methodology

3.1 Hypothesis

Hypothesis 1 : When firms have agency problems (large free cash flow) or low growth opportunity, they pay more dividends.

In the present paper, we empirically tested three hypotheses. Previous studies (Jensen,1992; Agrawal,1994) support Jensen's free cash flow hypothesis, which indicates that firms face severe agency problems when having substantial free cash flow. In addition, we supported the maturity hypothesis (Grullon et al., 2002). Based on the maturity hypothesis, firms are inclined to pay more cash when growth opportunity declines. Hypothesis 1 is based on the free cash flow and the maturity hypothesis, which we aim to prove.

Hypothesis 2 : In less concentrated industries, firms have high growth opportunities.

There are two different opinions to show the market competition's effect on a firms' capacity for innovation and growth. One is the positive relationship between product market competition and growth opportunity (Bertschek, 1995; Blundell et al., 1995; Nickell, 1996), the other is the negative relationship (Loury, 1979; Martin, 1993; Caballero and Jaffe, 1993).

In the present paper, we support the view that product market competition and growth opportunity have a positive relationship. We consider that firms in less concentrated industries tend to have more motives and incentives to improve performance, driving them to innovate and invest invariably to exceed their competitors.

Hypothesis 3 : Dividend payout policy is consistent with the free cash flow hypothesis in less concentrated industries.

Based on the review literature, we know that the more competitive industries are, the less agency problems they have. Many studies provide different points to support this view. For example, Hart (1983) shows that greater competition provides strong implicit managerial incentives. Nickle (1996) supports Hart's view by examining the productivity directly. Schmidt (1997) supports it further by showing that an increase in competition increases the possibility of liquidation. Ravi (2000) tries to prove this view by indirect method, which is related to free cash flow. In this paper, we aim to support this view through free cash flow: when two firms have the same level of free cash flow in different concentrated industries, the firm in less concentrated industries pays more dividends considering agency problems and incentives. Firms in less concentrated industries are inclined to pay more cash in order to decrease agency problems and increase managerial incentives. As such, we can conclude that dividend payout policy is consistent with the free cash flow hypothesis in less concentrated industries.

3.2 Methodology

Correlation shows the relationship between two variables, whereas Correlation Matrix computes the correlation coefficients of the columns of a matrix. We used the Pearson Correlation Testing to explore the relationship between two variables. To investigate the relationship between payout policy and product market competition, we conducted a regression analysis and used the following equation to perform a regression¹.

$$\text{PAYOUT1} = \beta_0 + \beta_1 \text{HHI} + \beta_2 \text{FCF} + \beta_3 \text{Tobin's Q} + \beta_4 \text{Leverage} + \beta_5 \text{Size} + \epsilon$$

In our paper, we employed two different regression models: an OLS regression and a panel regression. The latter refers to the Fixed Time Effect Model, which investigates how time affects the intercept using time dummy variables. The different levels of product market competition have different effects on growth opportunity and agency problems; thus we classified all our samples into two groups according to the median HHI and the median CONC. If a firm exceeded the within-year median HHI in each year, it was classified into High HHI, otherwise it was classified into Low HHI. If a firm exceeded the within-year median CONC in each year, it was classified into High CONC, otherwise, it was classified into Low CONC.

4. Results Analysis

4.1 Analysis of Correlation Matrix

Table 3 shows the Pearson Correlation Matrix for variables. PAYOUT 1 is positively and significantly correlated with FCF but is negatively and significantly correlated with Tobin's Q. As expected, the results follow the free cash flow hypothesis and the maturity hypothesis; thus, the results are consistent with Hypothesis 1. To check for robustness, we substituted PAYOUT 2 with PAYOUT 1. PAYOUT 2 is positively correlated with FCF significantly.

¹ In regression equation, we substituted another variable for original variable in order to check the robustness of our result.

The result also supports our Hypothesis 1; however, PAYOUT 2 is positively yet insignificantly correlated with Tobin's Q. We used HHI as a proxy for product market competition in order to examine the relationship between product market competition and growth opportunity. HHI has a significantly negative relationship with Tobin's Q. We substituted CONC for HHI. Similarly, CONC has a significantly negative relationship with Tobin's Q. The result supports Hypothesis 2, which argues that there is a negative relationship between product market competition and growth opportunity.

