

RESEARCH ARTICLE

Product market competition and operating leverage: International evidence*

Md. Babar | Ahsan Habib

School of Accountancy, Massey University, Auckland, New Zealand

Correspondence

Ahsan Habib, School of Accountancy, Massey University, Private Bag 102904, Auckland, New Zealand.
Email: a.habib@massey.ac.nz

*We appreciate helpful comments from Mabel Costa and the Associate Editor.

Abstract

This study examines the association between product market competition (PMC) and operating leverage for a large sample of international firms from 46 countries spanning the period 1985–2019. Using the Herfindahl-Hirschman (HH) index and the Industry Adjusted Price Cost Margin (IPCM) as two proxies for PMC, we provide evidence that PMC is significantly and positively associated with the operating leverage of firms. Cross-sectional analyses reveal that investment intensity, firm life cycle and the country-level employment protection legislation moderate the relationship between PMC and operating leverage. This study contributes to the scarce literature on the determinants of operating leverage. We expect our findings to be informative for investors in understanding the role market competition plays in shaping cost structures.

KEYWORDS

employment protection legislation, firm-life cycle, investment intensity, operating leverage, product market competition

1 | INTRODUCTION

We examine the association between product market competition (hereafter PMC) and operating leverage¹ of the firm in an international setting. Firm operations are affected not only by internal organizational factors, such as firm size, business strategies, and organizational culture, to name a few, but also by numerous external factors including financial market development, legal systems, and competitive environment. PMC has been identified as one of the most powerful corporate governance tools for motivating managers to achieve economic efficiency and maximize firm value (Giroud & Mueller, 2010; Shleifer & Vishny, 1997). A plethora of research has examined the effect of PMC on various issues relating to accounting, finance and corporate governance (Babar & Habib, 2020).

We examine whether PMC affects the degree of operating leverage: a hitherto unexplored consequence of PMC.

Firms with high operating leverages or high fixed-to-variable cost ratios are considered risky, because committed resources that are fixed in nature cannot be slashed quickly in response to a change in the decline in activity. However, firms with high operating leverages may benefit significantly more when demand increases, because unit fixed cost reduces with an increase in activity, thereby, increasing profit margins. Firms with low operating leverages, on the other hand, can adjust costs quickly in response to a demand shock. Operating leverage, therefore, has significant implications for firm's current, as well as future, performance (Holzhacker et al., 2015a). Moreover, having an understanding of the implications of operating leverage is crucial, as a firm is unable to charge a premium

This is an open access article under the terms of the [Creative Commons Attribution](https://creativecommons.org/licenses/by/4.0/) License, which permits use, distribution and reproduction in any medium, provided the original work is properly cited.

© 2022 The Authors. *Journal of Corporate Accounting & Finance* published by Wiley Periodicals LLC.

price when operating in an environment of intense competition. Hence, efficient cost management is pivotal for outperforming rivals in competitive markets.

Competing arguments exist regarding the relationship between PMC and operating leverage. A negative relationship can be predicted as prior studies show that higher PMC increases earnings and cash flow volatility (Gaspar & Massa, 2006), thereby, increasing the financial risk facing a firm. Since high operating leverage increases financial risk, we posit that firms operating in competitive environment will prefer low operating leverage, that is, a less rigid cost structure, to remain competitive. However, arguments supporting a positive relationship between PMC and operating leverage are equally plausible. First, demand uncertainty regarding both the products and services of firms leads managers to retain resources, even when there is a decline in demand (Anderson et al., 2003). We argue that high PMC intensifies the demand uncertainty, thereby, encouraging managers to retain excess capacity for some time in order to assess the demand trend. Therefore, firms operating in more competitive markets may prefer high operating leverages. This prediction is consistent with the real option theory regarding investment under uncertainty (Pindyck, 1991). Real option theory proposes that firms prefer to delay and abstain from investment when faced with high uncertainty. But market competition decreases the value of waiting and, hence, motivates managers to invest, even if the net present value is close to zero (Grenadier, 2002). Second, firms with high operating leverage operating in more competitive markets can withstand competition by spreading fixed costs over additional units (Johnstone, 2020). This also supports a positive relationship between PMC and operating leverage.

We use a sample of 391,737 firm-year observations for the period 1985–2019 with data from 46 countries to examine the association between PMC and operating leverage. Using the Herfindahl-Hirschman (HH) index and the Industry Adjusted Price Cost Margin (IPCM) as proxies for PMC, together with the operating leverage measure proposed in Kulchania (2016), we find a significant and positive relationship between PMC and operating leverage. We also find that the positive relationship is moderated by capital intensity, firm life cycle stages and employment protection legislation. Specifically, the positive relationship is more pronounced for firms with high capital intensity, for firms in growth stage of their life cycle and for firms domiciled in countries with weak employment protection legislation. Our results remain robust to endogeneity tests conducted to mitigate the reverse causality and omitted variable concerns.

This study contributes to the existing body of knowledge in several ways. First, by examining the relationship between PMC and operating leverage, we contribute to the

scant literature on the determinants of operating leverage. Prior literature focuses on price regulations, risk-taking and corporate social responsibility (CSR) activities affecting cost structure, but the role of competition remains unknown. Second, we contribute to the voluminous literature on PMC by showing that PMC has profound implications for managerial decisions regarding the appropriate cost structure. So, this study will assist managers in taking appropriate operating leverage decisions when faced with intense competition. Third, by exploiting an international sample, we enrich the international accounting and corporate governance literature. An international sample allows us to explore the variation in country-level employment protection legislation as a possible moderator, as well as to show whether the documented results are confined to certain countries, or are generalizable across countries.

The remainder of the paper proceeds as follows. Section 2 reviews the related literature on PMC and operating leverage. Section 3 develops the hypotheses. The research methods and sample selection procedure are described in Section 4. Descriptive statistics and test results are reported in Section 5. Section 6 provides a brief discussion of the empirical findings, and the final section concludes the paper.

2 | LITERATURE REVIEW

2.1 | Literature on PMC

PMC is viewed as a disciplinary mechanism that exerts pressure on management to reduce managerial slack, as well as to enhance profitability and efficiency (Giroud & Mueller, 2010, 2011). PMC compels managers to outperform peers, otherwise, the firm may go into bankruptcy and managers may face job termination (Chou et al., 2011).

Prior literature documents that PMC has profound implications for accounting, finance and corporate governance issues. For example, PMC affects financial reporting quality including managerial disclosures (Ali et al., 2014; X. Li, 2010), earnings quality (P. Cheng et al., 2013; Datta et al., 2013; Guo et al., 2019; Markarian and Santalfo, 2014), accounting conservatism (Dhaliwal et al., 2014; Haw, Ho, et al., 2015), and financial statement comparability (Imhof et al., 2018). PMC influences analysts' forecast properties (Almeida and Dalmlacio, 2015; Datta et al., 2011). Prior literature also shows that PMC affects audit fees (H. Chen et al., 2019; Leventis et al., 2011; Yuequan & Chui, 2015). With respect to the effect of PMC on cost stickiness, W. L. Li and Zheng (2017) find that cost stickiness increases for firms operating in competitive markets. Similar findings are demonstrated by Cheung et al. (2018).² In the domain of tax, increased competition encourages tax avoidance

(Kubick et al., 2015) and enhances corporate tax planning efficiency (Wang, 2019).

Finance literature has investigated the consequences of PMC for asset pricing and corporate policies. Several authors report that PMC increases stock returns (Hou & Robinson, 2006; Peress, 2010), whereas other studies document that higher PMC decreases stock returns (Bustamante & Donangelo, 2017; Ryu, 2019). PMC also increases idiosyncratic return volatility (Gaspar & Massa, 2006; Irvine & Pontiff, 2008), decreases the cost of equity (C. Chen et al., 2014) but increases cost of bank debt (Valta, 2012). With respect to investment and financing decisions of firms, research has found that PMC increases corporate investments (Jiang et al., 2015; Laksmana & Yang, 2015), increases both cash holdings and the marginal value of cash (Alimov, 2014; Chi & Su, 2016; Hoberg et al., 2014). Further, industrial and financial economics researchers posit that PMC and capital structure decisions of firms are interrelated. Several researchers reveal a positive association between PMC and leverage (Maksimovic, 1988; Showalter, 1999), while others document a negative association (Bolton & Scharfstein, 1990; Guney et al., 2011; MacKay & Phillips, 2005). Evidence remains mixed regarding the effect of PMC on firms' pay out decisions (He, 2012; Hoberg et al., 2014; Kao & Chen, 2013).

PMC has also been extensively researched in the corporate governance domain. Evidence suggests that PMC increases CEO compensation (Karuna, 2007), as well as the probability of CEO turnover (Dasgupta et al., 2017; DeFond & Park, 1999; Fee & Hadlock, 2000) and reduces CEO power (Jaroenjitrkam et al., 2020). Research on the relation between PMC and internal corporate governance reveals that PMC plays either a substitute (Aghion et al., 1999; Aghion & Howitt, 1998; Giroud & Mueller, 2010) or a complementary (Karuna, 2007; Ko et al., 2016) role for weak corporate governance.

2.2 | Literature on operating leverage

Firms with lower operating leverage enjoy the benefit of rapid cost reduction when demand decreases, while firms with higher operating leverage are unlikely to reduce costs quickly, hence, resulting in diminished profit. Thereby, the optimum operating leverage affects many facets of a business and understanding what affects firm-level operating leverage is one of the fundamental issues in cost accounting.

Notwithstanding the importance of operating leverage, only a few studies have examined the determinants of operating leverage. Aboody et al. (2018) show that managerial risk-taking incentives affect the operating leverage of the firm. The authors find that after the promulgation of

FAS 123R, which reduces option-based compensation in the U.S., managers tend to decrease operating leverage. Moreover, the study points that higher (lower) operating leverage is associated with higher (lower) risk. Kallapur and Eldenburg (2005) use real-option theory to argue that, as firms face heightened uncertainties, they choose technologies that have lower fixed costs and higher variable costs. Holzhacker et al. (2015a) evidence that price regulation affects cost structure. The authors argue that firms face higher cost pressure and operating risk from the imposition of fixed-price regulation, since revenue or price is not determined by its cost function. Harjoto (2017) reveals that CSR has a positive impact on firm's operating leverage. Referring to shareholder value maximization theory, the author asserts that if the firm fails to charge the per unit incremental price that is equal to or more than the per-unit incremental variable cost including the CSR-related costs, operating leverage will be higher for increased CSR activities. Chang et al. (2020) document that customer concentration affects the cost structure of a firm as firms with high customer concentration make more relationship-specific investments: investments that increase the proportion of fixed costs.

With respect to the consequences of operating leverage, Lev (1974) demonstrates empirically that firms with higher operating leverage tend to have higher systematic risk and stock return volatility. Similar findings are reported by Bowman (1979), Hamada (1972), and Rubinstein (1973). Novy-Marx (2011) documents that firms having high operating leverage experience greater stock returns than firms having lower operating leverage. Kulchania (2016) finds that firms with high operating leverage experience more volatile cash flows, hold more cash, and pay less dividends.

3 | HYPOTHESES DEVELOPMENT

3.1 | Product market competition and cost structure

Firms having higher operating leverage experience volatility in future cash flows and operating income and, hence, higher operating leverage is associated with potential future risk (Kulchania, 2016). Managers, therefore, prefer lower operating leverage when faced with greater financial risks (Holzhacker et al., 2015b). Firms operating in more competitive industries face more volatile earnings and cash flows (Gaspar & Massa, 2006): volatilities that increase the financial risk of the firm. Hence, we argue that such firms will use less rigid cost structures to reduce their financial risk.

However, Anderson et al. (2003) posit that when a firm faces uncertainty regarding the demand for its product and

services, it may retain the committed resources for a certain period. It is difficult to adjust committed resources quickly with fluctuations in demand, without incurring substantial resource adjustment costs. This may force the firms to retain slack resources, thereby, relating future demand uncertainty with the firm's fixed costs. High PMC increases demand uncertainty about the products and services and, therefore, encourages managers to retain excess capacity for some time, to assess the demand trend. Therefore, high PMC competition may increase operating leverage. This prediction is consistent with the real options theory, which asserts that deferring investment during periods of heightened uncertainty is desirable, because of the irreversible nature of many investments (Pindyck, 1991). However, the incorporation of market competition into the real option theory reveals that competition reduces the "value of waiting," thereby, motivating firms to invest, even in zero NPV projects (Grenadier, 2002). Therefore, investments under PMC can be viewed as a strategic game of exercising options, where the return on investment of one firm affects the return on investment of its rivals. Hence, under increased competition in the product market, firms invest more to enhance production capacity, and spend more on R&D and advertisements, in order to achieve the future growth needed to outperform competitors: actions that are likely to increase operating leverage. Consistent with real option theory, Akdoğu and MacKay (2008) reveal that firms operating in competitive industries exhibit higher investment-q sensitivity (change of investment with respect to change in Tobin's q) than those operating in weak competition industries. Furthermore, firms with high operating leverages operating in more competitive markets can withstand competition by spreading fixed costs over additional units produced. This also suggests a positive relationship between PMC and operating leverage.

Given the competing arguments posited above, we develop the following hypothesis:

H1: There is a relationship between PMC and the operating leverage of a firm.

3.2 | Moderating effect of investment intensity

Earlier work of Hartman (1972) provides evidence that increased competition amplifies investment. Schmutzler (2013) demonstrates analytically that higher competition is associated with greater cost-reducing investment. Hou and Robinson (2006) posit that firms in highly competitive industries involve in more innovation activities and, thereby, increase firms' investment. Similarly, Laksmana and Yang (2015) reveal that intense PMC encourages

managers to increase investments in capital expenditure and R&D. Jiang et al. (2015) also report the same finding in the context of China. Hence, prior literature demonstrates that firms' investments are positively influenced by increased competition. Moreover, from the real option theory, as discussed in Section 3.1, it is apparent that higher competition leads to higher investment which, in turn, can increase the operating leverage. We propose that investment intensity would affect the relationship between PMC and operating leverage. In other words, a positive (negative) association between PMC and operating leverage, would be more (less) pronounced for firms with high investment intensity. We, therefore, hypothesize as follows:

H2: Investment intensity moderates the association between PMC and operating leverage.

