5. INDUSTRY COMPETITION, AGENCY PROBLEM, AND FIRM PERFORMANCE

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Abstract

The study investigates the relationship between industry competition and firm performance in relation to agency problem conditions. At the same time, the literature also stated that different levels of national corporate governance have different impacts on corporate performance. We also investigate whether or not the relation between industry competition and firm performance would be different under different levels of agency problem. Our empirical results show that the positive relation between industry competition and firm performance is relatively significant for firms with higher free cash flows that present severe agency problems. The results do not change under different levels of national corporate governance.

I. Introduction

Firm performance can be affected by industry competition and corporate governance. Researchers have documented that firm performance and industry competition are negatively related (Slade, 2004, Schmidt, 1997, Peress, 2010, Hill and Hansen, 1991, Ghosal, 2002, Beiner *et al.*, 2011). Monopoly induces higher returns for the reason of lack of competition, firms in monopolistic industries have better methods to enforce discipline on each other, and as such, they are less likely to suffer profit losses in periods when demand is falling; instead of these, the losses would be passed on customers (Slade, 2004, Peress, 2010, Hill and Hansen, 1991, Ghosal, 2002). Schmidt (1997) indicates that increasing competition lowers each firm's profits; thus, the owner of the firm may not be interested in paying the manager the high rent necessary to achieve cost reduction although this reduces the manager's incentives for the latter to exert effort. Stefan, Markus, and Gabrielle (2011) proposed a convex

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relation between product market competition and managerial incentive. They found that the negative effect of lower economic rents seems to outweigh the positive effect of reducing managerial slack resulting from additional monitoring and threat of liquidation over a certain level of competition intensity in product market.

On the other hand, empirical evidence suggested a positive impact of industry competition on firm performance (Nickell, 1996, Nickell *et al*., 1997, Mitton, 2004, Karuna, 2007, Januszewski *et al*., 2002, Hou and Robinson, 2006, Irvine and Pontiff, 2009, Giroud and Mueller, 2010, Baggs and de Bettignies, 2007, Bozec, 2005, Beiner *et al*., 2011). They found that competition can produce better managerial incentives and monitoring quality; therefore, it can alleviate management inefficiency and improve company performance. In highly competitive markets, the space of profit may be compressed or plundered by others and only efficient firms can survive. Managers must work hard to avoid bankruptcy or being replaced (Giroud and Mueller, 2010, Baggs and de Bettignies, 2007, Bozec, 2005). Moreover, Nickell (1996), Nickell *et al*. (1997), Karuna (2007), and Januszewski *et al*. (2002) show that firms in highly competitive industries are easily influenced by aggregate shocks because each firm has less power to dominate the market and, thus, higher the probability of bankruptcy for which to provide incentives to managers to avoid it and make less cash flow waste. Therefore, product market competition can reduce free cash flow problems resulting from conflict of interests between shareholders and managers.

Mitton (2004) indicates that firms in competitive industries are also more likely to distribute cash to shareholders. There are three possible reasons for that. First, a highly competitive industry overinvesting in projects of negative net present value can make the firm less competitive and more likely to be driven out of the market. Second, intense competition makes it easier for outside investors to benchmark managers' performance to the performance of their competitors. This increases the risk of making investors discover overinvesting moves, improves monitoring quality, and reduces agency problems between the shareholders and the manager. Third, trying to avoid bankruptcy and the loss of their jobs, managers in more competitive industries tend to avoid overinvesting and distribute excess cash to shareholders as dividends. In the secondary markets, these companies in highly competitive industries have higher average of stock returns not only on account of their risk due to the influence of aggregate shocks, but also because these firms have a certain efficiency, lower price distortions, greater accountability, and transparency in business decisions (Hou and Robinson, 2006, Irvine and Pontiff, 2009).

Hence, the relationship between industry competition and firm performance is obscure. In other words, the slope coefficient between industry competition and firm performance is indeterminate. This is because a moderator variable could affect the slope coefficient between an independent variable and a dependent variable. Considering the above-mentioned, this paper attempts to fill this research gap.

This study argues that there must be a variable moderating the relationship between industry competition and firm performance. Agency problem became an increasing hot issue due to the growing interest in corporate governance. Agency conflicts strongly impact on managerial decision making (Rogers, 2004, Januszewski *et al*., 2002). Managerial slack is a source of agency problems; it breeds inefficiency, inhibits risk

taking, and hurts performance (Jensen, 1986, Jensen and Meckling, 1976, Brush *et al.*, 2000, Fama, 1980). Agency problems also exist when firms have substantial free cash flows (Jensen, 1986, Chi and Lee, 2010). Since the product market competition is an effective instrument for solving agency problems and improving corporate governance (Giroud and Mueller, 2010, Fama, 1980), we expected a stronger positive correlation between industry competition levels and operating performance among firms with severe agency costs of free cash flows. Our empirical results prove our expectation that the positive relation between product competition and firm performance is more intense for firms with higher free cash flow, thus presenting a severe agency problem.

