MICHAEL LEE-CHIN & FAMILY INSTITUTE
FOR STRATEGIC BUSINESS STUDIES

Pricing Power:

Measures, Trends and Influences on Firm Value

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Acknowledgements

The authors thank Vinay Kanetkar and Michael Cipriano for their insights and valuable suggestions.

DeGroote School of Business — Education with Purpose | McMaster University

January 31, 2021

Abstract

Pricing power is highly prized by investors, pursued by managers and almost totally ignored by marketing academics. One potential reason may be a lack of validated measures of pricing power. In this study, we examine two pricing power metrics: a new enterprise-level measure of price elasticity and the industry-adjusted Lerner Index. Both measures can be estimated across companies and time from readily available financial data. The enterprise-level estimates of price elasticity are consistent with those reported in meta-analyses of results from product-market level models. We find that the average absolute price elasticity for publicly held firms in the US has been increasing (becoming more negative) since the late 1980's. In contrast, the average Lerner Index (across industries) has been increasing over the same period. Therefore, pricing power for publicly held firms appears to be both increasing and decreasing over time. Finally, we show that both measures of pricing power have positive effects on firm value through their influence on future cash flows and cash flow variability.

1. Introduction

Pricing power is a most curious concept. On the one hand, it is a trait highly desired in any business. Renowned investor Warren Buffet famously stated, "*The single most important decision in evaluating a business is pricing power. If you've got the power to raise prices without losing business to a competitor, you've got a very good business. And if you have to have a prayer session before raising the price by 10 percent, then you've got a terrible business*" (quoted in Frye and Campbell, 2011). Since this quote came from the "Oracle of Omaha," numerous books on firm valuation have highlighted the importance of investing in businesses with pricing power (e.g., Arnold 2012; Damodaran 2016; Eide, Cunningham, and Hargreaves 2016; Shroff 2017). As competitive pressures mount, firms lacking pricing power will find themselves unable to raise or even maintain prices, resulting in downward pressure on margins, earnings and stock prices.

Despite the obvious importance of pricing power, existing research on this topic is primarily conceptual, with very few studies focusing on practical aspects of pricing power. Conceptually, pricing power (and its related construct of market power) has been extensively examined in the economics literature (Lerner 1934; Landes and Posner 1981; Gaspar and Massa 2006; Peress 2010). In contrast, most of the popular business press on the subject is quite recent (D'Aveni 2010; Smith 2016), reflecting the growing managerial concerns about a perceived erosion in pricing power in today's competitive context. Furthermore, surveys of executives and managers, find that most believe their businesses have limited pricing power (Simon-Kucher 2011; Tacke, Vidal and Ehrhardt 2013; Simon-Kucher 2017).

However, the proposition that firms, in general, are experiencing a decrease in pricing power is contradicted by some recent evidence. For instance, an erosion in pricing power should lead to lower profit margins and reduced earnings with a corresponding loss in value of the firm to investors. Nevertheless, the sustained rise in the U.S. stock market that started in 2009 has resulted in historic record highs for the Dow Jones Industrial Average and the S&P 500. As a matter of fact, in August 2018, Apple became the first-ever trillion-dollar firm by market capitalization. Moreover, U.S. macroeconomic data suggests that the market power of large firms has been growing steading for the past 40 years (Eggertsson, Robbins and Wold 2018).

Given the focus of investors, top executives and marketing managers on pricing power, there is a clear need to better understand this important managerial construct. First, how can pricing power be measured? Various measures of pricing power have been proposed in both the economic and business literatures, as well as in the popular business press. What is needed are measures that are objective and generalizable across companies. Second, is pricing power a dichotomous construct (i.e., present versus absent or high versus low) or is it a more nuanced continuous construct? Finally, how does pricing power impact the value of a company? This study provides some preliminary insights to these important questions.

We develop a conceptual framework to illustrate potential antecedents and consequences of pricing power, and also to inform us about measurement of pricing power. We distinguish between supply-side (usually industry-wide), and demand-side (often associated with individual firms) antecedents of pricing power. Furthermore, we measure pricing power along two separate dimensions. We proxy pricing power as the firm's ability to charge a price above its marginal cost (Lerner 1934). However, as noted (Greer 1980), this measure of exercised market power is static. Therefore, we also propose to measure pricing power as the firm's ability to increase prices without substantially reducing demand, reflecting Warren Buffett's description of pricing power, i.e., price elasticity. Finally, the consequences of pricing power (i.e., Lerner index or price-elasticity), are realized in how it influences the firm's future cash flow level, growth, variability and residual value, the determining elements of firm value (Srivastava, Shervani and Fahey 1998).