3.3 | Moderating effect of firm life cycle

Firm's competitive advantage can depend on various factors, such as resources, complexity of business, economies of scale, to name a few, that vary significantly across firm life cycle stages. Firm life cycle theory asserts that firms move through various stages in their lifespan by demonstrating a predictable pattern of development and growth. Life cycle theory also suggests that the reward for acquiring market share to create demand advantages, or for building capacity to create cost advantages, diminishes over a firm's life cycle stages. In other words, rewards are larger in the earlier stages of the firm life cycle. Therefore, it is necessary to maximize revenue growth in the earlier stages of the firm life cycle to create a permanent demand or cost benefits over competitors (Karnani, 1984; Porter, 1980; Wernerfelt, 1985). Consequently, firms at different stages of the life cycle require different management skills, priorities, structures and strategies (Miller & Friesen, 1980, 1984; Quinn & Cameron, 1983).

In the introduction stage, a firm faces intense competition, since it has less experience in the production process and fewer opportunities for diversifying revenue sources or achieving economies of scale. As the firm enters the growth stage, it starts enjoying growth in sales, and benefits from investments made in the introduction stage. Higher sales growth and greater profitability enjoyed by the firm encourage potential competitors to enter the market. Therefore, a growth-stage firm faces enhanced competition. In the mature stage, although firms enjoy economies of scale in production and an enhanced production process, they suffer from a decline in sales growth and engage in fewer innovations. Moreover, the opportunities for additional investments shrink for

mature firms, as they have exhausted and utilized the positive NPV projects (Dickinson, 2011). Therefore, mature firms start to face increased competition from rivals. The shake-out stage is the stage where a firm is highly exposed to competition, owing to rapid decline in sales volume and price competition, albeit the literature is very much silent about the investment behavior of firms in this stage. Like the shake-out stage, the decline stage also exhibits low prospects in the product market and, consequently, decline-stage firms either adopt different strategies for survival or go into liquidation (Dickinson, 2011). Based on these arguments, we posit that a positive (negative) association between PMC and operating leverage, would be more (less) pronounced for firms in the growth stage of their life cycle. We, therefore, hypothesize as follows:

H3 : Firm life cycle moderates the relationship between PMC and operating leverage.

3.4 | Moderating effect of employment protection legislation

Prior literature asserts that various institutional factors, including the legal system, employment protection legislation (hereafter EPL) and investor protection, influence a wide array of firm-level decisions (Banker et al., 2013; La Porta et al., 2000). Given the international focus of our study, we consider whether the country-level EPL moderates the relationship between PMC and operating leverage. EPL is a frame of rules that governs the hiring and firing of employees including, but not limited to, regulations about pay levels and restrictions on job dismissals (Banker et al., 2013). EPL consists of per worker employment costs, that is, hiring costs and employee benefits, such as searching and selection costs, minimum wages, training costs, mandatory leave payments, including sick leave and maternity leave, and so on. Prior evidence suggests that a more flexible EPL environment has been a crucial factor behind the economic success of the U.S. (Beuselinck et al., 2021). According to Bryan et al. (1999), labor flexibility, in other words, low levels of EPL in the U.S., led the accelerated growth of new industries compared with Europe and Japan. Using a sample of Organization for Economic Cooperation and Development (OECD) countries, Bassanini et al. (2009) document that strict employee dismissal regulation in the host country significantly lowers productivity growth. Strict EPLs make it difficult and costlier for employers to dismiss workers, thereby, inducing labor cost rigidity (Beuselinck et al., 2021; Karpuz et al., 2020). Strong EPL, therefore, appears to hinder market competition or, alternatively, PMC intensifies with flexible EPL. We, therefore, posit that the positive (negative) association between

PMC and operating leverage is likely to be more (less) pronounced in low (high) EPL countries. We, therefore, hypothesize as follows:

H4 : Country-level EPL moderates the relationship between PMC and operating leverage.

4 | RESEARCH METHOD

4.1 | Data and sample

We extract all data for calculating PMC, the operating leverage, and the firm-level fundamental variables from the Thomson Reuters Fundamentals and World Scope database. EPL data is retrieved from the OECD website. Moreover, country-level data is sourced mainly from the International Monetary Fund (IMF), the World Bank (WB), and La Porta et al. (2008). Our sample period starts from 1985, as the EPL data became available from 1985.

We start with an initial sample of 1,040,164 with non-missing PMC data across 46 countries for the period 1985–2019. Consistent with prior studies, we exclude 167,431 observations related to financial institutions, insurance and utilities, because of their distinct nature regarding market competition and operating leverage. We further remove 480,996 observations, as I require non-missing data for seven consecutive years to calculate operating leverage. We, therefore, derive a total of 391,737 observations for conducting the baseline regression for PMC and operating leverage. We then remove 50,075 observations with missing firm fundamental control variables. Finally, we remove 15,874 observations with missing country-level control variables. The number of observations in any given regression varies depending on the model-specific data requirements. Panel A, Table 1 details the sample selection procedure.

Table 1, Panel B presents the industry distribution of the sample, using the 48 Fama-French industries. About 10.21% of the firm-year observations come from Business Services followed by Construction (5.59%) and Electronic Equipment (5.35%). Defense (.12%) and Tobacco Products (.21%) have the lowest representation in our sample.

4.2 | Measurement of PMC

This study measures the PMC through two proxies, one is the HH index, which is an industry-level competition measure, and the other is the IPCM measure. Several prior studies using international data used the HH index as a proxy for PMC (Haw, Ho, et al., 2015; Lemma et al., 2018, Knyazeva & Knyazeva, 2012). The HH index indicates cross-industry variations in PMC and shows the market

TABLE 1 Sample selection process and industry distribution

Panel A: Sample selection			
Observations after dropping missing data for calculating HHI			1,040,164
Less: financial institutions, insurance, and utilities			(167,431)
Observations after dropping financial institutions, insurance, and utilities			8,72,733
Less: Missing data to calculate cost structure			(480,996)
Preliminary sample for the baseline regression			391,737
Less: Missing data for firm fundamental control variables			(50,075)
Less: Missing data for country-level control variables			(15,874)
Final Sample			325,788
Panel B: Industry distribution			
Industry number	Industry name	Observations	% Observations
1	Agriculture	4,267	1.09
2	Food products	11,419	2.91
3	Candy & soda	2,820	.72
4	Beer & liquor	3,381	.86
5	Tobacco products	811	.21
6	Recreation	3,392	.87
7	Entertainment	5,513	1.41
8	Printing and publishing	3,950	1.01
9	Consumer goods	8,993	2.3
10	Apparel	4,901	1.25
11	Healthcare	3,766	.96
12	Medical equipment	6,828	1.74
13	Pharmaceutical products	13,736	3.51
14	Chemicals	15,012	3.83
15	Rubber and plastic products	3,990	1.02
16	Textiles	6,159	1.57
17	Construction materials	15,160	3.87
18	Construction	21,915	5.59
19	Steel works etc.	12,513	3.19
20	Fabricated products	1,672	.43
21	Machinery	17,010	4.34
22	Electrical equipment	6,405	1.64
23	Automobiles and trucks	11,154	2.85
24	Aircraft	1,843	.47
25	Shipbuilding, railroad equipment	1,076	.27
26	Defense	458	.12
27	Precious metals	4,102	1.05
28	Non-metallic and industrial metal mining	5,339	1.36
29	Coal	1,917	.49
30	Petroleum and natural gas	13,181	3.36
32	Communication	10,906	2.78
33	Personal services	3,711	.95
34	Business services	40,010	10.21
35	Computers	9,744	2.49
36	Electronic equipment	20,973	5.35
37	Measuring and control equipment	5,534	1.41

(Continues)

TABLE 1 (Continued)

Panel B: Industry distribution			
Industry number	Industry name	Observations	% Observations
38	Business supplies	6,532	1.67
39	Shipping containers	2,017	.51
40	Transportation	14,925	3.81
41	Wholesale	19,084	4.87
42	Retail	20,454	5.22
43	Restaurants, hotels, motels	9,642	2.46
46	Real estate	14,078	3.59
48	Other	1,444	.37
	Total	391,737	100

Note: This table reports the sample selection process in Panel A, and industry distribution based on Fama and French 48 industry classification in Panel B.

power of firms within each industry (Haw, Hu, et al., 2015). It is calculated by summing the squares of the market shares of all the firms competing within an industry. The market share is measured through total sales of an individual firm divided by the total sales of the industry to which the firm belongs. Higher scores of the HH index represent lower competition. For ease of interpretation, we multiply the HH index by -1 , so that higher HH values imply higher competition.

$$HH\ index_{jt} = \sum_{i=1}^{n_j} S_{ijt}^2 \quad (1)$$

where S_{ijt}^2 is the square of market share of firm i in industry j in year t , and n is the number of firms in industry j .

According to Ali et al. (2008) some of the advantages of using the HH index include data availability for a long period of time, as well as detailed industry categories. However, the HH index is not without its limitations. The World Scope database we use, excludes private firms, a concern raised by Ali et al. (2008), as exclusion of private firms captures competition with errors. However, since many of the large private firms eventually get listed, and small private firms are not in a position to compete with large, listed firms (Markarian & Santal'fo, 2014), the use of the HH index as a proxy for PMC is justified.

Our second measure of PMC is the Lerner Index (LI): a firm-level measure that originated in economics (Lerner, 1934). LI represents a firm's ability to set the price of its products above its marginal cost and, hence, it is called the price cost margin (PCM). LI demonstrates the firm's pricing power. A lower (higher) value of the LI index represents high (low) competition faced by the firm. LI is calculated as follows:

$$LI = \frac{Profit_{it}}{Sales_{it}} \quad (2.1)$$

where, $Profit = Sales - \text{cost of goods sold} - \text{selling, general, and administrative expenses}$.

However, industry-specific elements unrelated to the pricing power of a firm can affect the PCM measure. Hence, prior researchers, such as Gaspar and Massa (2006), and Peress (2010), utilize the industry-adjusted price cost margin (IPCM) as follows:

$$IPCM = LI_i - \sum_{i=1}^N W_i * LI_i \quad (2.2)$$

Here, LI_i is the Lerner Index for firm i , N is the number of firms within an industry and W_i is the proportion of sales of firm i to total industry sales. This IPCM is an improved version, since it indicates the intra-industry market power and considers the industry-wide elements that commonly affect all firms within an industry (Datta et al., 2013). As with the HH index, for ease of interpretation, we multiply the IPCM by -1 , so that higher IPCM values imply more competition.

4.3 | Measurement of operating leverage

We estimate the following regressions to calculate the operating leverage following Kulchania (2016).

$$E[S_{i,t}] = S_{i,t-1} \sqrt{\left(\frac{S_{i,t-1}}{S_{i,t-3}}\right)}; \text{ and} \\ E[C_{i,t}] = C_{i,t-1} \sqrt{\left(\frac{C_{i,t-1}}{C_{i,t-3}}\right)} \quad (3.1)$$

where $S_{i,t}$ represents the sales or revenues and $C_{i,t}$ indicates the operating costs, for firm i in year t (normalized by total assets). To generate the innovations in growth rates,

Kulchania (2016) employs the following process:

$$\left[U_{S_{i,t}} \right] = \frac{[S_{i,t} - E[S_{i,t}]]}{S_{i,t-1}} \text{ and } \left[U_{C_{i,t}} \right] = \frac{[C_{i,t} - E[C_{i,t}]]}{C_{i,t-1}} \quad (3.2)$$

Then, a firm-level regression is run using a seven year (including the current year) rolling window of innovations in growth rates:

$$U_{C_{i,t}} = \text{Cost structure} \times U_{S_{i,t}} + \epsilon_{i,t}, t \in [-6, 0] \quad (3.3)$$

Cost structure is the coefficient for innovations in the growth rate of sales obtained from the regression of the innovations of growth in operating costs on the innovations of growth in sales (Kulchania, 2016). In Equation 3.3 the coefficient on **Cost structure** captures the sensitivity of the growth in operating costs to growth in sales after accounting for growth trends. Thus, a higher proportion of fixed costs will lead to lower sensitivity, in other words, a lower value of the coefficient on **Cost structure**. For convenience of interpretation, we multiply the coefficient by -1 and, therefore, a higher coefficient represents higher fixed costs in the cost structure. This model is better than other earnings before interest and tax (EBIT)-based operating leverage models³, as this model is not influenced by factors unrelated to the cost structure of the firm. Particularly, the changes in profit margins have no impact on the cost structure, whereas EBIT-based measures are affected by the changes in profit margins, even though the ratio of fixed and variable costs remains unchanged. Moreover, unlike EBIT-based measures, the Kulchania (2016) model can be applied even when the firm has negative EBIT.