Different countries have different objectives and rankings in their corporations (Gompers et al., 2003). Particularly, poor shareholder protection is penalized with lower valuation (La porta *et al*., 2002, Gompers *et al*., 2003, Chua *et al*., 2007). In the US and the UK, for instance, the threat of takeover ensures that managers act in line with the shareholders' interests, while in Germany and France the system of co-determination on the supervisory board formalizes this balance of interests, and both the shareholders and the employees emphasize their mission of protecting stakeholders. Aside from the firm's mission to shareholders' rights, different legal protections for outside investors tend to provide much higher levels of protection than the civil law countries (such as Germany and France), although these matter in the firm performance in different countries with common laws (such as the US and the UK) (La Porta *et al*., 1998). Therefore, in this study, we used samples from four countries, namely the US, the UK, Germany and France.

In this study, our aim is to examine whether different company missions and legal protections affect the relationship between competition and performance. We focus on the relationship between firm performance and industry competition, while considering the agency problem conditions over four top economic market samples to provide with us a better understanding under different levels of national corporate governance.

II. Methodology and Measurement

2.1. Sample Selection

Our main data source was Standard & Poor's Compustat. This provides fundamental financial and price data for both active and inactive publicly traded companies. Country-level governance data, such as shareholder rights and legal protection, were taken from the IMD World Competitiveness Online. This resource provides a worldwide reference point on the competitiveness of nations, rankings, and analyses on how an economy creates and sustains the competitiveness of enterprises.

The sample data were drawn from all exchange-listed firms in the four economic markets (i.e., the USA, the UK, Germany, and France) over a seven year period running from 2002 to 2008. We eliminated all firms that did not operate primarily in the manufacturing sector (SIC codes 2000–3999). This selection process resulted in a final sample of 10,514 firm-year observations, including four whole country samples. The separate sample sizes for independent countries based on firm-year observation are as follows: the USA (7,329), the UK (1,232), Germany (1,092), and France (861).

2.2. Measurement

2.2.1. *Firm* Performance

As Uotila *et al.* (2009) suggest, market-based performance indicators are more capable of capturing both short- and long-term performance, and of reflecting the true underlying value of corporate operating performance. This study adopts Tobin's Q as the dependent variable, which is estimated as the ratio of the market value of equity plus the book value of debt to the book value of the total assets. Given that Tobin's Q is a ratio, it can take on extreme values (in either direction) if the scaling variable becomes too small. To mitigate the effect of outliers, we dropped the firm-year observations at each tail of the Tobin's Q distribution in each country by 1%.

2.2.2. Industry *Competition*

In our study, we used four variables to stand for industry competition. These variables include the Herfindahl–Hirschman index (HHI), product substitutability, market size, and entry costs (MacKay and Phillips, 2005, Hou and Robinson, 2006, Haushalter *et al.*, 2007, Aggarwal and Samwick, 1999, Allayannis and Ihrig, 2001).

We used the HHI as a proxy for industry competition. HHI is well-grounded on industrial organizational theory and actually measures the industry concentration; a high HHI indicates more concentration and less competition in the industry. The HHI is defined as the sum of squared market shares, $HHI_{ijt} = \sum_{i=1}^{N_j} S_{ijt}^2$, where S_{ijt}^2 is the market share of firm *i* in industry *j* in year *t*. Market shares are computed from Compustat based on three-digit SIC codes. The three-digit partition is a compromise between a too wide partition, in which unrelated industries may be pooled together, and a too narrow partition, which may be subject to misclassification. In some cases, the industry classification is rather narrow, such that some industries consist of only a single firm, even though common sense suggests that they should be pooled together with other industries. These industries have a HHI of 1 which explains the small "spike" at the right endpoint of the empirical HHI distribution. Therefore, we dropped the firm-year observations at the right tail of the distribution by 2.5% to correct this misclassification.

Previous studies have mainly used level of concentration measures, such as the HHI, as the only measure of competition. However, recent studies in economics suggest that competition comprise several dimensions, including product substitutability, market size, and entry costs (Raith, 2003, Karuna, 2007). Hence, we considered these dimensions and provided the relation between competition and performance based on these three dimensions of competition, given that greater product substitutability, greater market size, and lower entry costs reveal greater price competition. The extent of product substitutability in industry (ENCOST) is equal to sales divided by operating costs for each industrial segment. Operating costs include cost of goods sold, selling, general and administrative expenses, depreciation, depletion, and amortization. The level of market size in industry (MKTSIZE) is measured by natural log of industry sales. For the measurement constructed from Compustat data, industry sales were computed as the sum of segment sales for firms operating in the industry. The level of

entry costs (ENTCOST) in the industry is equal to the natural log of weighted average of gross value of property cost, plant, and equipment for firms in the industry, weighted by each firm's market share in that industry.

2.2.3. Free *Cash* Flows (FCF)

To use a reliable variable to proxy the agency problem, we followed the previous studies and chose the free cash flows (Jensen, 1986, Chi and Lee, 2010). We assumed that agency problems would exist when firms have substantial free cash flows.