A second contribution of this research is the operationalization of the two proposed measures of pricing power and their estimation across a broad number of firms and industries over a long span of time. For the first measure of pricing power, we follow the extant literature (Gaspar and Massa 2006; Peress, 2010; Datta, Iskandar-Datta and Sharma, 2011), and estimate an industry-adjusted version of the Lerner index which controls for cross-sectional variation in margins. For the second measure of pricing power, we follow the method suggested by Kanetkar (2012), and estimate firm-level price elasticities.

Using publicly available accounting data, we validate these measures of pricing power for 20,000+ public companies, for the years 1976 through 2016 in multiple ways. We test for previously documented cross-sectional variations in the estimated pricing power measures (e.g., pharmaceuticals versus other non-durable manufacturers) as well as compare the distribution of the firm-level price elasticities with those estimated using product-market data (Tellis 1988; Bijmolt et al. 2005). Our analyses demonstrate that the two proposed measures of pricing power represent distinct and largely separate sub-dimensions of pricing power, and should be interpreted as singular (and continuous) constructs. Finally, we empirically demonstrate that both proposed measures of pricing power are positively associated with firm value, via their impact on future cash flow growth and cash flow variability (Srivastava, Shervani and Fahey 1998; Gruca and Rego 2005; Bayer, Tuli and Skiera 2017).

For managers, this research proposes and estimates two value-relevant measures of pricing power that can be used for firm valuation, benchmarking, evaluation of competitors, assessment of merger outcomes, and other valuation assessments. Our longitudinal analyses provides empirical evidence supporting both perspectives regarding the evolution of pricing power. On one hand, our findings suggest that on average, firms' ability to command prices higher than their marginal costs has steadily increased over time and is higher than ever, and provides empirical evidence supporting the currently observed firm valuations. On the other hand, our findings also indicate that the average (absolute) price-elasticity has steadily increased (i.e., became more negative) after 1985, suggesting that customers are increasingly more price sensitive. Therefore, and despite the ability to charge prices above marginal cost, firms are finding it increasingly difficult to raise prices without significantly reducing demand. This seemingly paradoxical trade-off certainly has important implications for competitive advantages and firm valuations.

This paper is organized as follows. First, we develop a conceptual framework of the antecedents and consequences of pricing power, and leverage it to inform us on the proposed measures of pricing power. In the empirical section, Study 1 describes the sampling framework, measures and methodological approach used to estimate and validate the two proposed firm-level measures of pricing power. In the subsequent Study 2, we examine the effect of the proposed pricing power measures on firm value, by empirically testing the association between pricing power, and future cash flow growth and cash flow variability. Next, we discuss this study's findings and present implications for theory and practice. Finally, we identify potential limitations and provide guidance on directions for future research.

2. A Conceptual Framework of Pricing Power

Conceptually, pricing power is related to the construct of market power. The industrial organization literature formally defines market power as, "the ability of a firm (or group of firms) to raise and maintain price above the level that would prevail under competition," (Khemani and Shapiro 1993). Overall, the industrial organization economics view of market power is generally negative, since, in their assessment, it results in, "reduced output and loss of economic welfare" (Khemani and Shapiro 1993). Market power is considered to be the outcome of a combination of specific industry structural characteristics that result in a competitive context that is distinct from perfect competition. These include number of competitors, product differentiation, or barriers to entry, and are often classified as influencing supply, demand or both (Greer 1980). Consequently, most of the structural conditions that lead to market power, are also antecedents of pricing power, via their influence on supply, demand or both. Importantly, some of these structural characteristics are likely to be influenced by the marketing function – e.g., product differentiation, while others – e.g., growth or firm size, are clearly outside the marketing sphere. Our proposed conceptual framework leverages structural characteristics that can be influenced by the marketing function. Figure 1 summarizes the general conceptual framework on the determinants, manifestations and consequences of pricing power. In the remainder of this section, we conceptually summarize the determinants and consequences of pricing power, discuss the rationale for the two proposed pricing power constructs, and present measurement details for the two pricing power measures.

Antecedents of Pricing Power

The factors that influence pricing power can be categorized as those that primarily influence supply and those whose primary effect is on demand. Prior research on pricing power suggests that three major trends: regulatory change, globalization and technological innovation have had a profound effect on firm-level pricing power in the last 50 years.

Deregulation: Due to its influence on the entry of new competitors, deregulation is an often-studied factor associated with decreased pricing power. The wave of deregulation initiated in the 1970's brought new competitors into many industries including airlines, banking, entertainment, telecommunications, trucking and utilities (Andrade, Mitchell, and Stafford 2001). Empirical studies show that, after deregulation, pricing power fell significantly in the airline, electricity, natural gas and telecommunications industries (Gaspar and Massa 2006).