In Table 3, PAYOUT 1 has a positive and significant relationship with HHI and CONC. PAYOUT 2 also has a positive and significant relationship with HHI and CONC. When payout policy has a positive relationship with HHI, it means that payout policy has a negative relationship with product market competition.²

Table 3 Pearson Correlation Matrix for variables

The total number of observations in Panel A is 4,459 for the period of 2001–2007.

Panel A correlation matrix on the whole sample										
	PAYOUT1	PAYOUT2	HHI	CONC	FCF	Tobin's Q	Leverage	Size		
PAYOUT1										
PAYOUT2	0.626 ***									
HHI	0.103 ***	0.072 ***								
CONC	0.158 ***	0.102 ***	0.784 ***							
FCF	0.127 ***	0.195 ***	0.072 ***	0.096 ***						
Tobin's Q	-0.067 ***	0.004	-0.118 ***	-0.141 ***	-0.093 ***					
Leverage	-0.009	-0.04 **	0.129 ***	0.167 ***	-0.101 ***	-0.031 **				
Size	0.207 ***	0.241 ***	0.148 ***	0.2 ***	0.34 ***	-0.138 ***	0.137 ***			

*, **, and *** indicate significance at 10%, 5%, and 1%, respectively.

4.2 Regression Analysis

4.2.1 Payout policy and product market competition

Table 4 shows estimates of regressions relating scaled payout policy to the product market competition and other control variables. In Panel A, we report the result that assumes a linear relationship between the HHI and the payout policy. In Panel B, we report the linear

² Given that HHI is low, it means that firms have a competitive market. When payout policy and HHI have a positive relationship, the payout policy and product market competition have a negative relationship.

relationship between CONC and payout policy. In Table 3, we know that payout policy has a positive relationship with HHI. Next, we examined the correlation between payout policy and product market competition in Table 4. The result shows that a significantly positive relationship exists between PAYOUT 1 and HHI in Column (1) of Panel A. Similarly, there is a significantly positive relationship between PAYOUT 2 and HHI in Column (2) of Panel A. To check the robustness of the result, we used CONC as a proxy for product market competition in Panel B. The result shows that a significantly positive relationship exists between PAYOUT1 and CONC in Column (1) of Panel B. Similarly, there is a significantly positive relationship between PAYOUT2 and CONC in Column (2) of Panel B. Thus, from the results of Table 3 and Table 4, we conclude that payout policy has a negative relationship with product market competition and all the results are significant.

In Table 4, we also examine the possibility of the free cash flow and the maturity hypothesis. There exists a significantly positive relationship between payout policy and FCF in Columns (1)–(2) of Panel A and in Columns (1)–(2) of Panel B. The results strongly prove that the free cash flow hypothesis is true. However, there is a little discrepancy between the results of Table 4 and the maturity hypothesis. In Column (1) of Panel A, payout policy and growth opportunity have a significantly negative relationship, thus supporting the maturity hypothesis. In Column (2) of Panel A, the results are ambiguous because there is a significantly positive relationship. In Panel B, the results are also not strong and significant to support the maturity hypothesis. In conclusion, we find strong support for the free cash flow hypothesis, but we can not find strong support for the maturity hypothesis.

Table 4 Linear Regression – Payout Policy and Product Market Competition

The table reports linear regressions results. PAYOUT 1 is the ratio of dividends to net income. PAYOUT 2 is the ratio of dividends plus share repurchases to net income. HHI is the three-digit SIC Herfindahl-Hirschman Index from the census of manufacturers. CONC is the proportion of sales in the industry accounted for by the four largest firms (by sales) in the industry. Tobin's Q is the book value of asset plus market value of equity minus market value of equity, scaled by the book value of assets. FCF is the operating income before depreciation minus interest expenses, income taxes, and capital expenditures, scaled by the book value of total assets. Leverage is the long-term debt plus short-term debt, scaled by the book value of assets. Size is the natural log of the book value of assets. t-statistics are shown in parentheses.