4.4 | Empirical model

We use the following OLS regression to test the association between PMC and operating leverage:

$$OPLEV_{i,t} = \beta_0 + \beta_1 PMC_{i,t} + \text{Fixed Effects} + \epsilon_{i,t} \quad (4.1)$$

$$\begin{aligned} OPLEV_{i,t} = & \beta_0 + \beta_1 PMC_{i,t} + \beta_2 SIZE_{i,t} + \beta_3 MTB_{i,t} \\ & + \beta_4 ROA_{i,t} + \beta_5 LEV_{i,t} + \beta_6 SALE_GR_{i,t} \\ & + \beta_7 R\&D_{i,t} + \beta_8 TANGIBILITY_{i,t} + \beta_9 GDP_{i,t} \\ & + \beta_{10} INFL_{i,t} + \beta_{11} FDI_{i,t} + \beta_{12} LEGOR_{i,t} \\ & + \beta_{13} INV_PRO_{i,t} + \text{Fixed Effects} + \epsilon_{i,t} \end{aligned} \quad (4.2)$$

The dependent variable is operating leverage (OPLEV) as detailed in 4.3 above. The main independent variable of interest is PMC proxied by HH index and IPCM. We incorporate several firm-specific control variables consistent with prior literature (e.g., Harjoto, 2017; Kahl et al., 2014; Kulchania, 2016). To control for the effect of firm

size on operating leverage, we include size (SIZE) measured as the natural logarithm of total assets. Large firms can achieve economies of scale and, hence, can have a low operating leverage (Harjoto, 2017). We include market-to-book (MTB) ratio to control for investment opportunities. Firms with high growth opportunities have more flexibility to raise capital, resulting in higher investment levels and a higher operating leverage. Return on assets (ROA) controls for firm profitability. Profitable firms invest more in future projects, thereby increasing operating leverage. But risk-averse managers may prefer to distribute dividend out of profits, instead of making additional investments. We, therefore, do not predict the sign on ROA. We include firm leverage (LEV) calculated as the sum of short-term debt, current portion of long-term debt and long-term debt divided by total shareholders' equity. The impact of financial leverage on operating leverage is ambiguous. On one hand, a negative association is expected as higher leverage increases debt-induced risk and firms will reduce operating leverage to improve profitability. On the other hand, higher leverage enables additional investments utilizing debt-financing, which can increase operating leverage (Harjoto, 2017). Sales growth (SALE_GR), measured as the percentage change in sales, is expected to be positively related to operating leverage, because firms invest more during periods of high sales growth to meet the higher demand. Research and development expenditure (R&D), calculated as research and development expense scaled by total assets, is also expected to be positively related to operating leverage, as the nature of R&D expenditure is often fixed (Kahl et al., 2014). Asset tangibility (TANGIBILITY), defined as net property, plant and equipment divided by total assets, will generate more fixed costs and, hence, a positive relation is expected with operating leverage.

Following prior international studies (Haw, Ho, et al., 2015; Knyazeva, & Knyazeva, 2012), we include several country-level control variables that may explain the cross-country variation in operating leverage. We include gross domestic product (GDP), measured as the natural logarithm of GDP per capita in US dollars, as high GDP countries will have more competition and investments and, thus, will increase operating leverage. On the other hand, firms operating in high GDP countries may have better business conditions, which may lead them to achieve economies of scale, thereby, reducing operating leverage. Inflation (INFL) is expected to have a negative relationship with operating leverage as firms may prefer to be flexible in their cost structures, considering the economic pressure exerted by high inflation. Foreign direct investment (FDI), measured as net foreign direct investment in current US dollars scaled by GDP in current US dollars, may accelerate economic growth through technological diffusion (Hansen & Rand, 2006) or hinder economic growth (McCombie &

Thirlwall, 1994), resulting an increase or decrease in operating leverage. Legal origin (LEGOR) is a dummy variable coded 1 if the firm is located in common law countries, and zero otherwise. We expect LEGOR and operating leverage to be positively related, as common law countries exhibit greater development in financial markets, property and contract rights (La Porta et al., 2008; Mahoney, 2001). Finally, investor protection (INV_PRO) proxied by the anti-self-dealing index of Djankov et al. (2008) is expected to have a negative relationship with operating leverage, as high investor protection directs the firm to be conservative in its investment behavior (Lan & Wang, 2004). All regressions include industry-, year-, and country-fixed effects to mitigate the effect of time-invariant omitted variables. Detailed variable definitions are provided in the appendix.

5 | EMPIRICAL RESULTS

5.1 | Descriptive statistics

Table 2, Panel A displays the descriptive statistics of the variables used in this study. We winsorize the continuous variables at the 1st and 99th percentiles of their respective distributions to minimize the effects of outliers. The mean (median) value of HH index is $-.18$ ($-.10$) with an interquartile range between $-.24$ and $-.05$. Recall that we multiplied HH index by -1 so that higher values imply more competitive environments. The descriptive values do confirm that our sample operates in highly competitive industries. The mean (median) value of IPCM is $.45$ ($.02$) which, again, is consistent with HH in suggesting that sample firms operate in more competitive industries. These values are similar to the findings reported by earlier research (e.g., Alexeev & Song, 2013; Haw, Hu, et al., 201b; Markarian & Santaló, 2014).⁴ The mean value of OPLEV is $-.88$ (OPLEV is multiplied by -1 so that higher values imply high operating leverage) implying that the firms exhibit lower operating leverages on average. The mean (median) values of SIZE is 11.96 (11.92) indicating that firms in the sample are large. Sample firms are characterized by moderate growth opportunities (mean (median) MTB of 2.56 (1.48)), negative profitability (mean ROA of $-.05$), high leverage (mean LEV of $.77$) and an increasing sales growth (average SALE_GR is $.13$). Average values of R&D, and TANGIBILITY are $.02$ and $.31$ respectively. The country-level control variables show that mean GDP is 10.06, mean INFL is $.03$, and overall net FDI is negative, although the value is trivial. 57% of the sample observations are from firms domiciled in common law countries. The average investor protection (INV_PRO) value is $.62$. Average investment intensity (INV_INT) is 5% of total assets. We use two proxies to capture firm life cycle. LC_1

is the Dickinson (2011) measure of life cycle which shows that 44% of the firm-year observations are of firms in the mature stage, followed by 24% in the growth stage, 13% in the shake-out stage, 12% in the introduction stage, and only 7% in the decline stage. LC_2 is the DeAngelo et al. (2006) measure (retained earnings deflated by total assets) which shows that 60% of the firm-year observations belong to the mature stage of their life cycle. The mean EPL is $.97$.

Panel B, Table 2, provides the sample distribution for each country as well as the descriptive statistics for the dependent, independent and country-level variables. The sample includes 46 countries, with U.S. representing the highest number of observations in the sample (102,618 or 26% of the sample), followed by Japan 12.19% (47,767 observations) and the UK 6.52% (25,553 observations). On the other hand, Nigeria, Jordan and Colombia each have less than 500 observations. Significant variation is observed for mean HH and IPCM across countries. In terms of HH index, U.S. ($-.07$), China ($-.08$) and Japan ($-.09$) appear to have highly competitive environments, while Colombia ($-.66$), Ireland ($-.60$) and Argentina ($-.58$) have less competitive environments. Mean values of OPLEV across countries reveal that all the firms in the sample countries exhibit lower operating leverages, with Australia having the highest operating leverage ($-.67$) among all the countries. With respect to country-level variables, GDP and inflation varies greatly among the sample countries. EPL varies considerably among the sample countries with Turkey (3.86), Greece (2.97), and France (2.83) reporting the highest EPL score, while Malaysia ($.08$), Peru ($.11$) and U.S. ($.17$) have the lowest EPL scores.

5.2 | Correlation analysis

Table 3 exhibits the Pearson correlations among the variables employed in the baseline regression model. The HH index is positively correlated with OPLEV, although the correlation is insignificant, while the correlation between IPCM and OPLEV is positive and significant (coefficient $.153$, $p < .01$). The correlation between HH and IPCM is very low but marginally significant (coefficient $.002$, $p < .10$), indicating that these two proxies capture different dimensions of PMC. This is so, because the HH index explains competition at the industry-level, but IPCM does so at the firm-level. Moreover, this weak correlation between HH index and IPCM suggests that firms facing higher competition do not necessarily have weak pricing power (Chou et al., 2011). OPLEV is positively and significantly correlated with MTB ($.054$, $p < .01$), SALE_GR ($.127$, $p < .01$), R&D ($.151$, $p < .01$), and TANGIBILITY ($.026$, $p < .01$). Among the country-level variables, the positive and significant association with OPLEV is observed for GDP

TABLE 2 Descriptive statistics and country distribution

Panel A: Descriptive statistics											
	N	Mean	Std. Dev.	p25	Median	p75					
Independent variables											
HH	391,737	-.18	.20	-.24	-.10	-.05					
IPCM	325,612	.45	3.50	-.04	.02	.09					
Dependent variable											
OPLEV	391,737	-.88	.37	-1.04	-.95	-.76					
Control variables											
SIZE	351,942	12.70	2.17	11.34	12.72	14.11					
MTB	351,942	2.56	4.24	.86	1.48	2.66					
ROA	351,942	-.05	.56	-.01	.03	.07					
LEV	351,942	.77	1.78	.06	.39	.94					
SALE_GR	351,942	.13	.73	-.08	.05	.19					
R&D	351,942	.02	.05	.00	.00	.01					
TANGIBILITY	351,942	.31	.24	.11	.26	.46					
GDP	331,796	10.06	1.02	9.90	10.48	10.72					
INFL	331,796	.03	.36	.01	.02	.03					
FDI	331,796	-.00	.03	-.01	.00	.01					
LEGOR	331,796	.57	.50	.00	1.00	1.00					
INV_PRO	331,796	.62	.20	.50	.65	.76					
Moderating variables											
INV_INT	331,796	.05	.06	.01	.03	.06					
LC_1											
INTRO	360,039	.12	.33	.00	.00	.00					
GROWTH	360,039	.24	.43	.00	.00	.00					
MATURE	360,039	.44	.50	.00	.00	1.00					
SHAKE	360,039	.13	.33	.00	.00	.00					
DECLINE	360,039	.07	.25	.00	.00	.00					
LC_2											
NON_MATURE	373,398	.40	.49	.00	.00	1.00					
MATURE	373,398	.60	.49	.00	1.00	1.00					
EPL	353,267	.97	1.00	.17	.80	1.63					
Panel B: Country distribution (N = 391,737)											
Country	N	%	HH	IPCM	OPLEV	GDP	INFL	FDI	LEGOR	INV_PRO	EPL
Argentina	758	.19	-.58	.01	-.83	9.10	.210	-.020	0	.34	.28
Australia	13,534	3.45	-.27	5.10	-.67	10.77	.030	-.020	1	.76	1.20
Austria	1,364	.35	-.58	-.01	-.91	10.53	.020	.020	0	.21	1.87
Belgium	2,060	.53	-.50	.16	-.90	10.47	.020	.000	0	.54	2.22
Brazil	3,197	.82	-.31	.21	-.90	8.90	.860	-.020	0	.27	.65
Canada	11,000	2.81	-.23	.71	-.81	10.49	.020	.010	1	.64	.42
Chile	1,654	.42	-.43	.32	-.90	9.22	.050	-.030	0	.63	1.75
China	17,353	4.43	-.08	.08	-.92	8.84	.030	-.010	0	.76	.40
Colombia	428	.11	-.66	.00	-.85	8.39	.080	-.030	0	.57	.62
Denmark	2,298	.59	-.53	.33	-.91	10.70	.020	.010	0	.46	1.47
Egypt	920	.23	-.38	.08	-.87	7.98	.140	-.020	0	.20	—
Finland	2,197	.56	-.52	.13	-.92	10.53	.020	.000	0	.46	1.82
France	11,434	2.92	-.33	.41	-.91	10.44	.010	.010	0	.38	2.83

(Continues)

TABLE 2 (Continued)

Panel B: Country distribution (N = 391,737)											
Country	N	%	HH	IPCM	OPLEV	GDP	INFL	FDI	LEGOR	INV_PRO	EPL
Germany	9,694	2.47	-.32	.24	-.90	10.49	.010	.010	0	.28	2.12
Greece	2,507	.64	-.33	.06	-.89	9.90	.020	.000	0	.22	2.97
Hong Kong	14,452	3.69	-.19	.41	-.88	10.48	.020	-.020	1	.96	-
India	20,814	5.31	-.12	.09	-.91	7.32	.050	-.010	1	.58	.61
Indonesia	5,449	1.39	-.26	.13	-.87	7.84	.090	-.010	0	.65	.80
Ireland	1,083	.28	-.60	.33	-.94	10.51	.020	-.030	1	.79	.84
Israel	2,190	.56	-.25	.28	-.86	10.42	.020	-.020	1	.73	1.35
Italy	3,863	.99	-.40	.17	-.90	10.29	.020	.000	0	.42	2.79
Japan	47,767	12.19	-.09	.02	-.93	10.55	.000	.020	0	.50	1.33
Jordan	373	.10	-.46	.57	-.86	8.31	.040	-.040	0	.16	-
Malaysia	11,435	2.92	-.16	.11	-.89	8.96	.030	.000	1	.95	.08
Mexico	1,880	.48	-.45	.05	-.91	9.02	.080	-.020	0	.17	2.81
Netherland	3,126	.80	-.47	.14	-.96	10.54	.020	.030	0	.20	2.20
New Zealand	1,171	.30	-.50	.02	-.96	10.28	.020	-.010	1	.95	1.29
Nigeria	282	.07	-.46	.04	-.85	7.74	.090	-.010	1	.43	-
Norway	2,158	.55	-.45	.45	-.83	11.03	.030	.020	0	.42	2.62
Peru	709	.18	-.46	.08	-.81	8.48	.030	-.040	0	.45	.11
Philippines	2,407	.61	-.42	.38	-.78	7.63	.040	-.010	0	.22	-
Poland	2,295	.59	-.29	.12	-.95	9.45	.020	-.020	0	.29	1.94
Portugal	922	.24	-.59	.00	-.92	9.69	.030	-.010	0	.44	3.32
Russia	1,835	.47	-.26	.18	-.82	9.31	.090	.000	0	.44	.56
Singapore	7,247	1.85	-.25	.22	-.93	10.68	.010	-.070	1	1.00	-
South Africa	3,430	.88	-.34	.02	-.92	8.51	.070	.000	1	.81	.27
South Korea	14,842	3.79	-.19	.08	-.92	10.10	.020	.010	0	.47	2.31
Spain	2,595	.66	-.46	.23	-.92	10.04	.020	.010	0	.37	2.67
Sri Lanka	649	.17	-.38	.05	-.85	8.05	.060	-.010	1	.39	-
Sweden	4,105	1.05	-.37	.48	-.89	10.72	.020	.010	0	.33	1.82
Switzerland	3,637	.93	-.41	.21	-.93	11.04	.010	.030	0	.27	1.34
Taiwan	12,140	3.10	-.14	.13	-.86	9.96	-	-	0	.56	-
Thailand	6,985	1.78	-.27	.10	-.89	8.40	.020	-.010	1	.81	.51
Turkey	3,327	.85	-.32	.10	-.87	9.11	.150	-.010	0	.43	3.86
UK	25,553	6.52	-.21	.38	-.91	10.44	.030	.000	1	.95	.87
U.S.	102,618	26.20	-.07	.73	-.85	10.68	.020	.000	1	.65	.17

Note: This table reports the descriptive statistics of variables of interest, controls and moderators in Panel A, and also country distribution with main variables and country-level controls in Panel B.