Globalization: Similarly, globalization has been identified as a (more) recent trend contributing to the erosion of pricing power (Mourdoukoutas 2011). While globalization may have accelerated in recent years, U.S. firms have been facing increasing competition from international companies for more than 50 years. For example, using data from 1964-2004, Levine and Pontiff (2009) document a seven-fold increase in the overall share of industry sales going to imports. However, for multinational corporations, globalization can increase their pricing power by allowing them to reach broader consumer bases and leverage economies of scale. Transnational corporations can also enjoy more pricing power under globalization by reducing costs with lower wages (e.g., outsourcing) and lower corporate taxes through innovative tax strategies (Mayer-Foulkes, 2015). Consequently, the overall impact of globalization on pricing power is likely to be context dependent.

Technological Innovation: Both theoretical models (Färe, Grosskopf, and Trembla, 2012) and industry case studies (Christensen 1997) show that technological change influences pricing power. However, the direction of the effect is often unclear. For instance, while technology disruptors tend to gain pricing power, their offerings also tend to extend beyond the low end of the market, where pricing power may not persist. Furthermore, the internet has recently been singled out for its impact on pricing power erosion. For instance, e-commerce can reduce barriers to entry, expand demand and create competition, all of which are likely to result in reduced pricing power. In addition, the very nature of the internet experience is likely to influence pricing power. Internet-based search enables consumers to compare prices easily across multiple e-commerce sites. Overall, existing theories suggest that broad-based reductions in consumer search costs lead to lower prices and reduced profits for both on-line (Bakos 1997) and off-line (Pan, Shankar and Ratchford 2002) sellers. Writing in the Harvard Business Review, Sinha (2000) suggested that, "*the Internet represents the biggest threat thus far to a company's ability to brand its products, extract price premiums from buyers, and generate high profit margins.*"

Given these changes in supply factors are generally in the direction of reduced pricing power, it is not surprising that executives feel pricing power has been eroding over time (e.g., D'Aveni 2010). A benchmark study of more than 3,900 executives found that about 65% believed their firms had low pricing power – i.e., inability to charge the prices commensurate with value delivered to customers (Simon-Kucher and Partners 2011). A subsequent study also found that, "The vast majority of companies feel they can't justify a price increase above current levels of inflation. Even when they dare to raise prices at all, they manage to get only half of what they ask for" (Tacke, Vidal and Ehrhardt 2013). Finally, in a more recent study, about 75% of surveyed executives reported increased pricing pressure in the past 2 years (Simon-Kucher and Partners 2017).

However, companies are not completely at the mercy of the potentially detrimental changes in supply factors. There are multiple demand-based factors that can result in increased pricing power. For example, Datta, Iskandar-Datta and Sharma (2011: 1354) contend that, "*Uniqueness and superiority of product lines or a strong brand name are the hallmarks of strong pricing power and competitive advantage.*" Furthermore, "*intra-industry product differentiation can affect the price elasticity of demand faced by a specific firm, regardless of the industry* *structure in which it operates.*"

Therefore, a firm's pricing power may arise from a reputation for high quality, a strong brand name, or a strong relationship with its customers. Past research has shown that each of these factors influences price elasticity (or the related concept of "willingness to pay") Moreover, the effects of these advantages extend past the initial purchase occasion. Delayed effects show up in the form of increased brand loyalty and reduced sensitivity to competitor pricing (Aaker 1991). Firm with loyal customers can command higher prices - after any initial promotional deals expire - without fear of losing those customers (Reichheld 1996). In addition, multiple studies (Anderson 1996; Homburg, Koschate and Hoyer 2005) suggest that more satisfied customers are less price sensitive. For the firm, this suggests that those able to increase satisfaction will reduce their customers' sensitivity to price, leading to greater pricing power.

Economists often focus on the role of vertical integration in creating and raising entry barriers. By vertically integrating, incumbent firms increase the capital costs for entrants who have to invest in all stages of the value chain to compete (Stuckey and White 1993). Thus protected from new competitors, the incumbent firms can exploit their market power, leading to higher returns. An absolute cost advantage may be realized through vertical control of scarce raw materials (Porter 1980). Here, market power may be firm specific rather than shared by multiple incumbents.

Marketing managers may choose forward integration in an effort to legally control retail prices. For many decades, vertical restrictions on prices (resale price maintenance) were considered per se illegal, although that view is changing (Nagle and Holden 2002). To avoid scrutiny by regulators, a manufacturer of high quality, high priced goods may restrict their distribution to owned retail outlets. This strategy eliminates ruinous price competition that can lead to commoditization and depressed margins. However, this approach has its own risks including limited market access / growth opportunities and high levels of additional investment if the company uses brink-and-mortar stores.