The free cash flows were calculated as cash flows from operations minus capital expenditures, scaled by total assets. This calculation was done to prove our expectation that the positive relation between industry competition and firm performance was more intense for firms with higher free cash flow, thus presenting a severe agency problem. We placed all firms into two groups on the basis of the present year's free cash flow. If a firm's free cash flow is below the median free cash flow of that year in its country, the firm is designated as part of the low free cash flow group. We assumed the low free cash flow group has better corporate governance and are less likely to have agency problems; otherwise, if a firm's free cash flow is above the median free cash flow of that year in its country, the firm is designated as part of the high free cash flow group. We assumed that the high free cash flow group has poor corporate governance and higher probability of facing an agency problem.

2.2.4. *Country*-Level Governance

Country-level governance data, such as shareholder rights and legal protection are taken from the IMD World Competitiveness Online, which provides a worldwide reference point on the competitiveness of nations, rankings, and analyses on how an economy creates and sustains the competitiveness of enterprises. The shareholder's right index is scored from 0 (lowest) to 10 (highest). The one with the higher index has better legal protection, which refers to the legal and regulatory framework index from the IMD World Competitiveness Online. The variable assesses the quality of law enforcement with index scores from 0 to 10; the higher the index is, the higher the legality is.

2.2.5. *Control* Variables

Following the literature, we used control variables to take firm characteristics into account and added the variables of particular interest to our study. Many studies on firm performance have used firm size, financial leverage, and sales growth as control variables. Specifically, firm size serves to control for possible economies of scale. Meanwhile, financial leverage is used to control for the influence of capital structure on investment behavior and managerial discretion. Sales growth was included to capture the impact of demand conditions and business-cycle fluctuations on performance. We measured firm size (Size) as the natural logarithm of book value of total assets at fiscal year end. Financial leverage (Leverage) was measured as long-term debt plus short-term debt scaled by the book value of assets, while sales growth (Growth) was measured by the three-year growth rate in total sales (Schoar, 2002, Gedajlovic and Shapiro, 1998).

We also constructed a dummy variable COMMON that took the value of 1 if the sample firm belonged to the common law country, whereas those located in a civil law country took the value of 0.

2.3. Models

In order to investigate the relation between competition and firm performance, we conducted two regression analyses mainly at the firm level. We used the following equations to test the predictions (given immediately below) in the present study:

$$TONBINQ_{i,t} = \beta_0 - \beta_1 HHI_{i,t} + \beta_2 Size_{i,t} + \beta_3 Leverage_{i,t} + \beta_4 Growth_{i,t} + \beta_5 RIGHTS_{i,t}$$
$$+ \beta_6 LAW_{i,t} + \beta_7 COMMON_{i,t} + \varepsilon_{i,t}` \tag{1}$$

$$TONBINQ_{i,t} = \beta_0 + \beta_1 DIFF_{i,t} + \beta_2 MKTSIZE_{i,t} - \beta_3 ENCOST_{i,t} + \beta_4 Size_{i,t} + \beta_5 Leverage_{i,t}$$
$$+ \beta_6 Growth_{i,t} + \beta_7 RIGHTS_{i,t} + \beta_8 LAW_{i,t} + \beta_9 COMMON_{i,t} + \varepsilon_{i,t} \tag{2}$$

Equation (1) uses the HHI as the industry competition measure, with the higher HHI indicating more concentration and less competition in the industry. We expected its sign to be negative related to TOBINQ. Equation (2) follows recent studies suggesting that competition comprises several dimensions, such as product substitutability, market size, and entry costs (Raith, 2003, Karuna, 2007). We used this equation to prove that competition is multi-dimensional in its relation to performance, and industry characteristics play a major role in influencing firm performance, greater product substitutability, greater market size and lower entry costs thereby reflecting greater price competition. We expected the signs for DIFF, MKTSIZE, and ENCOST to be positive, and positive and negative, respectively.

In the same way, since the intense product market competition helps solve agency problems and improve performance (Giroud and Mueller, 2010, Fama, 1980), we also did the same grouping to check this issue in accordance to what we have previously inferred. We considered the positive relation between product competition and firm performance to be more intense for the firms with higher free cash flow, indicating that the competition can help improve firm performance in those firms suffering from agency problems. Hence, we performed this research both on a whole sample base and on independent country sample base.

III. Analysis

3.1. Descriptive Statistics

Table 1 provides the descriptive statistics of all key variables included in our analysis for the full sample period from 2002 to 2008. In measuring corporate performance, the USA and the UK, as expected, have larger values (USA: 2.2337, UK: 1.6676) than those of Germany and France (Germany: 1.2454, France: 1.2488), thus indicating that common law countries, on average, get higher corporate performance than the civil law countries. The standard deviation of the whole sample is 2.2782. This value presents a large variation across countries and emphasizes regional and global difference in the quality and effectiveness of laws around the world.

As for competition measures, the common law countries have higher mean values in DIFF and MKTSIZE, as well as lower mean values in HHI and ENTCOST, indicating that the USA and the UK have intense competition structures in their respective product markets. By contrast, the civil law countries have lower mean values in DIFF and MKTSIZE, as well as higher mean values in HHI and ENTCOST, indicating that Germany and France have less intense competition structure in their product markets.

The proxy for agency problem is FCF. France shows the highest value of 0.0109, whereas the USA has the lowest value of -0.0449; thus the range for country is 0.0558 and the standard deviation of the whole sample is 0.4186, indicating that the differences and variations are not obvious across the four different countries.