(.045, $p < .01$), LEGOR (.064, $p < .01$) and INV_PRO (.024, $p < .01$), suggesting that operating leverage increases with the country's economic development as well as favorable legal and investor protection environment. On the other hand, OPLEV has a significant negative correlation with SIZE (-.152, $p < .01$), ROA (-.102, $p < .01$), LEV (-.042, $p < .01$), INFL (-.010, $p < .01$) and FDI (-.029, $p < .01$). The highest correlation is between INV_PRO and LEGOR (correlation .643). Multicollinearity is not a concern as the highest variance inflation factor (VIF) is 1.98, well below the common threshold of 10 (untabulated).

5.3 | PMC and operating leverage: Baseline regression result (H1)

In Table 4, Panel A, we provide the OLS regression result for the relationship between PMC and operating leverage (H1) using HH index as the proxy for PMC. In all the regressions, we cluster standard errors at the firm level. In column (1), we include the PMC variable and fixed effects but don't control for other variables. The coefficient on HH is .022 ($p < .05$). In terms of economic impact, a one standard deviation increase in competition increases operating

TABLE 3 Correlations

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
(1) HH	1.000														
(2) IPCM	.002	1.000													
(3) OPLEV	.002	.153	1.000												
(4) SIZE	.008	-.269	-.152	1.000											
(5) MTB	.025	.129	.054	-.191	1.000										
(6) ROA	-.051	-.400	-.102	.483	-.311	1.000									
(7) LEV	-.006	-.067	-.042	.184	.247	.098	1.000								
(8) SALE_GR	.006	.035	.127	-.083	.068	-.034	-.011	1.000							
(9) R&D	.097	.192	.151	-.143	.183	-.200	-.102	.043	1.000						
(10) TANGIBILITY	-.047	-.035	.026	.147	-.107	.068	.091	-.030	-.214	1.000					
(11) GDP	.075	.119	.045	-.007	.043	-.142	-.038	.027	.182	-.098	1.000				
(12) INFL	-.050	-.006	-.010	.023	-.004	.009	-.002	.007	-.014	.023	-.079	1.000			
(13) FDI	.042	-.026	-.029	.027	-.006	-.021	.012	-.020	.056	-.024	.241	-.014	1.000		
(14) LEGOR	.162	.137	.064	-.200	.073	-.167	-.083	.067	.124	.033	.120	-.025	-.142	1.000	
(15) INV_PRO	.187	.051	.024	-.066	.032	-.046	-.071	.040	.022	.006	-.003	-.042	-.254	.643	1.000

Note: This table reports the correlation results. Values in bold indicate statistical significance at $p < .01$. Variables are defined in Appendix.

leverage by .0044 (coefficient .022*.20 [S.D. of HH]). Given the unconditional mean OPLEV of .88, this translates into a .5% increase in OPLEV, which appears economically trivial. In column (2), I include firm-level control variables and continue to find the coefficient on HH positive and significant (coefficient .021, $p < .05$). Column (3) includes firm as well as country-level control variables and, again, reveals a positive and significant coefficient on HH (coefficient .020, $p < .05$). Taken together, results reported in columns (1) to (3) suggest that higher PMC is associated with increased operating leverage.

In column (4), (5), and (6) we report the results for the pre-, during- and post-global financial crisis (GFC) periods, respectively. Prior research, such as Demirgüç-Kunt et al. (2020) and Danso and Adomako (2014) document that the GFC significantly affected the capital structure and investment decisions of firms and, thus, would have affected operating leverage. Consistent with prior literature, we divide the pre GFC, during GFC and post GFC periods as years 1985–2007, years 2008–2009, and years 2010–2019, respectively (Aldamen et al., 2012). Results reveal that the relationship between PMC and operating leverage was more pronounced for the pre-GFC period (coefficient .036, $p < .01$) than during the GFC and after the GFC period (the coefficients on HH are positive but insignificant for these two sub-periods). The GFC increased firm risk but reduced the expected return, thereby, discouraging lenders from investing long-term (Demirgüç-Kunt et al., 2020). This might explain a weakening relationship between PMC and operating leverage in the post-GFC period compared with the pre GFC period when HH is used the proxy for PMC.

The sign and significance of the control variables are generally consistent with the prediction. We find the coefficients on MTB, SALE_GR, R&D, and TANGIBILITY to be positive and significant, while those on SIZE and ROA are negative and significant. Among the country-level controls, LEGOR demonstrates a positive relationship with OPLEV, which is consistent with the view that common law countries enjoy better development of financial markets, a feature that promotes competition and, eventually, increases operating leverage. On the other hand, INLF, FDI and INV_PRO exhibit negative associations with OPLEV.

Panel B, Table 4 presents the regression results for PMC and operating leverage using IPCM as an alternative proxy for competition. The coefficient on IPCM is positive and highly significant in columns (1) to (6). Economically, a one standard deviation increase in competition increases operating leverage by .039 (coefficient .011*3.50 (S.D. of IPCM)). Given the unconditional mean OPLEV of .88, this translates into a 4.38% increase in OPLEV, which appears economically significant.

We also test whether the dominance of U.S. observations materially alters the results. Panel C, Table 4 reports the result for the U.S. versus non-U.S. sub-sample. We find that, consistent with the full sample, the coefficients on HH are positive and significant for sub-groups (coefficients are .133 [$p < .05$] and .017 [$p < .10$] in columns (1) and (2), respectively). Similarly, the coefficients on IPCM are significantly positive for the sub-sample (coefficients are .009 [$p < .01$] and .008 [$p < .01$] in columns (3) and (4), respectively). Therefore, the results do not appear to be driven by the dominance of U.S. firms.

TABLE 4 Baseline regression of operating leverage and PMC

Panel A: Operating leverage and PMC: HH index as the PMC proxy							
Variable	Expected sign	(1) OLS Pooled	(2) OLS Pooled	(3) OLS Pooled	(4) OLS Before GFC	(5) OLS During GFC	(6) OLS After GFC
HH	?	.022** (2.212)	.021** (2.207)	.020** (2.087)	.036** (2.610)	.010 (.507)	.007 (.553)
SIZE	-		-.020*** (-26.374)	-.021*** (-26.728)	-.020*** (-16.973)	-.025*** (-15.727)	-.021*** (-21.670)
MTB	+		.001*** (3.905)	.001*** (4.008)	.002*** (5.684)	.000 (.053)	.000 (1.174)
ROA	?		-.056*** (-8.192)	-.052*** (-7.616)	-.050*** (-4.515)	-.027* (-1.669)	-.056*** (-5.892)
LEV	?		-.001 (-.877)	-.001 (-1.505)	-.002* (-1.708)	-.004* (-2.104)	-.001 (-.732)
SALE_GR	+		.053*** (44.560)	.053*** (43.759)	.054*** (24.694)	.041*** (11.364)	.054*** (34.706)
R&D	+		.946*** (21.358)	.971*** (21.438)	.827*** (12.676)	.986*** (10.943)	1.109*** (18.810)
TANGIBILITY	+		.089*** (11.619)	.086*** (11.028)	.069*** (5.817)	.072*** (4.499)	.104*** (10.572)
GDP	?			-.001 (-.114)	-.005 (-.416)	.004 (.153)	.005 (.389)
INFL	-			-.009*** (-4.015)	-.008*** (-3.595)	.015 (.263)	.027 (.449)
FDI	?			-.205*** (-5.480)	.107** (2.031)	-.147* (-1.855)	-.063 (-1.272)
LEGOR	+			.016 (.244)	.093 (.877)	.009 (.045)	-.049 (-.545)
INV_PRO	-			-.111 (-.863)	-.384 (-1.567)	-.069 (-.138)	.075 (.384)
Constant		-.925*** (-54.379)	-.713*** (-36.750)	-.608*** (-10.188)	-.366*** (-4.601)	-.559*** (-4.839)	-.722*** (-9.358)
Observations		391,737	353,609	333,461	137,615	27,730	168,116
Adjusted R ²		.060	.098	.101	.083	.135	.115
Industry dummy		Yes	Yes	Yes	Yes	Yes	Yes
Year dummy		Yes	Yes	Yes	Yes	Yes	Yes
Country dummy		Yes	Yes	Yes	Yes	Yes	Yes

Panel B: Operating leverage and PMC: IPCM as the PMC proxy							
Variable	Expected sign	(1) OLS Pooled	(2) OLS Pooled	(3) OLS Pooled	(4) OLS Before GFC	(5) OLS During GFC	(6) OLS After GFC
IPCM	?	.011*** (21.532)	.008*** (13.767)	.008*** (13.388)	.011*** (9.356)	.008*** (5.744)	.007*** (9.470)
SIZE	-		-.018*** (-21.973)	-.019*** (-22.372)	-.017*** (-13.418)	-.022*** (-13.401)	-.019*** (-18.882)

(Continues)

TABLE 4 (Continued)

Panel B: Operating leverage and PMC: IPCM as the PMC proxy							
Variable	Expected sign	(1) OLS Pooled	(2) OLS Pooled	(3) OLS Pooled	(4) OLS Before GFC	(5) OLS During GFC	(6) OLS After GFC
MTB	+		.001*** (4.227)	.001*** (4.230)	.003*** (6.005)	-.000 (-.275)	.001 (1.594)
ROA	?		-.038*** (-5.355)	-.034*** (-4.732)	-.027** (-2.409)	.006 (.306)	-.045*** (-4.402)
LEV	?		-.000 (-.407)	-.001 (-1.160)	-.002** (-1.974)	-.003 (-1.425)	-.000 (-.362)
SALE_GR	+		.057*** (43.289)	.057*** (42.413)	.056*** (21.749)	.049*** (11.578)	.058*** (34.941)
R&D	+		.860*** (19.054)	.886*** (19.147)	.791*** (11.689)	.942*** (10.000)	.968*** (15.774)
TANGIBILITY	+		.104*** (13.122)	.099*** (12.145)	.085*** (6.739)	.097*** (5.838)	.111*** (10.727)
GDP	?			-.000 (-.026)	-.017 (-1.305)	-.012 (-.361)	.008 (.623)
INFL	-			-.009*** (-3.991)	-.008*** (-3.624)	-.048 (-.795)	.015 (.221)
FDI	?			-.223*** (-5.506)	.126** (2.162)	-.142 (-1.580)	-.085 (-1.602)
LEGOR	+			.009 (.139)	-.002 (-.021)	-.058 (-.265)	-.041 (-.448)
INV_PRO	-			-.101 (-.746)	-.130 (-1.508)	.185 (.336)	.033 (.161)
Constant		-.929*** (-52.591)	-.760*** (-37.090)	-.662*** (-11.077)	-.452*** (-5.767)	-.610*** (-5.317)	-.757*** (-9.567)
Observations		325,612	295,024	276,862	109,226	23,124	144,512
Adjusted R ²		.071	.104	.106	.092	.126	.119
Industry dummy		Yes	Yes	Yes	Yes	Yes	Yes
Year dummy		Yes	Yes	Yes	Yes	Yes	Yes
Country dummy		Yes	Yes	Yes	Yes	Yes	Yes
Panel C: US vs. Non-US sample							
Variables	Expected sign	(1) OLS US	(2) OLS Rest of the world	(3) OLS US	(4) OLS Rest of the world		
HH	?	.133** (2.106)	.017* (1.721)				
IPCM	?			.009*** (9.070)	.008*** (9.179)		
Other control variables		Yes	Yes	Yes	Yes		
Constant		-3.037* (-1.663)	-.645*** (-10.482)	-3.131* (-1.700)	-.725*** (-11.400)		
Observations		85,110	248,351	80,829	196,033		
Adjusted R ²		.151	.087	.156	.087		
χ^2		3.26		.65			
Prob > χ^2		.071		.422			

(Continues)

TABLE 4 (Continued)

Panel C: US vs. Non-US sample					
Variables	Expected sign	(1) OLS US	(2) OLS Rest of the world	(3) OLS US	(4) OLS Rest of the world
Industry dummy		Yes	Yes	Yes	Yes
Year dummy		Yes	Yes	Yes	Yes
Country dummy		No	Yes	No	Yes

Note: This table reports the OLS regression results for the relationship between PMC and operating leverage. Panel A reports the baseline regression result for HI using HH as the proxy for PMC. Panel B reports the same but uses IPCM as the alternative PMC measure. Finally, panel C provides the baseline regression result based on sub-samples, U.S. versus non-U.S. Robust t-statistics clustered by firm are in parentheses. *, **, *** denote a two-tailed p -value of less than .10, .05, and .01, respectively. Variables are defined in the Appendix.