A riskier strategy involves announcing a price at which a given product must be resold. Retailers who fail to comply will lose the opportunity to sell the product. So long as there is no formal agreement on resale price maintenance, such an approach may be legal (Nagle and Holden 2002). However, its success lies in the relative power of the manufacturer in the relationship with the retailer. If the products in question are a high proportion of a retailer's business and there are few acceptable substitutes, such agreements might result in the desired maintenance of both retailer and manufacturer margins. Otherwise, the retailer might defect to another supplier or simply ignore the announced price and risk losing access to the given products.

Consequences of Pricing Power

Pricing power is considered a key determinant of a firm's financial performance since it is often associated with higher profit margins. Recent surveys confirm that firms with high pricing power reported average profit margins (3-year EBIDTA) that are 25% - 33% higher than those without pricing power (Simon-Kucher and Partners 2011, 2017). While these survey findings are compelling, the determination of whether a firm has pricing power is self-reported. Respondents from firms with higher profit margins infer pricing power to be the reason behind their superior performance when other factors, e.g., lower cost supply, are present.

The business press identifies multiple mechanisms through which pricing power impacts firm performance – i.e., higher prices, higher profit margins, ability to charge the price that the firm "deserves," lower price elasticity, etc. While some of the proposed mechanisms are realized in the product-marketplace, other mechanisms can only be observed on the firm's quarterly financial-accounting statements. Ultimately, for pricing power to be useful for practitioners and relevant for academics, it should have a significant and demonstrable effect on firm value. However, the extant empirical research has only partially demonstrated such association.

Conceptually, researchers have used analytical models to investigate the effect of pricing power on firm value primarily through the lens of price elasticity. For instance, Booth (1981) models the association between the price elasticity of demand and the firm's cost of capital. The study shows that firms with lower price elasticity of demand will have lower cost of capital. Similarly, Conine (1983) demonstrates that a firm's market-to-book ratio increases as the price elasticity of demand decreases. Furthermore, Peress (2010) shows that firms facing less elastic demand for their products have less volatile profits, resulting in increased stock liquidity and lower stock returns volatility, and increased stock value.

The empirical research focused on cross-sectional (intra-firm) differences in pricing power and its effects on contemporaneous measures of volatility, trading volume and liquidity. For instance, Gaspar and Mass (2006), find that pricing power is associated with reduced idiosyncratic volatility in profits and increased stock returns. Peress (2010) shows that pricing power is associated with increased trading volume, while Kale and Loon (2011) establish an association between pricing power and increased stock liquidity. Although individually, each of these factors is related to firm value, a direct association between pricing power and firm value has yet to be demonstrated. To establish that pricing power is positively associated with firm value, it is critical to demonstrate that pricing power can favorably shape various aspects of future cash flows, i.e., their growth and variability. These are crucial "*building blocks*" of firm valuation (Srivastava, Shervani and Fahey 1998).

This raises the question of why and how pricing power should shape a firm's future cash flows. With respect to enhancing future cash flows levels, the relationship is straight forward – if pricing power results in higher margins, then future cash flow level will be higher. Future cash flow growth is a consequence of the antecedents of pricing power. For instance, as noted earlier, increased customer satisfaction leads to reduced price sensitivity, so repeat customers often pay more than new ones. Similarly, satisfied customers provide positive word-of-mouth advertising, bringing in new buyers without additional effort and expense on the part of the company (Anderson 1998; Lee, et al., 2006; Reichheld 1996; Wangenheim and Bayón 2007). Both of these effects are likely to boost future cash flows continuously, resulting not only in increased cash flow level, but also in increased cash flow growth – i.e., continuously.

Multiple sources are also responsible for the reduction in future cash flow volatility. Peress (2010) shows that firms with higher pricing power are better able to absorb unexpected supply shocks (e.g., an oil crisis) by passing on more of the additional costs to consumers. Furthermore, brand equity theory (Aaker 1991) suggests that the enduring effects on loyalty and reduced price sensitivity moderates the impacts of competitor actions on a firm's customers (Aaker 1991). This insulation from competitor actions is also consistent with the research on customer satisfaction (Fornell et al 1996).

Finally, the residual value of a firm is proportional to the size and quality of its future cash flows (Srivastava, Shervani and Fahey 1998). Firms whose offerings incorporate switching costs are likely to enjoy higher pricing power as well as larger customer bases. Consequently, pricing power based on brand equity and/or customer satisfaction will result in a customer base that is more loyal, more willing to pay premium prices, less susceptible to competitor's actions, more disposed to try new products from the firm and recommend them to others. All of these outcomes are likely to enhance the size and quality of the firm's future cash flows, thus resulting in a higher residual value.