Panel A: Regression on payout policy with HHI		
	PAYOUT1	PAYOUT2
Variable	(1)	(2)
Intercept	-0.022 (-1.04)	-0.057 (-1.5)
HHI	0.164 *** (4.99)	0.187 *** (3.14)
Tobin's Q	-0.009 ** (-2.02)	0.025 *** (3.25)
FCF	0.136 *** (3.43)	0.553 *** (7.70)
Leverage	-0.076 *** (-2.59)	-0.22 *** (-4.13)
Size	0.03 *** (11.23)	0.063 *** (13.24)
Adj. R-square	0.053	0.078
N	4459	4459

Panel B: Regression on payout policy with CONC		
	PAYOUT1	PAYOUT2
Variable	(1)	(2)
Intercept	-0.135 *** (-5.15)	-0.168 *** (-3.54)
CONC	0.242 *** (8.22)	0.245 *** (4.59)
Tobin's Q	-0.007 (-1.57)	0.027 *** (3.47)
FCF	0.128 *** (3.23)	0.545 *** (7.60)
Leverage	-0.095 *** (-3.24)	-0.237 *** (-4.44)
Size	0.028 *** (10.58)	0.062 *** (12.86)
Adj. R-square	0.062	0.081
N	4459	4459

*, **, and *** indicate significance at 10%, 5% and 1%, respectively.

To be robust, we set two dummy variables to represent a firm's product market competition in a given year. One was the DUMMYHHI, and the other was the DUMMYCONC. In Panel

A of Table 5, the relationship between payout policy and product market competition is significantly negative in Columns (1)–(2). In Panel B of Table 5, the relationship between payout policy and product market competition is also significantly negative in Columns (1)–(2). The results are consistent with our prior results.

Next, we examined the relationship among payout policy, FCF, and growth opportunity. In Panel A of Table 5, the relationship between payout policy and FCF is significantly positive in Columns (1)–(2). In Panel B of Table 5, the relationship between payout policy and FCF is also significantly positive in Columns (1)–(2). However, the relationship between payout policy and growth opportunity is still ambiguous in Columns (1)–(2) of Panel A and Panel B. In summary, we get the same results in Table 4.

Table 5 Linear Regression with Dummy Variable — Payout Policy and Product Market Competition

The table reports the results of linear regressions. PAYOUT 1 is the ratio of dividends to net income. PAYOUT 2 is the ratio of dividends plus share repurchases to net income. DUMHHI is 1. If a firm exceeds the within-year median HHI in each year, then it will be zero. DUMCONC is 1. If a firm exceeds the within-year median CONC in each year, then it will be zero. Tobin's Q is the book value of assets plus market value of equity minus the market value of equity, scaled by the book value of assets. FCF is the operating income before depreciation minus interest expenses, income taxes, and capital expenditures, scaled by the book value of total assets. Leverage is the long-term debt plus the short-term debt, scaled by the book value of assets. Size is the natural log of the book value of assets. t-statistics are shown in parentheses.

Panel A: Regression on payout policy with DUMHHI		
	PAYOUT1	PAYOUT2
Variable	(1)	(2)
Intercept	-0.021 (-1.01)	-0.054 (-1.47)
DUMHHI	0.089 *** (6.96)	0.097 *** (4.18)
Tobin's Q	-0.008 * (-1.85)	0.026 *** (3.34)
FCF	0.131 *** (3.30)	0.547 *** (7.63)
Leverage	-0.091 *** (-3.08)	-0.235 *** (-4.40)
Size	0.028 *** (10.53)	0.062 *** (12.77)
Adj. R-square	0.058	0.08

N	4459	4459
Panel B: Regression on payout policy with DUMCONC		
	PAYOUT1	PAYOUT2
Variable	(1)	(2)
Intercept	-0.02 (-0.98)	-0.053 (-1.42)
DUMCONC	0.084 *** (6.55)	0.088 *** (3.80)
Tobin's Q	-0.008 (-1.89)	0.025 *** (3.31)
FCF	0.133 *** (3.35)	0.55 *** (7.66)
Leverage	-0.088 *** (-2.99)	-0.231 *** (-4.33)
Size	0.028 *** (10.62)	0.062 *** (12.85)
Adj. R-square	0.057	0.079
N	4459	4459

*, **, and *** indicate significance at 10%, 5%, and 1%, respectively.