5.4 | Accounting for endogeneity concerns

In developing H1, we argued that PMC affects the operating leverage of the firm. However, it is also plausible that operating leverage can affect PMC, as firms' cost management strategies can intensify or hinder PMC. Hence, to alleviate this reverse causality concern, we perform a change analysis by regressing change in operating leverage ($\Delta OPLEV$) on change in PMC (ΔHH and $\Delta IPCM$), along with changes in firm- and country-level control variables. Table 5, Panel A reports the results. Column (1) reports an insignificant coefficient on ΔHH . However, column (2) shows that coefficient on $\Delta IPCM$ is significantly positive (coefficient .002 [$p < .01$], which is consistent with the baseline regression result. Therefore, reverse causality does not appear to be a concern in this study. We also regress one-year-ahead operating leverage ($OPLEV_{t+1}$) on HH_t , $IPCM_t$, and control variables at time t . The coefficient on HH_t is .016 ($p < .10$) (column 4) and that on $IPCM_t$ is .011 ($p < .01$) (column 5), which provides assurance that reverse causality is not biasing the results.

Next, we conduct a two-stage-least-squares (2SLS) regression using (i) average IPCM based on country-year-industry, denoted as AVG_IPCM1 and (ii) average IPCM based on year-industry, denoted as AVG_IPCM2 , as two instruments. When calculating the instruments, we exclude the focal firm's IPCM, to account for the average IPCM of competitors of the focal firm only. Several prior studies utilize the industry average as instrumental variable, such as B. Cheng et al. (2014), Hasan et al. (2015). In Table 5, Panel B, we show the 2SLS regression results for the endogeneity test. Columns (1) and (3) indicate the first stage regression results for AVG_IPCM1 and AVG_IPCM2 respectively. The coefficients on both the instruments are significantly positive.

Columns (2) and (4) report the second stage regression results, and reveal that the coefficients on the fitted values of AVG_IPCM1 (.036, $p < .01$) and AVG_IPCM2 (.016,

$p < .01$) continue to be significantly positive, suggesting that endogeneity is not a concern in this study. Moreover, to investigate the validity of the instruments, we perform several post-estimation tests following prior literature (B. Cheng et al., 2014). We report the under-identification test following the Kleibergen-Paap rk LM statistic, and find that the instrumental variables are relevant ($p < .01$). Then, we conduct the weak identification test, and the results of the Kleibergen-Paap rk Wald F statistic confirm that there is no "weak identification" problem for our model, as the Stock and Yogo (2005) critical value is much lower than the Cragg-Donald Wald F statistic.

5.5 | Moderation tests

In this section, we report regression results of the moderating effects of investment intensity, firm life cycle and EPL on the association between PMC and operating leverage.

5.5.1 | PMC and operating leverage: Moderating role of investment intensity (H2)

We define investment intensity (INV_INT) as capital expenditures divided by total assets. We then split the sample into high INV_INT (if INV_INT greater than or equal to median INV_INT), and low INV_INT (if INV_INT less than median INV_INT) sub-samples. Table 6 presents the result. We find that the association between PMC and operating leverage is positive and significant for high INV_INT sub-sample (the coefficient on HH is .027, $p < .05$) but insignificant for the low INV_INT sub-sample. The difference in coefficient on HH between the two groups, however, is insignificant ($\chi^2 = .76$, p -value .38). The coefficients on $IPCM$ are positive and highly significant for both groups (coefficients .008, $p < .01$ for both groups). Therefore, this study finds partial support for H2.

TABLE 5 Test of endogeneity

Panel A: Change analysis							
Change analysis				Lead lag test			
Variables	Expected sign	(1)	(2)	Variables	Expected sign	(4)	(5)
DV = Δ OPLEV		OLS	OLS	DV = OPLEV _{t+1}		OLS	OLS
Δ HH	?	-.011 (-1.608)		HH	?	.016* (1.650)	
Δ IPCM	?		.002*** (3.771)	IPCM	?		.011*** (19.546)
Δ SIZE	-	.018 (.187)	.108 (1.03)	SIZE	-	-.021*** (-26.792)	-.018*** (-22.202)
Δ MTB	+	-.002 (-.772)	-.003 (-1.221)	MTB	+	.001*** (3.897)	.001*** (4.011)
Δ ROA	?	.000 (.414)	.000 (.178)	ROA	?	-.061*** (-8.399)	-.032*** (-4.433)
Δ LEV	?	.000 (.417)	.000 (.425)	LEV	?	-.001 (-.885)	-.000 (-.473)
Δ SALE_GR	+	.001*** (5.956)	.001*** (5.605)	SALE_GR	+	.048*** (40.340)	.051*** (38.173)
Δ R&D	+	.005*** (3.25)	.005*** (2.842)	R&D	+	.990*** (21.972)	.875*** (19.199)
Δ TANGIBILITY	+	-.004 (-.976)	-.007 (-1.627)	TANGIBILITY	+	.092*** (11.745)	.105*** (12.896)
Δ GDP	?	-.002 (-1.539)	-.002 (-1.352)	GDP	?	.002 (.268)	.004 (.519)
Δ INFL	-	.000 (1.324)	.000* (1.65)	INFL	-	-.008*** (-3.415)	-.008*** (-3.377)
Δ FDI	?	.000 (.426)	.000 (-.121)	FDI	?	-.200*** (-5.512)	-.201*** (-5.138)
Constant		-.008 (-.36)	-.012 (-.505)	LEGOR	+	.035 (.515)	.036 (.522)
Observations		75,236	67,646	INV_PRO	-	-.163	-.181
Adjusted R ²		.001	.002			(-1.263)	(-1.339)
Industry dummy		Yes	Yes	Constant		-.603*** (-10.089)	-.649*** (-10.825)
Year dummy		Yes	Yes	Observations		329,670	271,297
Country dummy		Yes	Yes	Adjusted R ²		.102	.112
				Industry dummy		Yes	Yes
				Year dummy		Yes	Yes
				Country dummy		Yes	Yes

Panel B: Two-stage-least-squares (2SLS) regression results					
		(1)	(2)	(3)	(4)
		Instrument 1		Instrument 2	
		First stage	Second stage	First stage	Second stage
Variables:	Expected sign	IPCM	DV = OPLEV	IPCM	DV = OPLEV
AVG_IPCM1	+	.540*** (13.217)			
AVG_IPCM2	+			.761*** (11.942)	

(Continues)

TABLE 5 (Continued)

Panel B: Two-stage-least-squares (2SLS) regression results					
Variables:	Expected sign	(1)	(2)	(3)	(4)
		Instrument 1		Instrument 2	
		First stage	Second stage	First stage	Second stage
		IPCM	DV = OPLEV	IPCM	DV = OPLEV
IPCM	?		.036*** (9.843)		.016*** (3.143)
Constant		1.314*** (5.349)	-.664*** (-10.224)	.883*** (3.460)	-.666*** (-11.106)
Observations		269,862	269,862	276,862	276,862
Adjusted R ²		.201	.058	.185	.103
Industry dummy		YES	YES	YES	YES
Year dummy		YES	YES	YES	YES
Country dummy		YES	YES	YES	YES
Under identification test:					
Kleibergen-Paap rk LM statistic		234.095 (p = .000)		129.800 (p = .000)	
Weak identification test					
Cragg-Donald Wald F statistic		7197.718		2705.634	
Stock-Yogo critical values (10%)		16.38		16.38	
Kleibergen-Paap rk Wald F statistic		174.700		142.608	

Note: This table reports the endogeneity test results for the relationship between PMC and operating leverage. Panel A reports the results of change analysis and lead-lag test. Panel B presents 2SLS regression results. Robust t-statistics clustered by firm are in parentheses. *, **, *** denote a two-tailed *p*-value of less than .10, .05, and .01, respectively. Variables are defined in the Appendix.

TABLE 6 PMC and cost structure: The moderating role of investment intensity

Variables	Expected sign	(1) Low investment intensity	(2) High investment intensity	(3) Low investment intensity	(4) High investment intensity
DV = OPLEV					
HH	?	.013 (.955)	.027** (2.468)		
IPCM	?			.008*** (11.358)	.008*** (7.361)
Other control variables		Yes	Yes	Yes	Yes
Constant		-.530*** (-6.152)	-.719*** (-11.412)	-.577*** (-6.680)	-.783*** (-12.267)
Observations		152,365	181,096	128,824	148,038
Adjusted R ²		.112	.099	.119	.103
χ^2		.76		.00	
Prob > χ^2		.384		.966	
Industry dummy		Yes	Yes	Yes	Yes
Year dummy		Yes	Yes	Yes	Yes
Country dummy		Yes	Yes	Yes	Yes

Note: This table reports the OLS regression results regarding the moderating role of investment intensity on the relationship between PMC and operating leverage for H2. The sample is divided into two sub-groups based on the median value of investment intensity. A firm is categorized as a low investment intensity firm if the median value of the firm is below the median value of the full sample, otherwise a firm is categorized as a high investment intensity firm. Robust t-statistics clustered by firm are in parentheses. *, **, *** denote a two-tailed *p*-value of less than .10, .05, and .01, respectively. Variables are defined in the Appendix.

5.5.2 | PMC and operating leverage: Moderating role of firm life cycle (H3)

Our first proxy for firm life cycle is the one proposed by Dickinson (2011). Dickinson (2011) argues that the performance, risk, and growth prospects vary across life cycle stages and can be captured through variations in cash flow from operating activities (CFO), cash flow from investing activities (CFI), and cash flow from financing activities (CFF). Following Dickinson (2011), we classify each firm-year observation into one of the five life-cycle stages: (i) Introduction: if $CFO < 0$, $CFI < 0$, and $CFF > 0$; (ii) Growth: if $CFO > 0$, $CFI < 0$, and $CFF > 0$; (iii) Mature: if $CFO > 0$, $CFI < 0$, and $CFF < 0$; (iv) Decline: if $CFO < 0$, $CFI > 0$, and $0 \geq CFF \geq 0$; and (v) Shakeout: the remaining firm-years.

Table 7, Panel A, report the results using HH index as the proxy for PMC. Column (2) indicates that the growth stage of the firm life cycle strengthens the positive relationship between PMC and operating leverage (coefficient .037, $p < .01$), whereas other life-cycle stages do not show any significant moderating effect. Chi-square (χ^2) results document that the coefficients vary significantly between different life cycle stages, such as the introduction and growth stages ($\chi^2 = 4.56$, $p < .05$). Table 7, Panel B, also exhibits a significant and positive moderating effect of firm life cycle when we employ the IPCM as a proxy for PMC. The coefficient on IPCM is positive and significant in the introduction stage (coefficient .004, $p < .01$), growth stage (coefficient .012, $p < .01$), mature stage (coefficient .008, $p < .10$), shake-out stage (coefficient .009, $p < .01$), and decline stage (coefficient .007, $p < .01$). However, the moderating effect is stronger in the growth stage, and this is consistent with the result obtained in Panel A of Table 7. Again, chi-square (χ^2) results reveal that coefficients vary significantly between the life cycle stages, such as the introduction and growth stages ($\chi^2 = 4.25$, $p < .05$), introduction and shake-out stages ($\chi^2 = 8.23$, $p < .01$) and, finally, introduction and decline stages ($\chi^2 = 4.62$, $p < .05$).

Panel C of Table 7 reports regression results for the alternative life cycle measure, namely, RETA, defined as retained earnings scaled by total assets (DeAngelo et al., 2006). The coefficients on HH are (.028, $p < .10$) and (.029, $p < .01$) for non-mature and mature firms respectively (the difference in coefficients between the groups is insignificant, $\chi^2 = .00$, $p = .96$). The coefficient on IPCM for mature firms is (.007, $p < .01$) and for non-mature firms is (.013, $p < .01$) (the difference is significant, $\chi^2 = 4.23$, $p = .040$). Hence, the findings are inconsistent with the findings reported in Panel A above. However, the firm life cycle measure of Dickinson (2011) is a more reliable proxy for firm life cycle, as this measure is based on firm performance and resource allocation decisions that depict a dynamic view of firm.

5.5.3 | PMC and operating leverage: Moderating role of EPL (H4)

Finally, we test the moderating effects of country-level EPL on the relationship between PMC and operating leverage. To perform this test, we partition the sample into high versus low EPL groups, based on the median EPL values. In Table 8, we provide the moderating test results, which show that the relation between PMC and operating leverage is more pronounced for firms operating in low EPL countries (coefficient on HH is .076, $p < .01$), whereas the relation is insignificant for the high EPL sub-sample. The chi-square (χ^2) result reveals that coefficients on HH vary significantly between low and high EPL groups ($\chi^2 = 13.73$, $p < .01$). Columns (3) and (4) show the results using IPCM as the proxy for PMC. The coefficient on IPCM is positive and significant for both the low (coefficient .009, $p < .01$) and high (coefficient .007, $p < .01$) EPL sub-sample. Although the magnitude of the coefficient is larger for the low EPL group, the chi-square (χ^2) test, shows no significant difference in coefficients between the two groups. Taken together, the results provide evidence that competition increases operating leverage for firms operating in low EPL countries.