Defining Pricing Power

Despite the widespread concerns that managers have regarding the real or perceived erosion in pricing power, relatively little academic research exists on the topic. One factor that might explain the paucity of studies is the wide variety of definitions of "pricing power" put forth by the business press, consultants and investment advisors. For instance, while some define pricing power as the ability to raise prices faster than inflation (Eide, Cunningham, and Hargreaves 2017), others suggest it to be the firm's ability to charge the (premium) price that it desires (Simon 2015: 24-25). Additionally, some authors defend that pricing power exists when a firm can set prices such that competitor(s) actions have no impact on the focal firm's demand (Smith, 2016: 67). Yet, others suggest that pricing power is largely determined by a firm's dependence on a small number of customers. For example, a firm that sells a large proportion of its volume through Wal-Mart has significantly reduced pricing power (Janjigian, Horan, and Trzcinka 2011).

In contrast, while economists have a clear description of market power, their problem lies in measurement. To illustrate, consider Khemani and Shapiro (1993) who state that: "Although a precise economic definition of market power can be put forward, the actual measurement of market power is not straightforward. One approach that has been suggested is the Lerner Index, i.e., the extent to which price exceeds marginal cost. However, since marginal cost is not easy to measure empirically, an alternative is to substitute average variable cost. Another approach is to measure the price elasticity of demand facing an individual firm since it is related to the firm's price-cost (profit) margin and its ability to increase price. However, this measure is also difficult to compute." This discussion suggests that a firm's market power is manifested in two measures: the Lerner Index and price elasticity of demand.

These two indicators of market power are, not coincidentally, the underpinnings of the formal definition of pricing power from Black's Law Dictionary (1968):

> "*Pricing Power: The company's ability to raise the price of a product without affecting its demand. A company that produces a product that is unique or faces little competition has high pricing power.*"

From the above definition, one can first conclude that a firm's pricing power is made manifest in the elasticity of demand for its products, consistent with Warren Buffett's definition. Second, the level of competition faced by the firm is reflected in its Lerner Index, which compares a firm's margin structure to that expected under perfect competition. Therefore, we will employ these two measures – the Lerner Index and price elasticity of demand – as measures of a firm's pricing power[1].

One might question the need for two separate measures of pricing power. However, looking at discussions in economics and law, we see that both aspects of pricing power – elasticity and price-cost margins – are present. More important, these measures have different properties. Economists consider the Lerner Index to be a static indicator (Greer 1980: page) while the measurement of price elasticity requires change suggesting that it is more dynamic.

The need for separate measures is best illustrated in the disconnection between theory and empirics in the extant pricing power literature in finance. For example, all of the analytical results in the widely-cited Peress (2010) paper are driven by firm-level variations in the price elasticity of demand. However, all of the empirical results rely on the Lerner Index (price-cost

[1] It should be noted that these are reflective measures since we are not directly measuring the pricing power of a firm. Rather, these measures are reflection of the presence of pricing power.

margins) as the measure of pricing power. The argument for equating these two measures arises when firms experience unexpected cost shocks. Those with lower price elasticity (higher pricing power) are more able to pass along additional costs to their customers without a large reduction in sales revenue or margins. While this causal path linking elasticity to price-cost margins is compelling, its reverse is not necessarily true. In other words, a firm with a high Lerner index need not have low price elasticity of demand.

There are multiple sources of high price-cost margins in addition to low price elasticity. A firm may have high price-cost margins due to cost advantages related to scale or cumulative experience. A firm may also have an absolute cost advantage due to its access for low cost raw materials. Consider, for example, the state-owned oil company Aramco. Its costs for crude oil are the lowest in the world (Sergie 2019) suggesting that its price-cost margin is the highest among all oil companies. However, it does not have any power to increase the price its product commands in the open marketplace. Aramco can influence the overall world price for oil, which means it has market power. However, since it cannot charge a premium for its product, it has no pricing power.

At the same time, there are sectors of the economy where prices rise rapidly over long periods of time and, yet, operating margins do not expand over time. Economist William Baumol (2012) advanced a theory called, The Cost Disease," which suggests that costs of services such as health care, education, live performing arts, and other "personal services" are condemned to rise at a rate faster than the overall inflation rate for the foreseeable future. The source of cost disease is a combination of the inseparability of the service from a human service provider and a lack of productivity improvements due to technology. The inability of organizations to reduce the labor component of these services leads to higher and higher costs over time. In contrast, these so-called “stagnant sectors” are businesses engaged in manufacturing of automobiles, television sets, and computers. It must be noted that not all services are included in the stagnant sector. For example, telecommunications is clearly a service but also one where technology has resulted in a relentless lowering of the costs of communications over time.