Two country-level governance measures were used. As shown in Table 1, shareholder rights (RIGHTS) was considered an index ranging from 0 to 10 (from IMD World Competitiveness Online). Higher points were assigned to firms in a country that demonstrated responsibility in protecting the shareholders' rights. In this respect, the USA has the highest mean value of 7.501, whereas France has the lowest score of 6.4924; thus the mean values of RIGHTS in the USA and the UK are higher than the values in Germany and France. In the same vein, LAW was used as the legal and regulatory framework index (also from IMD World Competitiveness Online). The score is higher if the firms in that country have good judicial efficiency and legality. On average, the USA and the UK (USA: 6.0088, UK: 4.9825) have higher scores than Germany and France (Germany: 3.8966, France: 3.2955). Particularly, the USA has the highest score, which is consistent with the finding of La Porta *et al.*, (2002).

Table 1

Descriptive Statistics

Country	USA	UK	Germany	France	Total
N	7,329	1,232	1,092	861	10,514
Firm Performance					
TOBINQ					
Mean	2.2337	1.6676	1.2454	1.2488	1.984
Standard Deviation	2.6329	1.1229	0.5156	0.5721	2.2782
Median	1.6402	1.3356	1.1195	1.0902	1.453
Competition Measure					
HHI					
Mean	0.2529	0.6022	0.5043	0.5828	0.347
Standard Deviation	0.1984	0.2328	0.2372	0.2903	0.2597
Median	0.1952	0.5517	0.5058	0.5414	0.2778
DIFF					
Mean	1.2213	1.1895	1.1298	1.1706	1.2039
Standard Deviation	0.1147	0.1492	0.0635	0.1189	0.1193
Median	1.1817	1.1586	1.1159	1.143	1.1659
MKTSIZE					
Mean	10.7733	7.4014	8.2609	7.7198	9.8672
Standard Deviation	1.4856	2.0217	1.8528	1.9485	2.1481
Median	10.9756	7.2769	8.3799	7.9138	10.114
ENTCOST					
Mean	-2.1249	-2.8304	1.4371	1.2203	-1.5637

Country	USA	UK	Germany	France	Total
Standard Deviation	6.7018	9.3503	5.3378	5.6167	7.0042
Median	0.4688	0.1952	3.222	2.1122	0.8668
Agency Proxy Variable					
FCF					
Mean	5.7578	4.5071	5.5362	5.4763	5.8168
Standard Deviation	2.4817	2.3847	2.1179	2.1563	2.1297
Median	5.9203	4.4931	5.17	5.1128	5.6516
Control Variables					
Size					
Mean	5.7578	4.5071	5.5362	5.4763	5.8168
Standard Deviation	2.4817	2.3847	2.1179	2.1563	2.1297
Median	5.9203	4.4931	5.17	5.1128	5.6516
Leverage					
Mean	0.5259	0.5112	0.5983	0.6051	0.5382
Standard Deviation	1.2524	0.2307	0.216	0.1979	1.0529
Median	0.4506	0.5134	0.6175	0.6073	0.4944
Growth					
Mean	0.1369	0.0859	0.0723	0.0749	0.1191
Standard Deviation	1.1324	0.312	0.2049	0.2856	0.9576
Median	0.0765	0.0485	0.0478	0.0415	0.0657
Country-level Governance					
RIGHTS					
Mean	7.501	7.1572	7.31	6.4924	7.3582
Standard Deviation	0.452	0.317	0.1934	0.2902	0.4955
Median	7.4828	7.0227	7.3488	6.5217	7.2941
LAW					
Mean	6.0085	4.9825	3.8991	3.5384	5.4669
Standard Deviation	0.4821	1.0488	0.7254	0.5248	1.077
Median	6.2308	4.2963	3.8966	3.2955	5.7

3.2. The T-test

Prior to investigating the relation between industry competition and firm performance under different situations, we used the t-test grouped by HHI to detect the existence of TOBINQ difference in different legal systems and different countries. If the TOBINQ difference significantly existed in different HHI groups, then we considered that the differences likely came from different levels of competition. The HHI was calculated as the sum of squared market shares, with a larger HHI indicating more concentration and less competition in the industry. We independently partitioned the sample into two sub-samples on the basis of firm's HHI in the specific country. For each year, a firm was placed into the high HHI group to find out if its HHI exceeded the within-year median HHI in its country; otherwise, the firm was placed into the low HHI group in its country. The results are presented in Panels A and B of Table 2.

Furthermore, since the competition is an effective instrument for solving agency problems and improving corporate governance (Giroud and Mueller, 2010, Fama, 1980), we conducted a further study to examine a more specific issue: where did the difference came from? We assumed that the difference came from different agency

problem situations and that the difference is more obvious in the higher FCF group, thus indicating that the competition could lead to TOBINQ difference in those firms suffering from an agency problem. The FCF was calculated as cash flow from operations minus capital expenditures scaled by total assets. We independently partitioned the sample into two sub-samples on the basis of firm's FCF. For each year, a firm was placed into the high HHI group if its FCF exceeded the within-year median HHI in its country; otherwise, the firm was placed into the low FCF group in its country. The results are presented in Panels C and D of Table 2.