5.6 | Additional tests

5.6.1 | Demand uncertainty, PMC and operating leverage

In Section 3.1, we argued that high PMC increases the demand uncertainty about the products and services and, therefore, encourages managers to retain excess capacity. Therefore, high PMC may increase operating leverage in the presence of heightened demand uncertainty. When a firm faces demand uncertainty, managers invest more to meet the demand once the firm finds a sudden surge in demand (Aboody et al., 2018). In the same vein, Banker et al. (2013) posit that operating leverage has a favorable impact on a firm's expected profit when the firm anticipates high demand growth. Since our baseline hypothesis results show that PMC is positively related with operating leverage, it is plausible that this positive association will be strengthened when demand uncertainty is high. To test this proposition, we follow Banker et al. (2014), and estimate the following regression using the standard deviation of log-change in sales for all observations of each firm:

$$\text{Demand uncertainty} = \sigma \Delta \ln \text{Sales}_{i,t} \quad (5)$$

where, $\Delta \ln \text{Sales}_{i,t}$ is log-changes in sales. We split the sample into low and high demand uncertainty groups. We define a firm as having low demand uncertainty if the

TABLE 7 PMC and cost structure: The moderating role of firm life cycle (Dickinson, 2011)

Panel: A [Independent variable = HH]						
Variables	Expected sign	(1)	(2)	(3)	(4)	(5)
DV = OPLEV		OLS	OLS	OLS	OLS	OLS
HH	?	-.016 (-.678)	.037*** (2.690)	.017 (1.450)	.002 (.090)	-.008 (-.242)
Other control variables		YES	YES	YES	YES	
Constant		-.980*** (-8.195)	-.683*** (-8.569)	-.663*** (-9.459)	-.478*** (-3.521)	-.820*** (-4.269)
Observations		36,162	77,519	142,561	37,681	18,216
Adjusted R ²		.195	.077	.052	.103	.168
Industry dummy		YES	YES	YES	YES	YES
Year dummy		YES	YES	YES	YES	YES
Country dummy		YES	YES	YES	YES	YES
Life cycle stage			χ^2			Prob > χ^2
Introduction vs. Growth			4.56			.033**
Introduction vs. Mature			1.71			.191
Introduction vs. Shake out			.41			.521
Introduction vs. Decline			.05			.816
Growth vs. Mature			1.95			.162
Growth vs. Shake out			2.65			.104
Growth vs. Decline			1.80			.180
Mature vs. Shake out			.55			.459
Mature vs. Decline			.55			.460
Shake out vs. Decline			.08			.774
Panel B: [Independent variable = IPCM]						
Variables		(1)	(2)	(3)	(4)	(5)
DV = OPLEV		OLS	OLS	OLS	OLS	OLS
		Introduction	Growth	Mature	Shake out	Decline
IPCM	?	.004*** (5.257)	.012*** (3.330)	.008* (1.906)	.009*** (6.429)	.007*** (7.909)
Other control variables		Yes	Yes	Yes	Yes	Yes
Constant		-.970*** (-7.985)	-.761*** (-9.523)	-.699*** (-9.975)	-.524*** (-3.895)	-.831*** (-4.342)
Observations		29,575	65,237	121,299	31,708	15,398
Adjusted R ²		.191	.083	.057	.107	.177
Industry dummy		Yes	Yes	Yes	Yes	Yes
Year dummy		Yes	Yes	Yes	Yes	Yes
Country dummy		Yes	Yes	Yes	Yes	Yes
Life cycle stage			χ^2			Prob > χ^2
Introduction vs. Growth			4.25			.039**
Introduction vs. Mature			.75			.387
Introduction vs. Shake out			8.23			.004***
Introduction vs. Decline			4.62			.032**
Growth vs. Mature			.68			.410
Growth vs. Shake out			.67			.412
Growth vs. Decline			1.95			.162
Mature vs. Shake out			.03			.861
Mature vs. Decline			.09			.758
Shake out vs. Decline			1.74			.188

(Continues)

TABLE 7 (Continued)

Panel C: PMC and cost structure: The moderating role of firm life cycle (DeAngelo et al., 2006)					
Variables	Expected sign	(1) OLS NON_MATURE	(2) OLS MATURE	(3) OLS NON_MATURE	(4) OLS MATURE
HH	?	.028* (1.697)	.029*** (2.580)		
IPCM	?			.007*** (10.848)	.013*** (4.383)
Other control variables		Yes	Yes	Yes	Yes
Constant		-.600*** (-5.859)	-.666*** (-9.681)	-.698*** (-6.818)	-.704*** (-10.196)
Observations		117,023	200,624	94,600	175,207
Adjusted R ²		.143	.047	.145	.053
χ^2		.00		4.23	
Prob > χ^2		.960		.040**	
Industry dummy		Yes	Yes	Yes	Yes
Year dummy		Yes	Yes	Yes	Yes
Country dummy		Yes	Yes	Yes	Yes

Note: This table reports the OLS regression results regarding the moderating role of firm life cycle stages on the relationship between PMC and operating leverage. Panel A shows the moderating effect results for H3 where firm life cycle is proxied by Dickinson (2011) and PMC is proxied by HH index. Panel B reports the same where firm life cycle is proxied by Dickinson (2011) and PMC is proxied by IPCM. Panel C reports the moderating effect of firm life cycle proxied by DeAngelo et al. (2006). Robust t-statistics clustered by firm are in parentheses. *, **, *** denote a two-tailed *p*-value of less than .10, .05, and .01, respectively. Variables are defined in the Appendix.

TABLE 8 PMC and cost structure: The moderating effect of EPL

Variables DV = OPLEV	Expected sign	(1) OLS Low EPL	(2) OLS High EPL	(3) OLS Low EPL	(4) OLS High EPL
HH	?	.076*** (4.079)	-.003 (-.295)		
IPCM	?			.009*** (9.892)	.007*** (8.458)
Other control variables		Yes	Yes	Yes	Yes
Constant		-.160 (-.964)	-.711*** (-6.849)	-.298* (-1.645)	-.739*** (-6.970)
Observations		149,572	183,889	133,579	143,283
Adjusted R ²		.106	.102	.114	.102
χ^2		13.73***		1.31	
Prob > χ^2		.000		.253	
Industry dummy		Yes	Yes	Yes	Yes
Year dummy		Yes	Yes	Yes	Yes
Country dummy		Yes	Yes	Yes	Yes

Note: This table reports the OLS regression results regarding the association between PMC and operating leverage conditional on the country-level EPL (H4). The sample is divided into two sub-samples based on the median value of country-level EPL. A firm is categorized as low EPL firm if the median value of the firm is below the median value of the full sample, otherwise a firm is categorized as high EPL firm. Robust t-statistics clustered by firm are in parentheses. *, **, *** denote a two-tailed *p*-value of less than .10, .05, and .01, respectively. Variables are defined in the Appendix.

TABLE 9 PMC and cost structure: The moderating role of demand uncertainty

Variables DV = OPLEV	Expected sign	(1) Low demand uncertainty	(2) High demand uncertainty	(3) Low demand uncertainty	(4) High demand uncertainty
HH	?	.012 (1.117)	.031* (1.866)		
IPCM	?			-.026** (-2.431)	.006*** (9.364)
Other control variables		Yes	Yes	Yes	Yes
Constant		-.842*** (-13.855)	-.324*** (-2.967)	-.846*** (-13.814)	-.417*** (-3.805)
Observations		199,953	133,508	167,590	109,272
Adjusted R ²		.026	.136	.030	.141
χ^2		.97		8.81***	
Prob > χ^2		.325		.003	
Industry dummy		Yes	Yes	Yes	Yes
Year dummy		Yes	Yes	Yes	Yes
Country dummy		Yes	Yes	Yes	Yes

Note: This table reports the OLS regression results regarding the association between PMC and operating leverage conditional on firm-level demand uncertainty. The sample is divided into two sub-samples based on the median value of demand uncertainty. A firm is categorized as low demand uncertainty firm if the median value of the firm is below the median value of the full sample, otherwise a firm is categorized as high demand uncertainty firm. Robust t-statistics clustered by firm are in parentheses. *, **, *** denote a two-tailed *p*-value of less than .10, .05, and .01, respectively. Variables are defined in the Appendix.

median value of demand uncertainty is below the median value of all the sample firms, otherwise the firm is considered to have high demand uncertainty. Table 9, column (1) shows that the coefficient on HH is positive but insignificant for the low-demand uncertainty group, but positive and marginally significant for the high-demand uncertainty group (coefficient .031, $p < .10$) (column 2). The coefficient on IPCM is negative and significant for the low-demand uncertainty group (coefficient $-.026$, $p < .01$) (column 3), but positive and significant for the high-demand uncertainty group (coefficient .006, $p < .01$) (column 4), indicating that PMC increases operating leverage under high demand uncertainty, but decreases operating leverage for low demand uncertainty. The coefficients differ significantly between the groups for IPCM ($\chi^2 = 8.81$, $p < .01$).

5.6.2 | Alternative measure of PMC

We employ the country-level Competition Law Index (CLI) developed by Bradford and Chilton (2018) as an alternative measure of PMC. CLI indicates the strictness of a country's competition regulation. A higher value of CLI indicates that the firm faces higher regulatory risk stemming from the violation of competition rules and regulation (Bradford & Chilton, 2018) and, therefore, a more competitive environment. CLI is calculated by combining two variables: AUTHORITY, the rules regarding who can enforce the competition law; and SUBSTANCE,

the rules and regulations about competition in the market. SUBSTANCE is the sum of: MERGERS, the rules and regulations regarding notifying the merger to the authority of the relevant country; DOMINANCE, the rules restricting dominant firms from involvement in abusive behavior; and ANTICOMP, the rules prohibiting firms from entering into anticompetitive agreements. The CLI is obtained by taking the equally-weighted average of AUTHORITY and SUBSTANCE.⁵

Column (1) in Table 10 shows that the coefficient on the composite CLI score, CLI_OVERALL, is insignificant. We then include AUTHORITY and SUBSTANCE in column (2), but continue to find insignificant coefficients. Columns (3) to (5) include AUTHORITY and each of the three components of SUBSTANCE individually. Column (5) shows that the coefficient on AUTHORITY is significant and negative (coefficient $-.049$, $p < .01$) but ANTICOMP is positive and significant (coefficient .056, $p < .01$) suggesting that AUTHORITY decreases operating leverage, whereas ANTICOMP increases operating leverage. Finally, column (6) includes AUTHORITY along with three of the SUBSTANCE components in the same model, and reveals that the coefficient on AUTHORITY is significant and negative (coefficient $-.041$, $p < .05$), DOMINANCE is also significant and negative (coefficient $-.049$, $p < .01$) while that on ANTICOMP is significant and positive (coefficient .081, $p < .01$), indicating that AUTHORITY and DOMINANCE decrease operating leverage, while ANTICOMP increases operating leverage. We conclude

TABLE 10 PMC and operating leverage: Alternative measure of PMC

Variables DV = OPLEV	Expected sign	(1)	(2)	(3)	(4)	(5)	(6)
CLI_OVERALL	?	-.015 (-.924)					
AUTHORITY	?		-.029 (-1.630)	-.018 (-1.123)	-.012 (-.747)	-.049*** (-2.723)	-.041** (-2.163)
SUBSTANCE	?		.017 (.894)				
MERGERS	?			-.002 (-.143)			.001 (.110)
DOMINANCE	?				-.014 (-.910)		-.049*** (-2.595)
ANTICOMP	?					.056*** (2.901)	.081*** (3.656)
Other control variables		Yes	Yes	Yes	Yes	Yes	Yes
Constant		-.459*** (-6.304)	-.482*** (-6.439)	-.465*** (-6.373)	-.450*** (-5.960)	-.529*** (-6.946)	-.505*** (-6.577)
Observations		179,562	179,562	179,562	179,562	179,562	179,562
Adjusted R ²		.095	.095	.095	.095	.095	.095
Industry dummy		Yes	Yes	Yes	Yes	Yes	Yes
Year dummy		Yes	Yes	Yes	Yes	Yes	Yes
Country dummy		Yes	Yes	Yes	Yes	Yes	Yes

Note: This table reports the OLS regression results for the relationship between competition law index (CLI), an alternative measure of PMC and operating leverage. Robust t-statistics clustered by firm are in parentheses. *, **, *** denote a two-tailed *p*-value of less than .10, .05, and .01, respectively. Variables are defined in the Appendix.

from this additional test that the components of CLI have implications for operating leverage, but the signs of the coefficients are not consistent.

5.6.3 | Alternative measure of operating leverage

We also use an alternative proxy for operating leverage to further test the robustness of our baseline regression result. Following Aboody et al. (2018), we estimate the following equation to calculate the operating leverage:

$$OC_{i,k} = \alpha_0 + \beta_{i,t}REV_{i,k} + ei, k, k = t - 8, \dots, t - 1, \quad (6)$$

where, OC is the natural logarithm of total operating costs, and REV is the natural logarithm of revenue. Operating leverage is the estimate of $1 - \beta$, whereby a higher value implies high operating leverage. Table 11 shows that the coefficient on HH is insignificant but that on IPCM is positive and significant (.014, $p < .01$), suggesting that PMC is positively related with operating leverage. Therefore, use

TABLE 11 PMC and operating leverage: Alternative measure of operating leverage

Variables DV = OPLEV	Expected sign	(1) OLS	(2) OLS
HH	?	-.008 (-1.235)	
IPCM	?		.014*** (47.365)
Other control variables		Yes	Yes
Constant		.400*** (11.020)	.374*** (10.209)
Observations		442,579	363,096
Adjusted R ²		.181	.205
Industry dummy		Yes	Yes
Year dummy		Yes	Yes
Country dummy		Yes	Yes

Note: This table reports the OLS regression results for the relationship between PMC and operating leverage using alternative operating leverage proxy used by Aboody et al. (2018). Robust t-statistics clustered by firm are in parentheses. *, **, *** denote a two-tailed *p*-value of less than .10, .05, and .01, respectively. Variables are defined in the Appendix.

of this alternative proxy provides some evidence consistent with earlier results.