The evidence presented to support Baumol’s conjectures are various time series of price indexes of various products and services. Comparing the growth in the price indexes for college tuition, physician services, legal services and the like to the overall CPI, Baumol (2012) seems to suggest that the observed rising prices in these sectors of the economy are due in large part to rising labor costs. Consequently, in these stagnant sectors, we have a situation wherein organizations are able to increase prices over time, which would appear to be consistent with having high pricing power. However, given that labor costs are also rising continuously, there will be little evidence of pricing power as indicated by the Lerner Index.

In conclusion, while the extant literature considers price elasticity and price-cost margins (Lerner Index) to be equivalent indicators of pricing power, they are separate and, depending on circumstances, independent measures of pricing power. We discuss each of these measures in detail next.

The Lerner Index

As noted above, market power is defined as the ability of a firm to set a price above marginal cost and earn a positive profit (Landes and Posner, 1981). Under perfect competition, firms are price takers. They cannot raise prices above marginal costs and profits are zero (Varian, 1992).

To measure market power, Lerner (1934) suggested using the ratio of margin (price minus marginal cost) to price[2]. The Lerner Index ranges from zero to one and has a monotonic relationship with market power. In perfectly competitive markets, the Lerner Index is zero.

In this study, we use industry-adjusted Lerner Index to measure pricing power, following recent work by Gaspar and Massa (2006), Peress (2010), and Datta, et al. (2011). One of the primary advantages of the industry-adjusted Lerner Index is that it isolates firm-level pricing power from industry-level differences in profit margins unrelated to differences in pricing power (Datta, et al. 2011).

Prior research in finance has used the industry-adjusted Lerner Index as a measure of intra-industry pricing power. Based on this measure, firms with higher pricing power have been shown to have lower idiosyncratic return volatility (Gaspar and Massa 2006), lower profit volatility (Gaspar and Massa 2006), higher trading volume (Peress 2010), and a lower dispersion of analysts' forecasts (Datta, Iskandar-Datta and Sharma 2011). These and other related studies (e.g., Kale and Loon 2011) aimed to explain the increase in idiosyncratic stock volatility that has been observed in recent decades (e.g., Gaspar and Massa 2006; Irvine and Pontiff 2009). Their basic premise – confirmed in several studies – is that the source of the increasing volatility in stock returns is tied to an increase in competition.

An alternative interpretation of this body of research is that higher pricing power results in increased firm value. In fact, Peress (2010) demonstrates that firms with higher pricing power are also characterized by higher liquidity. Since higher liquidity translates into lower cost of capital, firms with higher pricing power should also have higher valuations. However, none of these studies modeled the impact of pricing power on the growth or variability of <u>future</u> cash

[2] $LI = \frac{P-MC}{P}$, where LI is the Lerner Index, P is the firm's price and MC is marginal cost.

flows.

Price Elasticity of Demand

The extant academic research on pricing is large and highly relevant to managers (Monroe 2003). Within this body of literature is an active stream of research dedicated to calibrating market response functions using product-market level sales, pricing and other causal marketing data (Hanssens, Parsons, and Schultz 2003; Bowman and Gatignon 2010). One important outcome from this stream of research is a plethora of estimates of price elasticities, for a wide array of products, markets, countries and time-periods. The enduring importance of pricing research to both marketing theory and practice is demonstrated in two extensive meta-analyses, published almost two decades apart (Tellis 1988; Bijmolt et al. 2005).

Tellis (1988) examined 367 price elasticity estimates from 42 studies published between 1960 and 1985. The estimated mean price elasticity was -1.76 with a standard deviation of 1.74. This study also found that price elasticity differs significantly across product categories, the product life cycle, countries and estimation methods. Many years later, Bijmolt et al. (2005) examined 1,851 price elasticity estimated from an additional 81 studies published through 2004. This latter study offers additional insights on the variability of price elasticity across product life cycle and geographic location. Overall, the two meta-analyses provide benchmarks of price elasticity distribution that can be utilized to assess the face validity of any measure of price elasticity.

To assess price elasticity at the firm level, we introduce a new model based on Kanetkar's (2012) derivation of a construct known as the firm's "profit-price elasticity." The profit-price elasticity is defined as the percent change in profit with 1% change in price. Kanetkar's (2012) work was motivated by anecdotal suggestions that, for the average Fortune 1500 firm, a 1%

increase in price could result in a 7-11% increase in profits (Marn Roegner and Zawada 2004; Mohammed 2010). Such large increase in profits is based on an implicit assumption that the average firm's profit-price elasticity figure is zero, an assertion that Kanetkar's (2012) study failed to support. For the purposes of this study, we follow Kanetkar (2012) key finding that a firm's profit-price elasticity is influenced by its price elasticity of demand. In fact, these two constructs are inseparable as we discuss in our model formulation section.