Panel A shows the T-test of TOBINQ by groups of legal system. The mean of TOBINQ is 2.1522 for the common law countries group, and 1.2469 for the civil law countries group. The difference of TOBINQ between the two groups is statistically significant with p-value less than 0.0001. This indicates that the common law countries outperform the civil law countries. The present finding is similar with that shown in a previous study stating that legal protection for outside investors vary considerably across countries, with common law countries, such as the USA and the UK, showing much higher levels of protection than the civil law countries such as Germany and France (La Porta *et al*., 1998). In addition, the common law countries have better operating performance (La Porta *et al*., 2002, Gompers *et al*., 2003, Chua *et al*., 2007).

Panel B presents the T-test of TOBINQ by groups of HHI. In each country, we independently partitioned the sample into two sub-samples based on the firm's HHI in its country. For each year, a firm was placed into the high HHI group if its HHI exceeded the within-year median HHI in its country; otherwise, the firm was placed into the low HHI group in its country. As shown in Panel B, the mean value of TOBINQ in the low HHI group is generally higher than that in the high HHI group in each country. However, the difference is less statistically significant in the civil law countries. The p-value is significant at the 1% level in the USA and the UK. However, the difference is significant at 10% in France but is not significant in Germany. On average, firms in the high competition industries show higher TOBINQ values in each country.

Panel C also presents the T-test of TOBINQ by groups of HHI. The sample only considered those firms with substantial higher FCFs in their country. A firm was placed into the High FCF group if its FCF was higher than the sample median in its country. High FCF groups were considered as those firms that have a potential agency problem (Jensen, 1986, Chi and Lee, 2010). In Panel C, the difference between the low HHI group and the high HHI group is still significant at the 1% level in the US and the UK; however, the result in Germany and France turned out to be significant after we grouped the country by FCF. In order to compare with the result in Panel C, we did the same research in Panel D and considered only those firms with lower FCFs in their country. The low FCF group consisted of firms with minor agency problems. The difference between the low and the high HHI groups is not significant in all countries, except for the USA.

Table 2 shows that the common law countries perform better than the civil law countries, and that the low HHI group has higher performance than the high HHI group; however, the difference only significantly exists in the high FCF group.

Therefore, the result meets our expectation: the performance difference comes from different agency problem situations and is more obvious in the higher FCF group, thereby indicating that competition can lead to TOBINQ differences in those firms suffering from agency problems.

Table 2

Two Sample t-tests of Tobin's Q

Panel A: Whole sample firms by legal system			
	Common Law Countries	Civil Law Countries	T-test
	2.1522	1.2469	30.71***
Panel B: All sample firms by country			
	Low HHI Group	High HHI Group	T-test
USA	2.6678	1.7824	14.78***
UK	1.7519	1.5818	2.67**
Germany	1.2656	1.2237	1.34
France	1.259	1.096	1.95*
Panel C: High FCF Group in each country			
	Low HHI Group	High HHI Group	T-test
USA	2.4142	1.8493	13.079***
UK	1.834	1.5355	4.37***
Germany	1.3465	1.2436	2.25**
France	1.2177	1.0804	2.66***
Panel D: Low FCF Group in each country			
	Low HHI Group	High HHI Group	T-test
USA	2.7673	1.620	11.18***
UK	1.6642	1.6249	0.36
Germany	1.185	1.2037	-0.44
France	1.3588	1.286	1.34
USA	2.7673	1.620	11.18***

3.3. Regression Analysis

This study performed a series of regression analyses to test our hypotheses. Our empirical results are reported in Tables 3–6. Following the methodology used by La Porta *et al*., (2002), we ran random-effect regressions, allowing for country-specific or industry-specific random effects. This helped to alleviate the concern about the possibly omitted variables at the country or industry level.

3.3.1. The Effect of Industry Competition on Firm Performance

In this section, we present our investigation on whether industry competition affects a manager's decision to exert more efforts into improving the performance of a company. The results are given in Table 3. Columns 1 and 2 of Table 3 provide the results for the panel regression conducted on the basis of equations (1) and (2), which include the whole sample. The results generally show that competition and legal system affect firm performance. The coefficients are generally as predicted and are consistent with previous research. In equation (1), the coefficient of HHI, β_1, is -1.234, which is negative and significant at the 1% level. In equation (2), the coefficient of

DIFF, β1, is 2.856, which is positive and significant at the 1% level. The coefficient of MKTSIZE, β2, is 0.135, which is positive and significant at the 1% level). The coefficient of ENTCOST, β3, is -0.005, which is negative and significant at the 10% level. Thus, the results show that the lower industry concentration level, the greater product substitutability, greater market size, and lower entry costs are associated with higher Tobin's Q. These suggest that competition is positively related to performance.

In line with earlier empirical studies on firm performance (Spanos *et al.*, 2004, Nickell and Nicolitsas, 1999, Goddard *et al.*, 2005, Gedajlovic and Shapiro, 1998), we find that size has a negative impact on TOBINQ, whereas leverage and growth have a positive effect on performance measures.