We also used panel regression to explore the relationship between payout policy and product market competition. Before the examination, the regressions in Column (1) of Panel A and Panel B have no explanatory power³. In Panel A of Table 6, payout policy has a significantly negative relationship with product market competition in Columns (1)–(2). In Panel B of Table 6, payout policy also has a significantly negative relationship with product market competition in Columns (1)–(2).

In Panel A of Table 6, payout policy has a significantly positive relationship with FCF in Columns (1)–(2). In Panel B of Table 6, payout policy also has a significantly positive relationship with product market competition in Columns (1)–(2). Nevertheless, the relationship between payout policy and growth opportunity is ambiguous. From Table 4, Table 5, and Table 6, we have the same result, which states that payout policy and product

³ In Panel A and Panel B of Table 6, the regressions do not explain power in Columns (1)–(2) because the results are “NO” in the row of year fixed effects.

market competition have a strong negative relationship, thus supporting the free cash flow hypothesis strongly, but not the maturity hypothesis. With this finding, we consider that some variables affect the relationship between payout policy and growth opportunity. In Table 3, PAYOUT 1 and Tobin's Q have a significantly negative relationship. In Table 4, Table 5, and Table 6, the relationship between PAYOUT 1 and Tobin's Q is negative but not significant compared with Table 3. From the table, we suppose that some variables would weaken growth opportunity's negative effect on payout policy.

Table 6 Panel Regression – Payout Policy and Product Market Competition

The table reports panel regressions results. PAYOUT 1 is the ratio of dividends to net income. PAYOUT 2 is the ratio of dividends plus share repurchases to net income. HHI is the three-digit SIC Herfindahl-Hirschman Index from the Census of Manufacturers. CONC is the proportion of sales in the industry accounted for by the four largest firms (by sales) in the industry. Tobin's Q is the book value of asset plus market value of equity minus market value of equity, scaled by the book value of assets. FCF is the operating income before depreciation minus interest expenses, income taxes, and capital expenditures, scaled by the book value of total assets. Leverage is the long-term debt plus the short-term debt, scaled by the book value of assets. Size is the natural log of the book value of assets. t-statistics are shown in parentheses.

Panel A: Panel Regression on payout policy with HHI		
Variable	PAYOUT1 (1)	PAYOUT2 (2)
Intercept	-0.038 (-1.47)	0.083 * (1.78)
HHI	0.164 *** (4.98)	0.188 *** (3.17)
Tobin's Q	-0.009 ** (-2.07)	0.025 *** (3.27)
FCF	0.137 *** (3.45)	0.56 *** (7.82)
Leverage	-0.08 *** (-2.69)	-0.199 *** (-3.73)
Size	0.03 *** (11.26)	0.062 *** (12.89)
Adj. R-square	0.055	0.087
N	4459	4459
Year fixed effects	NO	YES

Panel B: Panel Regression on payout policy with CONC		
	PAYOUT1	PAYOUT2
Variable	(1)	(2)
Intercept	-0.149 *** (-4.92)	-0.031 (-0.56)
CONC	0.241 *** (8.19)	0.253 *** (4.75)
Tobin's Q	-0.007 * (-1.63)	0.027 *** (3.50)
FCF	0.129 *** (3.25)	0.552 *** (7.71)
Leverage	-0.098 *** (-3.33)	-0.217 *** (-4.06)
Size	0.028 *** (10.60)	0.06 *** (12.48)
Adj. R-square	0.064	0.09
N	4459	4459
Year fixed effects	NO	YES

*, **, and *** indicate significance at 10%, 5%, and 1%, respectively.

4.2.2 Payout policy and different levels of product market competition

To check the possibility of Hypothesis 3, we classified all samples into two groups. We separated HHI into High HHI and Low HHI, and similarly separate CONC into High CONC and Low CONC. In Panel A of Table 7, the relationship between payout policy and FCF is significantly positive in Columns (2)–(4) but not in Column (1). In Panel B of Table 7, we also find that the relationship between payout policy and FCF is significantly positive as shown in Columns (2)–(4). However, the relationship between payout policy and FCF is not significant as shown in Column (1). Comparing High HHI with Low HHI, that Low HHI has a positive relationship with FCF. Comparing High CONC with Low CONC, we get the same result that Low CONC has a positive relationship with FCF. The results support Hypothesis 3.