Study Hypotheses

Focus on two key aspects of firm value: cash flow growth and variability (Gruca and Rego 2005; Bayer, Tuli and Skiera 2017).

Therefore, we propose the following hypotheses:

H_{1A}: Firm-level price elasticity will have a positive[3] effect on future cash flows.

H_{1B}: Industry-adjusted Lerner Index will have a positive effect on future cash flows.

In addition, the enduring effects on loyalty and reduced-price sensitivity should moderate the impacts of competitor actions on a firm's customers (Aaker 1991). This would mean that firms with higher levels of pricing power should have more stable cash flows over time. Consequently, we also propose the following hypotheses:

H_{2A}: Firm-level price elasticity will have a negative effect on future cash flow variability.

H_{2B}: Industry-adjusted Lerner Index will have a negative effect on future cash variability.

4. Empirical Analysis

The empirical analysis in this section contains two sequential studies to test the validity of our measures (Study 1) and their impact on firm value (Study 2).

[3] Since price elasticity tends to be negative, firms with higher magnitude of price elasticity will have lower future cash flows.

Study 1 serves as the foundation, in which we can test the validity and present the generalizability of our measures. In our first study, we are able to estimate the proposed measure of firm-level price elasticity and the Lerner Index for a very large sample: more than 20,000 publicly traded firms for the years 1976-2016.

In Study 2, our focus shifts from aggregate analysis to firm-level variations. For this reason, we use the industry-adjusted Lerner Index (Gaspar and Massa 2006; Peress 2010; Datta, et al. 2011) which removes industry level variations in margins. This measure compares the relative ability of firms within an industry to charge prices higher than marginal costs. We estimate the ability of these two measures of pricing power to shape cash flow level and variability - key determinants of firm value (Srivastava, Shervani and Fahey 1998; Gruca and Rego 2005; Bayer, Tuli and Skiera 2017). We restricted our second analysis to the period of 1987-2016 on 3980 companies. This ensured that public companies were reporting key financial measures used as control variables.

Study 1: Firm-Level Measures of Price Elasticity and Lerner Index

The main purpose of this study is to present and evaluate a method for estimating firm-level measures of price elasticity from income statement data. We also estimated the industry-adjusted Lerner Index values for the same firms and time period. The second objective is to examine longitudinal changes in these two measures of pricing power.

Estimation Methodology: Industry-Adjusted Lerner Index

Due to the lack of data on marginal costs, the firm's operating profit margin is as a proxy. It based on the assumption that average variable costs are equal to marginal costs (Lindenberg and Ross 1981, Carlton and Perloff 1989). The Lerner Index is thus computed as by:

(3) $$LI = \frac{Sales - COGS - XSGA}{Sales}$$

where: Sales are in revenues, COGS is costs of goods sold and XSGA is selling, general and administrative expenses. This approximation of the Lerner Index is regularly used in empirical finance research (e.g., Kale and Loon, 2011) as a measure of product market or pricing power.

In Study 2, our firm level measure of pricing power is the industry-adjusted Lerner Index (Gaspar and Massa 2006; Peress 2010; Datta, et al. 2011). It is computed as follows.

(4) $$LI_{w,i} = LI_i - \sum_{j=1}^{N} \omega_j \, LI_j$$

where $LI_{w,i}$ is the weighted Lerner index for firm i, LI_i is the Lerner Index for firm i as defined in Equation 3, ω_i is ratio of the sales of firm i to total industry sales, and N is the total number of firms in the industry.

Estimation Methodology: Price Elasticity

Recalling the relationship between price-profit elasticity and demand price elasticity (see Model 2) from Kanetkar (2012):

$$\Phi = \frac{Sales}{Profit}\left(1 + \eta \,(Margin)\right)$$

where, ϕ is the profit-price elasticity and η is the demand price elasticity.