6 | DISCUSSION

The separation of ownership and control gives rise to information asymmetries that managers can use to exploit individual outside shareholders (Jensen & Meckling, 1976). To minimize such sub-optimal managerial actions, researchers have identified several market forces, like PMC (Stigler, 1958), the market for corporate control (Manne, 1965), and labor market pressure (Fama, 1980). Shleifer and Vishny (1997) argue that PMC is probably the most powerful force for achieving economic efficiency in the world. According to the industrial organization view, competition has been portrayed as an industry-level construct and, therefore, competition is defined by the industry dynamics, such as the degree of market share held by the firm, that is, the industry concentration. Despite the importance of PMC for explaining financial reporting quality, real economic decisions, and corporate governance arrangements, research on whether and how PMC affects firm-level costs structure decision remains unexplored. We fill this void in the literature using international data. Firms with lower operating leverage enjoy the benefit of rapid cost reduction when demand decreases, while firms with higher operating leverage are unlikely to reduce costs quickly, hence, resulting in diminished profit. Thereby, the optimum operating leverage affects many facets of a business and understanding what affects firm-level operating leverage is one of the fundamental issues in cost accounting. We posit that PMC is one such factor.

Using the HH index and the IPCM as proxies for PMC, together with the operating leverage measure proposed in Kulchania (2016), we find a significant and positive relationship between PMC and operating leverage. We also find that the positive relationship is moderated by capital intensity, firm life cycle stages and employment protection legislation. Specifically, the positive relationship is more pronounced for firms with high capital intensity, for firms in growth stage of their life cycle and for firms domiciled in countries with weak employment protection legislation. Our findings on firm life cycle and EPL have practical implications. Prior research shows that stock price reaction to earnings, accruals mispricing, value relevance of accounting measures, dividend policy, accrual quality, cost of equity, forecasting profitability and growth, corporate policies and other disclosure initiatives, such as CSR, differ across FLCs (Habib & Hasan, 2019). As our finding indicates that the growth stage of the firm life cycle strengthens the positive relationship between PMC and operating leverage, potential investors would

need to consider whether a high operating leverage for growth firms would favorably or adversely affect future performance given the competitive nature of the market within which such firms operate. With respect to country-level EPL, our empirical result shows that competition increases operating leverage for firms operating in low EPL countries. Although our finding does not go as far as to suggest whether such a positive relationship is beneficial or detrimental for firm outcomes (e.g., firm performance, firm risk and so on), it highlights the importance of considering the employment regulation of a country for global investors.

7 | CONCLUSION

In this study, we explore the relationship between PMC and operating leverage utilizing a large sample of international firms, and reveal a significant positive association between PMC and operating leverage. This finding is particularly important, as operating leverage affects various aspects of a firm, such as systematic risk, cost of equity, dividend pay-out, and so on. We also document that investment intensity, firm life cycle, and country-level EPL moderate to some extent the positive relation between PMC and operating leverage. In particular, the positive association is more pronounced for firms with more investment intensity, for firms in the growth-stage of their life cycle, and in countries with flexible EPL.

This study contributes to the extant literature in many ways. As there is a paucity of research regarding the determinants of operating leverage, this study adds new insight by demonstrating PMC as a determinant of operating leverage. Investors of the firm may find this useful, as this study stresses the importance of competition in shaping cost structure decisions and, hence, can enable investors to assess the investment risk for firms with high operating leverage. In addition, the use of an international sample enhances our understanding regarding the implications of competition and cost management in international settings.

ACKNOWLEDGEMENTS

Open access publishing facilitated by Massey University, as part of the Wiley - Massey University agreement via the Council of Australian University Librarians. WOA Institution: Massey University Consortia Name: CAUL 2022.

ENDNOTES

¹We use operating leverage, high fixed-to-variable cost ratio, and rigid cost structure interchangeably.

²Cost stickiness examines how costs behave in response to changes in sales. Managers expand resources in the event of a sales

increase, but they are reluctant to reduce redundant capacity when demand decreases. Hence, on average, costs increase more than they decrease for an equivalent change in firm activity (Anderson et al., 2003).

³There are several EBIT based measures of operating leverage, such as the O'Brien and Vanderhaiden (1987) measure that calculates operating leverage by utilizing 10-year lagged positive EBIT values. Mandelker and Rhee (1984) use the sensitivity of EBIT to sales to calculate operating leverage.

⁴Utilizing data from the U.S. for 1989 to 2011 sample period, Markarian and Santalo (2014) report a mean HH index of 0.05 which is comparable to the HH index of 0.07 reported in our study for the U.S. sample. Alexeev and Song (2013) report an average HH index of 0.22 for a broad sample of international firms, which is again comparable to the HH index of 0.18 reported in our study.

⁵The required data is retrieved from the following source: <http://comparativecompetitionlaw.org/data>. The data is available from 1889 to 2010 for several countries.

REFERENCES

- Aboody, D., Levi, S., & Weiss, D. (2018). Managerial incentives, options, and cost-structure choices. *Review of Accounting Studies*, 23(2), 422–451.
- Aghion, P., & Howitt, P. (1998). A Schumpeterian perspective on growth and competition. In F. Coricelli, M. D. Matteo, & F. Hahn (Eds.), *New theories in growth and development* (pp. 9–49). Palgrave Macmillan UK.
- Aghion, P., Dewatripont, M., & Rey, P. (1999). Competition, financial discipline and growth. *The Review of Economic Studies*, 66(4), 825–852.
- Akdoğan, E., & MacKay, P. (2008). Investment and competition. *Journal of Financial and Quantitative Analysis*, 43(2), 299–330.
- Aldamen, H., Duncan, K., Kelly, S., McNamara, R., & Nagel, S. (2012). Audit committee characteristics and firm performance during the global financial crisis. *Accounting & Finance*, 52(4), 971–1000.
- Alexeev, M., & Song, Y. (2013). Corruption and product market competition: An empirical investigation. *Journal of Development Economics*, 103, 154–166.
- Ali, A., Klasa, S., & Yeung, E. (2008). The limitations of industry concentration measures constructed with Compustat data: Implications for finance research. *The Review of Financial Studies*, 22(10), 3839–3871.
- Ali, A., Klasa, S., & Yeung, E. (2014). Industry concentration and corporate disclosure policy. *Journal of Accounting and Economics*, 58(2), 240–264.
- Alimov, A. (2014). Product market competition and the value of corporate cash: Evidence from trade liberalization. *Journal of Corporate Finance*, 25, 122–139.
- Almeida, J. E. F. d., & Dalmácio, F. Z. (2015). The effects of corporate governance and product market competition on analysts' forecasts: Evidence from the Brazilian capital market. *The International Journal of Accounting*, 50(3), 316–339.
- Anderson, M. C., Banker, R. D., & Janakiraman, S. N. (2003). Are selling, general, and administrative costs “sticky”? *Journal of Accounting Research*, 41(1), 47–63.
- Babar, M., & Habib, A. (2020). Product market competition in accounting, finance, and corporate governance: A review of the literature. *International Review of Financial Analysis*, 73, 101607.
- Banker, R. D., Byzalov, D., & Chen, L. T. (2013). Employment protection legislation, adjustment costs and cross-country differences in cost behavior. *Journal of Accounting and Economics*, 55(1), 111–127.
- Banker, R. D., Byzalov, D., & Plehn-Dujowich, J. M. (2014). Demand uncertainty and cost behavior. *The Accounting Review*, 89(3), 839–865.
- Bassanini, A., Nunziata, L., & Venn, D. (2009). Job protection legislation and productivity growth in OECD countries. *Economic Policy*, 24(58), 349–402.
- Beuselinck, C., Markarian, G., & Verriest, A. (2021). Employee protection shocks and corporate cash holdings. *Journal of Corporate Finance*, 69, 102027.
- Bolton, P., & Scharfstein, D. S. (1990). A theory of predation based on agency problems in financial contracting. *The American Economic Review*, 80(1), 93–106.
- Bowman, R. G. (1979). The theoretical relationship between systematic risk and financial accounting variables. *The Journal of Finance*, 34(3), 617–630.
- Bradford, A., & Chilton, A. S. (2018). Competition law around the world from 1889 to 2010: The competition law index. *Journal of Competition Law & Economics*, 14(3), 393–432.
- Bryan, L. L., Fraser, J., Rall, W., & Oppenheim, J. (1999). *Race for the world: Strategies to build a great global firm*. Harvard Business Press.
- Bustamante, M. C., & Donangelo, A. (2017). Product market competition and industry returns. *The Review of Financial Studies*, 30(12), 4216–4266.
- Chang, H., Hall, C. M., & Paz, M. T. (2020). Suppliers' product market competition, customer concentration, and cost structure. *Journal of Management Accounting Research*. Forthcoming.
- Chen, C., Li, L., & Ma, M. L. Z. (2014). Product market competition and the cost of equity capital: Evidence from China. *Asia-Pacific Journal of Accounting & Economics*, 21(3), 227–261.
- Chen, H., Xing, L., & Zhou, H. (2019). Product market competition and audit fees: Evidence from an emerging market. *Asian Review of Accounting*, 28(1), 89–109.
- Cheng, P., Man, P., & Yi, C. H. (2013). The impact of product market competition on earnings quality. *Accounting and Finance*, 53(1), 137–162.
- Cheng, B., Ioannou, I., & Serafeim, G. (2014). Corporate social responsibility and access to finance. *Strategic Management Journal*, 35(1), 1–23.
- Cheung, J., Kim, H., Kim, S., & Huang, R. (2018). Is the asymmetric cost behavior affected by competition factors? *Asia-Pacific Journal of Accounting & Economics*, 25(1–2), 218–234.
- Chi, J., & Su, X. (2016). Product market threats and the value of corporate cash holdings. *Financial Management*, 45(3), 705–735.
- Chou, J., Ng, L., Sibilkov, V., & Wang, Q. (2011). Product market competition and corporate governance. *Review of Development Finance*, 1(2), 114–130.
- Danso, A., & Adomako, S. (2014). The financing behaviour of firms and financial crisis. *Managerial Finance*, 40(12), 1159–1174.
- Dasgupta, S., Li, X., & Wang, A. Y. (2017). Product market competition shocks, firm performance, and forced CEO turnover. *The Review of Financial Studies*, 31(11), 4187–4231.
- Datta, S., Iskandar-Datta, M., & Sharma, V. (2011). Product market pricing power, industry concentration and analysts' earnings forecasts. *Journal of Banking & Finance*, 35(6), 1352–1366.

- Datta, S., Iskandar-Datta, M., & Singh, V. (2013). Product market power, industry structure, and corporate earnings management. *Journal of Banking & Finance*, 37(8), 3273–3285.
- DeAngelo, H., DeAngelo, L., & Stulz, R. M. (2006). Dividend policy and the earned/contributed capital mix: A test of the life-cycle theory. *Journal of Financial Economics*, 81(2), 227–254.
- DeFond, M. L., & Park, C. W. (1999). The effect of competition on CEO turnover. *Journal of Accounting and Economics*, 27(1), 35–56.
- Demirgüç-Kunt, A., Peria, M. S. M., & Tressel, T. (2020). The global financial crisis and the capital structure of firms: Was the impact more severe among SMEs and non-listed firms? *Journal of Corporate Finance*, 60, 101514.
- Dhaliwal, D., Huang, S., Khurana, I. K., & Pereira, R. (2014). Product market competition and conditional conservatism. *Review of Accounting Studies*, 19(4), 1309–1345.
- Dickinson, V. (2011). Cash flow patterns as a proxy for firm life cycle. *The Accounting Review*, 86(6), 1969–1994.
- Djankov, S., La Porta, R., Lopez-de-Silanes, F., & Shleifer, A. (2008). The law and economics of self-dealing. *Journal of Financial Economics*, 88(3), 430–465.
- Fama, E. F. (1980). Agency problems and theory of the firm. *Journal of Political Economy*, 88(2), 288–307.
- Fee, C. E., & Hadlock, C. J. (2000). Management turnover and product market competition: Empirical evidence from the U.S. newspaper industry. *The Journal of Business*, 73(2), 205–243.
- Gaspar, J.-M., & Massa, M. (2006). Idiosyncratic volatility and product market competition. *Journal of Business*, 79(6), 3125–3152.
- Giroud, X., & Mueller, H. M. (2010). Does corporate governance matter in competitive industries? *Journal of Financial Economics*, 95(3), 312–331.
- Giroud, X., & Mueller, H. M. (2011). Corporate governance, product market competition, and equity prices. *The Journal of Finance*, 66(2), 563–600.
- Grenadier, S. R. (2002). Option exercise games: An application to the equilibrium investment strategies of firms. *The Review of Financial Studies*, 15(3), 691–721.
- Guney, Y., Li, L., & Fairchild, R. (2011). The relationship between product market competition and capital structure in Chinese listed firms. *International Review of Financial Analysis*, 20(1), 41–51.
- Guo, Y., Jung, B., & Yang, Y. S. (2019). On the nonlinear relation between product market competition and earnings quality. *Accounting and Business Research*, 49(7), 818–846.
- Habib, A., & Hasan, M. M. (2019). Corporate life cycle research in accounting, finance and corporate governance: A survey, and directions for future research. *International Review of Financial Analysis*, 61, 188–201.
- Hamada, R. S. (1972). The effect of the firm's capital structure on the systematic risk of common stocks. *The Journal of Finance*, 27(2), 435–452.
- Hansen, H., & Rand, J. (2006). On the causal links between FDI and growth in developing countries. *World Economy*, 29(1), 21–41.
- Harjoto, M. A. (2017). Corporate social responsibility and degrees of operating and financial leverage. *Review of Quantitative Finance and Accounting*, 49(2), 487–513.
- Hartman, R. (1972). The effects of price and cost uncertainty on investment. *Journal of Economic Theory*, 5(2), 258–266.
- Hasan, M. M., Hossain, M., Cheung, A., & Habib, A. (2015). Corporate life cycle and cost of equity capital. *Journal of Contemporary Accounting & Economics*, 11(1), 46–60.
- Haw, I.-M. G., Ho, S. S. M., Li, Y., & Zhang, F. (2015). Product market competition, legal institutions, and accounting conservatism. *Journal of International Accounting Research*, 14(2), 1–39.
- Haw, I.-M., Hu, B., & Lee, J. J. (2015). Product market competition and analyst forecasting activity: International evidence. *Journal of Banking & Finance*, 56, 48–60.
- He, W. (2012). Agency problems, product market competition and dividend policies in Japan. *Accounting and Finance*, 52(3), 873–901.
- Hoberg, G., Phillips, G., & Prabhala, N. (2014). Product market threats, payouts, and financial flexibility. *The Journal of Finance*, 69(1), 293–324.
- Holzhammer, M., Krishnan, R., & Mahlendorf, M. D. (2015a). The impact of changes in regulation on cost behavior. *Contemporary Accounting Research*, 32(2), 534–566.
- Holzhammer, M., Krishnan, R., & Mahlendorf, M. D. (2015b). Unraveling the black box of cost behavior: An empirical investigation of risk drivers, managerial resource procurement, and cost elasticity. *The Accounting Review*, 90(6), 2305–2335.
- Hou, K., & Robinson, D. T. (2006). Industry concentration and average stock returns. *The Journal of Finance*, 61(4), 1927–1956.
- Imhof, M. J., Seavey, S. E., & Watanabe, O. V. (2018). Competition, proprietary costs of financial reporting, and financial statement comparability. *Journal of Accounting, Auditing & Finance*, 0148558X18814599, 1–29.
- Irvine, P. J., & Pontiff, J. (2008). Idiosyncratic return volatility, cash flows, and product market competition. *The Review of Financial Studies*, 22(3), 1149–1177.
- Jaroentitram, A., Yu, C. F., & Zurbrugg, R. (2020). Does market power discipline CEO power? An agency perspective. *European Financial Management*, 26(3), 724–752.
- Jensen, M. C., & Meckling, W. H. (1976). Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of Financial Economics*, 3(4), 305–360.
- Jiang, F., Kim, K. A., Nofsinger, J. R., & Zhu, B. (2015). Product market competition and corporate investment: Evidence from China. *Journal of Corporate Finance*, 35, 196–210.
- Johnstone, D. (2020). Fama's ratio and the effect of operating leverage on the cost of capital under CAPM. *Abacus*, 56(2), 268–287.
- Kahl, M., Lunn, J., & Nilsson, M. (2014). *Operating leverage and corporate financial policies*. University of Colorado, Working Paper.
- Kallapur, S., & Eldenburg, L. (2005). Uncertainty, real options, and cost behavior: Evidence from Washington state hospitals. *Journal of Accounting Research*, 43(5), 735–752.
- Kao, L., & Chen, A. (2013). How product market competition affects dividend payments in a weak investor protection economy: Evidence from Taiwan. *Pacific-Basin Finance Journal*, 25, 21–39.
- Karnani, A. (1984). The value of market share and the product life cycle—A game-theoretic model. *Management Science*, 30(6), 696–712.
- Karpuz, A., Kim, K., & Ozkan, N. (2020). Employment protection laws and corporate cash holdings. *Journal of Banking & Finance*, 113, 105705.
- Karuna, C. (2007). Industry product market competition and managerial incentives. *Journal of Accounting and Economics*, 43(2), 275–297.
- Knyazeva, A., & Knyazeva, D. (2012). Product market competition and shareholder rights: International evidence. *European Financial Management*, 18(4), 663–694.