As documented in La Porta *et al.*, (1998), the English common law countries tend to provide shareholders with stronger protection than the countries with civil law traditions, the former countries thus scoring higher on the shareholder's rights and legal protection. In equations (1) and (2), the coefficient of LAW is positive, as expected, and statistically significant at the 1% level, whereas COMMON also has a positive and significant coefficient at the 1% level. However, the coefficient of RIGHTS is not significant.

In line with hypothesis 1, the overall results in columns 1 and 2 of Table 3 suggest that firms have better performance when industry competition is greater. The results, significant in equation (2), also suggest that competition is multi-dimensional in its relation with performance. However, the legal system also plays an important role in affecting performance and, thus, the common law countries have better corporate performance.

3.3.2. The Effect of Potential FCF Problems on the Relation between Industry Competition and Firm Performance

As discussed earlier, if industry competition is an effective instrument for solving agency problems and improving corporate governance (Giroud and Mueller, 2010, Fama, 1980), the positive relation between the competition and firm performance documented in this section should be stronger among firms with high FCF levels. Given that competition affects a manager's decision by increasing the risk and the cost of overinvesting and bankruptcy (Mitton, 2004, Giroud and Mueller, 2010, Baggs and de Bettignies, 2007, Bozec, 2005), its effect on performance should be stronger among those firms that are more likely to overinvest because they have great amounts of FCF on hand.

In this section, we examine this issue by estimating regressions relating firm performance to the competition measures on sub-samples partitioned based on whether a firm has high or low potential problem on FCFs.

Columns 3, 4, 5, and 6 of Table 3 provide the results for the panel regression conducted on the basis of equations (1) and (2) on sub-samples partitioned based on FCF. In equation (1), we find that the negative relation between TOBINQ and HHI is completely driven by the firms with high FCFs. One should notice that the effect of the HHI on TOBINQ for the firms with high FCF (see Column 3) based on order of magnitudes is larger than firms with low FCFs (see Column 5). In the high FCF group, where the agency problem is assumed to be more severe, we find that the coefficient of the HHI has a value of -1.32. However, in the low FCF group, where the agency

problem from FCFs is minor, we find that the coefficient of the HHI is almost zero (coefficient = -0.036). Columns 4 and 6 of Table 3 show similar results by using equation (2); the coefficients of the three competition measures are higher in the high FCF group. In addition, the adjusted R2 values are much higher in the high FCF group than in the low FCF group. The outcomes imply that the competition measures have more explanatory power in firm performance when the samples are limited to having more severe agency problems.

Consistent with hypothesis 2, the results in Columns 3, 4, 5, and 6 of Table 3 suggest that the effect of product competition on firm performance is more intense when the agency problem of free cash flows is more severe.

Table 3

Regression Results for the Whole Sample

	Dependent variable : TOBINQ					
	Total samples		High FCF group		Low FCF group	
Variables	(1)	(2)	(1)	(2)	(1)	(2)
Intercept	0.780**	-4.212***	3.069***	-1.453***	0.155***	-0.096**
	(1.97)	(-9.94)	(6.38)	(-2.58)	(4.7)	(-2.3)
HHI	-1.234***		-1.320***		-0.036***	
	(-16.54)		(-10.61)		(-4.13)	
DIFF		2.856***		2.058***		0.155***
		(16.96)		(7.24)		(7.22)
MKTSIZE		0.135***		0.183***		0.004***
		(12.2)		(9.77)		(2.77)
ENTCOST		-0.005*		-0.011***		0.000
		(-1.94)		(-2.62)		(0.36)
Size	-0.171***	-0.189***	-0.323***	-0.341***	-0.006***	-0.008***
	(-21.07)	(-22.74)	(-22.13)	(-22.13)	(-6.25)	(-7.22)
Leverage	1.244***	1.239***	1.255***	1.251***	0.074***	0.082***
	(76.75)	(78.41)	(61.87)	(62.79)	(8.8)	(9.78)
Growth	0.069***	0.048***	0.035	0.023	0.000	-0.001
	(3.87)	(2.74)	(1.58)	(1.07)	(-0.16)	(-0.49)
RIGHTS	0.032	0.050	-0.144**	-0.120*	-0.013**	-0.009*
	(0.56)	(0.89)	(-2)	(-1.69)	(-2.55)	(-1.85)
LAW	0.171***	0.15***	0.198***	0.18***	0.002	0.00
	(4.69)	(4.15)	(4.11)	(3.8)	(0.6)	(0.96)
Common	0.387***	0.24***	0.447***	0.20*	0.040***	0.03***
	(4.5)	(2.76)	(3.75)	(1.69)	(4.86)	(3.7)
Firm Random effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	10514	10514	5264	5264	5250	5250
Adj. R-squared	0.413	0.443	0.481	0.501	0.025	0.038

3.3.3. The Effect of Industry Competition on Firm Performance in Different Countries

We used different country samples to examine whether the relationship between competition and performance is robust for different countries that have different characteristics.