Table 7 Linear Regression—Payout Policy and different levels of Product Market Competition

The table reports linear regressions results. We classify all samples into two groups. If a firm exceeds the within-year median HHI in each year, it is classified into high HHI; if not, it is classified into low HHI. If a firm exceeds the within-year median CONC in each year, it is classified into High CONC; if not, it is classified into Low CONC. PAYOUT 1 is the ratio of dividends to net income. PAYOUT 2 is the ratio of dividends plus share

repurchases to net income. Tobin's Q is the book value of asset plus the market value of equity, minus market value of equity, scaled by the book value of assets. FCF is the operating income before depreciation minus interest expenses, income taxes, and capital expenditures, scaled by the book value of total assets. Leverage is the long-term debt plus the short-term debt, scaled by the book value of assets. Size is the natural log of the book value of assets. t-statistics are shown in parentheses.

Panel A: Regression on payout policy with High and Low HHI				
	PAYOUT1		PAYOUT2	
	High HHI	Low HHI	High HHI	Low HHI
Variable	(1)	(2)	(3)	(4)
Intercept	0.039 (0.99)	-0.002 (-0.09)	-0.084 (-1.34)	0.019 (0.42)
Tobin's Q	-0.015 (-1.73)	-0.004 (-1.06)	0.047 *** (3.32)	0.015 * (1.69)
FCF	0.092 (1.13)	0.145 *** (3.73)	0.583 *** (4.48)	0.567 *** (6.64)
Leverage	-0.046 (-0.93)	-0.131 *** (-3.92)	-0.164 ** (-2.08)	-0.303 *** (-4.21)
Size	0.033 *** (6.93)	0.024 *** (8.63)	0.072 *** (9.48)	0.055 *** (8.79)
Adj. R-square	0.033	0.052	0.069	0.074
N	2141	2318	2141	2318
Panel B: Regression on payout policy with High and Low CONC				
	PAYOUT1		PAYOUT2	
	High CONC	Low CONC	High CONC	Low CONC
Variable	(1)	(2)	(3)	(4)
Intercept	0.029 (0.77)	0.002 (0.07)	-0.094 (-1.53)	0.023 (0.50)
Tobin's Q	-0.012 (-1.39)	-0.006 (-1.43)	0.048 *** (3.50)	0.014 (1.45)
FCF	0.115 (1.49)	0.142 *** (3.38)	0.576 *** (4.61)	0.576 *** (6.53)
Leverage	-0.036 (-0.76)	-0.139 *** (-3.81)	-0.142 * (-1.86)	-0.327 *** (-4.28)
Size	0.033 *** (7.17)	0.025 *** (8.26)	0.072 *** (9.71)	0.056 *** (8.73)
Adj. R-square	0.035	0.046	0.073	0.072
N	2152	2307	2152	2307

*, **, and *** indicate significance at 10%, 5% and 1%, respectively.

5. Conclusion

Our paper aim to explore the relationship between payout policy and product market competition. In order to investigate the relationship, we set three hypotheses. Hypothesis 1 is based on the free cash flow and the maturity hypothesis. Our results show significant support for free cash flow, but not for the maturity hypothesis. Hypothesis 2 and Hypothesis 3 are both supported. We argue that in less concentrated industries, firms pay less dividend payouts from the point of Hypothesis 2. However, firms in less concentrated industries pay more dividends from the point of Hypothesis 3. Firms in less concentrated industries face the problem of trade-off between agency problems and growth opportunity from the points of Hypothesis 2 and Hypothesis 3. If managers want to expand and accelerate their firms quickly, they must put their cash into future investments and decrease dividends. Meanwhile, if managers want to solve agency problems, they must increase dividends in order to disgorge cash, although this would mean not having higher financial flexibility to invest in the future.

We use different approaches to investigate the relationship between payout policy and product market competition from Tables 4, 5, and 6. We find that the results are all the same. It seems to support the idea that payout policy and product market competition have a negative relationship. From the previous view, we can conclude that managers are inclined to retain cash for future growth opportunity instead of disgorging cash to solve agency problems in less concentrated industries. In other words, firms are inclined to use the maturity hypothesis as a standard to fulfill dividend payout policy in less concentrated industries.

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