- Ko, H.-C. A., Tong, Y., Zhang, F., & Zheng, G. (2016). Corporate governance, product market competition and managerial incentives: Evidence from four Pacific Basin countries. *Pacific-Basin Finance Journal*, 40, 491–502.
- Kubick, T. R., Lynch, D. P., Mayberry, M. A., & Omer, T. C. (2015). Product market power and tax avoidance: Market leaders, mimicking strategies, and stock returns. *The Accounting Review*, 90(2), 675–702.
- Kulchania, M. (2016). Cost structure and payout policy. *Financial Management*, 45(4), 981–1009.
- La Porta, R., Lopez-de-Silanes, F., Shleifer, A., & Vishny, R. (2000). Investor protection and corporate governance. *Journal of Financial Economics*, 58(1–2), 3–27.
- La Porta, R., Lopez-de-Silanes, F., & Shleifer, A. (2008). The economic consequences of legal origins. *Journal of Economic Literature*, 46(2), 285–332.
- Laksmiana, I., & Yang, Y. W. (2015). Product market competition and corporate investment decisions. *Review of Accounting and Finance*, 14(2), 128–148.
- Lan, Y., & Wang, N. (2004). *Investor protection and investment*. University of Rochester, Working Paper.
- Lemma, T. T., Negash, M., Mlilo, M., & Lulseged, A. (2018). Institutional ownership, product market competition, and earnings management: Some evidence from international data. *Journal of Business Research*, 90, 151–163.
- Lerner, A. P. (1934). The concept of monopoly and the measurement of monopoly power. *The Review of Economic Studies*, 1(3), 157–175.
- Lev, B. (1974). On the association between operating leverage and risk. *Journal of Financial and Quantitative Analysis*, 9(4), 627–641.
- Leventis, S., Weetman, P., & Caramanis, C. (2011). Agency costs and product market competition: The case of audit pricing in Greece. *The British Accounting Review*, 43(2), 112–119.
- Li, W. L., & Zheng, K. (2017). Product market competition and cost stickiness. *Review of Quantitative Finance and Accounting*, 49(2), 283–313.
- Li, X. (2010). The impacts of product market competition on the quantity and quality of voluntary disclosures. *Review of Accounting Studies*, 15(3), 663–711.
- MacKay, P., & Phillips, G. M. (2005). How does industry affect firm financial structure? *The Review of Financial Studies*, 18(4), 1433–1466.
- Mahoney, P. G. (2001). The common law and economic growth: Hayek might be right. *The Journal of Legal Studies*, 30(2), 503–525.
- Maksimovic, V. (1988). Capital structure in repeated oligopolies. *The Rand Journal of Economics*, 19(3), 389–407.
- Mandelker, G. N., & Rhee, S. G. (1984). The impact of the degrees of operating and financial leverage on systematic risk of common stock. *Journal of Financial and Quantitative Analysis*, 19(1), 45–57.
- Manne, H. (1965). Mergers and the market for corporate control. *Journal of Political Economy*, 73(2), 110–120.
- Markarian, G., & Santalo, J. (2014). Product market competition, information and earnings management. *Journal of Business Finance & Accounting*, 41(5–6), 572–599.
- Mccombie, J. S. L., & Thirlwall, A. P. (1994). The balance-of-payments constraint as an explanation of international growth rate differences. In *Economic growth and the balance-of-payments constraint* (pp. 232–261). Palgrave Macmillan.
- Miller, D., & Friesen, P. H. (1980). Momentum and revolution in organizational adaptation. *Academy of Management Journal*, 23(4), 591–614.
- Miller, D., & Friesen, P. H. (1984). A longitudinal study of the corporate life cycle. *Management Science*, 30(10), 1161–1183.
- Novy-Marx, R. (2011). Operating leverage. *Review of Finance*, 15(1), 103–134.
- O'Brien, T. J., & Vanderheiden, P. A. (1987). Empirical measurement of operating leverage for growing firms. *Financial Management*, 16(2), 45–53.
- Peress, J. (2010). Product market competition, insider trading, and stock market efficiency. *The Journal of Finance*, 65(1), 1–43.
- Pindyck, R. S. (1991). Irreversibility, uncertainty, and investment. *Journal of Economic Literature*, 29(3), 1110–48.
- Porter, M. E. (1980). Industry structure and competitive strategy: Keys to profitability. *Financial Analysts Journal*, 36(4), 30–41.
- Quinn, R. E., & Cameron, K. (1983). Organizational life cycles and shifting criteria of effectiveness: Some preliminary evidence. *Management Science*, 29(1), 33–51.
- Rubinstein, M. E. (1973). A mean-variance synthesis of corporate financial theory. *The Journal of Finance*, 28(1), 167–181.
- Ryu, D. (2019). The US–Korea free trade agreement as a shock to product market competition: Evidence from the Korean stock market. *Finance Research Letters*, 35, 101296.
- Schmutzler, A. (2013). Competition and investment—A unified approach. *International Journal of Industrial Organization*, 31(5), 477–487.
- Shleifer, A., & Vishny, R. W. (1997). A survey of corporate governance. *The Journal of Finance*, 52(2), 737–783.
- Showalter, D. (1999). Strategic debt: Evidence in manufacturing. *International Journal of Industrial Organization*, 17(3), 319–333.
- Stigler, G. (1958). The economics of scale. *Journal of Law and Economics*, 1, 54–71.
- Stock, J. H., & Yogo, M. (2005). Testing for weak instruments in linear IV regression. D. W. K. Andrews & J. H. Stock (Eds.), *Identification and inference for econometric models, essays in honor of thomas rothenberg* (pp. 80–108). Cambridge University Press.
- Valta, P. (2012). Competition and the cost of debt. *Journal of Financial Economics*, 105(3), 661–682.
- Wang, T. (2019). Product market competition and efficiency of corporate tax management. *Asian Review of Accounting*, 27(2), 247–272.
- Wernerfelt, B. (1985). The dynamics of prices and market shares over the product life cycle. *Management Science*, 31(8), 928–939.
- Yuequan, W., & Chui, A. C. W. (2015). Product market competition and audit fees. *Auditing: A Journal of Practice & Theory*, 34(4), 139–156.

AUTHOR BIOGRAPHIES

Md. Babar (deceased) was a doctoral student at the School of Accountancy, Massey University, Auckland, New Zealand. He was working on the consequences of product market competition as an external corporate governance mechanism in an international context. His work has been published in *International Review of Financial Analysis*.

Ahsan Habib is a Professor of Financial Accounting at Massey University, Auckland, New Zealand. His areas of main research interest include but are not limited to capital market-based accounting research, the interface between corporate governance and accounting information, audit quality, corporate finance, and corporate social responsibility.

How to cite this article: Babar, M. d., & Habib, A. (2022). Product market competition and operating leverage: International evidence. *Journal of Corporate Accounting & Finance*, 33, 189–216. <https://doi.org/10.1002/jcaf.22558>

APPENDIX

Definition of variables

Variable	Definition	Sources
Dependent variable		
OPLEV	Operating leverage proxy following Kulchania (2016), measured by the sensitivity of the growth in operating costs to growth in sales. OPLEV is multiplied by -1 . See Section 4.3 for measurement of OPLEV.	Thomson Reuters Fundamentals, own calculation
Independent variables		
HH	Herfindahl-Hirschman index, measured by the sum of the squares of market shares of firms in terms of country-year-industry. HH index is multiplied by -1 .	Thomson Reuters Fundamentals, own calculation
IPCM	Industry-adjusted price cost margin represents a firm's ability to set the price of its products above its marginal cost. IPCM is multiplied by -1 . For detail see Section 4.2.	Thomson Reuters Fundamentals, own calculation
Firm-fundamental controls		
SIZE	Natural logarithm of total assets.	Thomson Reuters Fundamentals
MTB	Market to book value calculated as the market value of equity divided by common shareholder's equity.	Thomson Reuters Fundamentals
ROA	Return on Assets, calculated as net income after preferred dividends divided by total assets.	Thomson Reuters Fundamentals
LEV	Leverage ratio calculated as the sum of short-term debt, the current portion of long-term debt, and long term debt, divided by total shareholders' equity.	Thomson Reuters Fundamentals
SALE_GR	Sales growth, calculated as (revenue – lagged revenue)/lagged revenue.	Thomson Reuters Fundamentals
R&D	Research & development expenses calculated as research & development expense divided by total assets. The missing R&D values are set to zero.	Thomson Reuters Fundamentals
TANGIBILITY	Asset tangibility calculated as net property, plant and equipment divided by total assets.	Thomson Reuters Fundamentals
Country-level control variables		
GDP	Natural logarithm of gross domestic product per capita (U.S. dollars).	International Monetary Fund
INFL	Inflation (GDP deflator, annual %) indicates inflation as measured by the annual growth rate of the GDP with implicit deflator shows the rate of price change in the economy as a whole. It is then divided by 100.	World Bank
FDI	Net foreign direct investment current US\$/ GDP (current US\$).	World Bank
LEGOR	An indicator variable coded 1 for common law countries, and 0 otherwise.	La Porta et al. (2008)
INV_PRO	Investors' protection, scores are obtained from anti-self-dealing index. Higher values indicate higher invertors' protection.	Djankov et al. (2008)

(Continues)

Variable	Definition	Sources
Moderating variables		
INV_INT	Investment intensity, calculated as capital expenditures divided by total assets.	Thomson Reuters Fundamentals
EPL	Employment protection legislation score is calculated as average of strictness of employment protection-individual & collective dismissal; and strictness of employment protection-temporary contracts. Higher values indicate higher employment protection.	OECD website
LC_1	Firm life cycle, defined by Dickinson (2011). Five life-cycle stages are: (i) Introduction: if CFO < 0, CFI < 0, and CFF > 0; (ii) Growth: if CFO > 0, CFI < 0, and CFF > 0; (iii) Mature: if CFO > 0, CFI < 0, and CFF < 0; (iv) Decline: if CFO < 0, CFI > 0, and 0 > = CFF > = 0; and (v) Shakeout: the remaining firm-years. Where CFO is cash flow from operating activities, CFI is cash flow from investment activities, CFF is cash flow from financing activities.	Thomson Reuters Fundamentals
LC_2	Firm life cycle, defined by DeAngelo et al. (2006), calculated as retained earnings/total assets.	Thomson Reuters Fundamentals