The results for the main tests conducted are given in Table 4. In equation (1), the coefficient on HHI, β1, is -1.554 for USA, -0.46 for UK, -0.314 for Germany, and -0.166 for France. All of them are negative and significant, as expected. The results generally show that lower industry concentration level is associated with a higher Tobin's Q value, suggesting that competition is positively related to performance. However, in equation (2), the coefficient of MKTSIZE is not significant in France, and the coefficient of ENCOST is not significant in Germany and France. Thus, comparing models (1) and (2) for their fitness, we find that the adjusted R2 value is much higher in equation (2) than in equation (1) in both Germany and France. The results indicate that insignificant coefficients of competition measures in Germany and France may not result from the fitness of model. It should be some factor that we have not taken into consideration in our analysis yet, considering these insignificant results. Therefore, we believe that the factor may be an agency problem. The detailed discussion proving our inference is presented in Section 3.3.4.

Table 4

Regression Results by Country

	Dependent variable : TOBINQ							
	USA		UK		Germany		France	
Variables	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
Intercept	3.613***	-3.274***	5.032***	2.991***	1.309**	-0.054	2.604***	4.616***
	(8.28)	(-6.16)	(5.51)	(3.32)	(2.19)	(-0.08)	(4.41)	(4.71)
HHI	-1.544***		-0.467***		-0.314***		-0.166**	
	(-12.83)		(-3.46)		(-5.02)		(-2.5)	
DIFF		3.825***		1.070***		0.868***		0.532**
		(16.02)		(4.06)		(3.38)		(2.13)
MKTSIZE		0.102***		0.120***		0.061***		-0.021
		(5.41)		(5.79)		(5.96)		(-0.29)
ENTCOST		-0.010**		-0.008**		-0.004		-0.004
		(-2.55)		(-2.5)		(-1.39)		(-0.54)
Size	-0.233***	-0.224***	-0.029**	-0.070***	-0.017**	-0.048***	0.008	-0.267***
	(-19.8)	(-19.2)	(-1.99)	(-4.52)	(-2.28)	(-5.51)	(0.91)	(-5.64)
Leverage	1.243	1.238***	-0.081	0.003	-0.266***	-0.111	-0.439***	0.616***
	(65.93)	(67.06)	(-0.57)	(0.02)	(-3.74)	(-1.55)	(-4.39)	(4.4)
Growth	0.052**	0.035	0.800***	0.608***	0.442***	0.361***	0.117*	-0.070
	(2.5)	(1.71)	(8.02)	(6.29)	(6)	(4.92)	(1.73)	(-1.19)
RIGHTS	-0.225***	-0.144***	-0.454***	-0.515***	0.133	0.100	-0.094	-0.164***
	(-4.04)	(-2.62)	(-3.05)	(-3.63)	(1.53)	(1.17)	(-1.23)	(-3)
LAW	0.243***	0.26***	0.054	0.10**	-0.169***	-0.16***	-0.124***	-0.21***
	(4.66)	(5.01)	(1.21)	(2.31)	(-7.27)	(-6.73)	(-2.94)	(-5.88)
Firm Random effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	7329	7329	1232	1232	1092	1092	861	861
Adj. R-squared	0.414	0.438	0.068	0.153	0.106	0.142	0.035	0.089

3.3.4. The Effect of Potential Free Cash Flow Problems on the Relation between Industry Competition and Firm Performance in Different Countries

In this section, we discuss how we investigated the agency problem affecting the association between competition measure and performance measure in different countries. We expected that the effect of competition measured by TOBINQ would be more intense when the agency problem is more severe no matter which country we consider. The results are presented in Table 5 and Table 6, which show the regression results for the above- and below-median FCF groups. The results are consistent with our prediction. The coefficients on competition measures meet our expectation and are generally higher for the high FCF group than for the low FCF group in equations (1) and (2) in each country. In Table 5, we only considered firms with a large amount of FCF into regression. In equation (1), the coefficients of HHI are still negatively significant in all countries as reflected in Table 4. In equation (2), the coefficients of multi-dimensional competition variables are all significant in all countries, as expected. Compared with the results in Table 4, which used the whole sample, the originally insignificant coefficients turned out to have at least a 10% significance level in France and Germany. In Table 6, the coefficients have the lowest value and significance in the three samples (whole sample, high FCF group, and low FCF group).

Table 5

Regression Results Grouping by High FCF Group

Dependent variable : TOBINQ								
	USA		UK		Germany		France	
Variables	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
Intercept	4.210***	-1.399	3.941***	1.771	1.157	-0.296	2.328***	0.841
	(5.6)	(-1.55)	(3.82)	(1.71)	(1.24)	(-0.4)	(2.98)	(0.99)
HHI	-1.237***		-0.344**		-0.284***		-0.240***	
	(-5.92)		(-2.12)		(-2.82)		(-2.78)	
DIFF		2.852***		1.722***		1.093***		0.940***
		(7.02)		(5.92)		(3.77)		(3.53)
MKTSIZE		0.106***		0.047**		0.044***		0.065***
		(3.1)		(1.98)		(3.73)		(3.66)
ENTCOST		-0.014**		-0.008**		-0.009***		-0.007*
		(-2.15)		(-2.28)		(-2.68)		(-1.67)
Size	-0.439***	-0.419***	0.050***	0.022	-0.009	-0.050***	-0.020*	-0.004
	(-20.55)	(-19.5)	(2.92)	(1.07)	(-0.81)	(-5.07)	(-1.71)	(-0.25)
Leverage	1.245***	1.245***	-0.129	-0.344*	-0.637***	0.255***	0.121	-1.072***
	(53.25)	(53.81)	(-0.68)	(-1.91)	(-5.2)	(3.31)	(1)	(-6.31)
Growth	0.024	0.016	0.626***	0.523**	0.545***	0.119	0.118*	-0.027
	(0.96)	(0.62)	(2.64)	(2.28)	(4.8)	(1.35)	(1.77)	(-0.35)
RIGHTS	-0.259***	-0.194**	-0.320*	-0.370**	0.189	0.055	-0.075	-0.053
	(-2.69)	(-2.04)	(-1.9)	(-2.27)	(1.4)	(0.57)	(-0.74)	(-0.51)
LAW	0.340***	0.35***	0.015	0.06	-0.179***	-0.12***	-0.150***	-0.04
	(3.77)	(3.95)	(0.29)	(1.19)	(-4.99)	(-4.43)	(-2.68)	(-0.71)
Firm Random effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3668	3668	616	616	546	546	427	427
Adj. R-squared	0.501	0.511	0.146	0.248	0.145	0.174	0.073	0.154

Compared with the results in Table 4, the adjusted R2 values are highest in the high FCF group among the three samples, implying that the competition measures have more explanatory power in firm performance when the samples are limited to have more severe agency problems. Overall, the results in Table 5 and Table 6 are consistent with hypothesis 2: the effects of competition are more intense when potential agency problems exist in each country (i.e., the USA, the UK, Germany, and France).

Table 6

Regression Results Grouping by Low FCF Group

	Dependent variable : TOBINQ
	\multicolumn{2}{c}{USA}	\multicolumn{2}{c}{UK}	\multicolumn{2}{c}{Germany}	\multicolumn{2}{c}{France}
Variables	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
Intercept	1.157	-3.388***	6.347***	4.863***	1.229	-0.314	3.424***	2.458***
	(1.24)	(-7.18)	(4.38)	(3.45)	(1.58)	(-0.37)	(3.84)	(2.59)
HHI	-0.284***		-0.473**		-0.167*		-0.143	
	(-2.82)		(-2.33)		(-1.95)		(-1.4)	
DIFF		3.492***		-0.268		1.154***		0.495*
		(15.93)		(-0.56)		(3.42)		(1.86)
MKTSIZE		0.061***		0.228***		0.042***		0.033*
		(3.82)		(5.98)		(2.89)		(1.84)
ENTCOST		-0.006*		-0.012**		-0.003		-0.003
		(-1.78)		(-2.07)		(-0.76)		(-0.58)
Size	-0.009	-0.026**	-0.163***	-0.208***	-0.025***	-0.040***	0.027*	0.005
	(-0.81)	(-2.34)	(-6.48)	(-8.4)	(-2.6)	(-3.53)	(1.83)	(0.27)
Leverage	-0.637***	-0.204**	-0.100	0.181	-0.041	0.083	-0.872***	-0.834***
	(-5.2)	(-2.49)	(-0.5)	(0.94)	(-0.47)	(0.95)	(-5.42)	(-5.14)
Growth	0.545***	1.447***	0.771***	0.577***	0.239***	0.156*	0.317	0.238
	(4.8)	(14.16)	(6.49)	(5.05)	(3)	(1.96)	(1.34)	(1)
RIGHTS	0.189	-0.065	-0.603**	-0.639***	0.110	0.075	-0.217*	-0.203*
	(1.4)	(-1.39)	(-2.56)	(-2.89)	(0.98)	(0.69)	(-1.9)	(-1.78)
LAW	-0.179***	0.20***	0.088	0.12*	-0.169***	-0.15***	-0.069	-0.06
	(-4.99)	(4.66)	(1.23)	(1.83)	(-5.55)	(-4.86)	(-1.08)	(-0.88)
Firm Random effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3661	3661	616	616	546	546	434	434
Adj. R-squared	0.114	0.176	0.032	0.102	0.070	0.125	3.40%	0.084

IV. Conclusion

Product market competition in an industry affects managerial decisions. Therefore, product market competition is an important determinant of firm performance. However, there is no consensus as to exactly how such competition affects firm performance.

The present study investigates how firm performance changes according to an industry's intensity of competition under agency problems. When we investigate the relation between firm performance and competition, we consider agency problems between managers and shareholders, simultaneously. Our research combines industry competition with agency problem issues in order to separate firm performance under different situations. By taking country-level governance into consideration, we do not only aim to perform robust checks for our hypothesis, we also strive to identify the different characteristics of different countries.

Our empirical tests show that higher competition level is positively correlated with better operating performance based on a whole sample, which includes four countries. The results are consistent with those shown in previous studies. Moreover, we find that the positive relation between industry competition and firm performance is more intense for firms with higher free cash flows. The said outputs suggest that competition can improve performance more significantly in those firms that suffer from severe agency problems.

The analysis is robust as regards the four countries in the sample (i.e., the USA, the UK, Germany, and France), which indicates competition can effectively produce better managerial incentives and alleviate management slack to improve firm performance no matter what shareholder protection and judicial efficiency a firm possesses. In sum, this finding suggests that improving the competition environment should remain a priority for related policymakers.

Acknowledgements

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