Therefore, if we define R = *Sales/Profit* and M = *(Sales- Variable Cost)/Profit*, then,

(5) $$R = \phi - \eta M$$

Consequently, for each firm i at quarter q in year t,

(6) $$R_{iqt} = \phi_{iqt} - \eta_{iqt} M_{iqt}$$

where ϕ_{iqt} is the profit-price elasticity of firm *i* at quarter *q* in year *t*, and η_{iqt} is the demand price elasticity of firm *i* at quarter *q* in year *t*, If we assume $\phi_{iqt} \sim N(\phi_{it}, \sigma^2_{\phi it})$, $\eta_{iqt} \sim N(\eta_{it}, \sigma^2_{\eta it})$ for each firm i in year t, where $\phi_{it} = E(\phi_{iqt})$ is the average profit-price elasticity of firm *i* in year *t*, and $\eta_{it} = E(\eta_{iqt})$ is the average demand price elasticity of firm i in year t, then

(7) $R_{iqt} = \phi_{iq} - \eta_{iq} M_{iqt} + \epsilon_{iqt}$

where $\epsilon_{iqt} = \epsilon_{\phi iqt} - \epsilon_{\eta iqt}, \epsilon_{\phi iqt} \sim N(0, \sigma^2_{\phi it}), \epsilon_{\eta iqt} \sim N(0, \sigma^2_{\eta it})$.

A consistent finding of the price elasticity meta-analyses mentioned earlier (Tellis 1988; Bijmolt et al. 2005) is that price elasticity varies across industry sectors. Additionally, prior research using PIMS data (Hagerty, Carman and Russell 1998) pooled observations across companies to estimate pricing (and other) elasticities at the industry level. Therefore, we extend model (7) into a multi-level model. The first level of the multi-level estimation model is as follows:

(8A) $R_{istq} = \phi_{ist} - \eta_{ist} M_{istq} + \epsilon_{istq}$

where the sales to profit ratio R_{istq} is for firm i in industry sector s in t quarter q of year t. The term M_{istq} is the gross profit to operating profit ratio for the same firm, industry section, quarter and year. The term ϕ_{ist} is the profit-price elasticity of firm i in industry sector s at year t. Finally, and most important to this study, η_{ist} is the average price elasticity of firm i in industry sector s at year t. By adding another level to equation (8A), we obtain:

(8B) $\eta_{ist} = \beta_{st} + \epsilon_{ist}$

$\phi_{ist} = \beta'_{st} + \epsilon'_{ist}$

For this study, we define industrial sectors following NAICS industry-sector classification (U.S. Census 2017). Since contemporaneous price elasticities are expected to be similarly impacted by the economic environment, we obtain the following formulation:

(8C) $\beta_{st} = \beta_t + \epsilon_{st}$

$\beta'_{st} = \beta'_t + \epsilon'_{st}$

In summary, Model (8C) is a standard multilevel model, which is estimated from restricted maximum likelihood (REML) by applying functions in *R* package *lme4* (Bates, et al.2014).

Data Sources

To calibrate the model detailed above (Equations 3 through 8C), we used quarterly data items from Compustat. These measures included sales, cost of goods sold, selling and general and administrative expenses (item XSGA), or operation income before depreciation (item OIBDX) if XSGA is not reported. Other categories of capital and financing expenses (taxes, interest, amortization, depreciation, etc.) are not included. Our data covers the years 1976-2016. Our overall sample covers 22,206 publicly traded companies and 226,834 firm-year observations.

Findings

In Figure 1, we present the distribution of estimated price elasticities for the 226,834 firm-year observations in our data. The frequency distribution appears to be very similar to those presented in the published meta-analyses (Tellis 1988; Bijmolt, et al. 2005). All the curves are right skewed with long tail. The mean for our entire sample is -3.57 with a standard deviation of 1.41.

Using the 2017 NAICS industry sectors, we classified all our firms into 17 categories. The average industry-level price elasticities are presented in Table 1 (Tables and Figures follow Reference throughout).

Our results show that firms in the construction and wholesale trade industry sectors have the highest average price elasticities, reflecting lower pricing power. In contrast, companies in the information and educational services sectors have the lowest average price elasticity, indicative of higher pricing power. As a check on the face validity of these results, we compared the average price elasticity for firms in the pharmaceutical and medical manufacturing industry (-2.72, NAICS 3254) to the overall average of manufacturers of non-durable products (-3.60). As we would expect, the average elasticity is significantly lower ($t = -66.6$, $p < 0.000$) for products in the pharmaceutical/medical industry.

Additionally, we also examined deviations from mean price elasticity and Lerner Index (Equation 3), by industry. Figure 2 provides a graphical summary of these analyses. There are five industries whose price elasticities and Lerner Indices that indicate above average pricing power. Of these, three are services (Information, Finance & Insurance, Real Estate, Rental & Leasing, Arts, Entertainment & Recreation). The fourth is the most capital intensive of all: Mining and Logging. Conversely, several industries (i.e., Construction, Wholesale Trade, Accommodation & Food Services), display both price elasticities and Lerner Indices that represent below average pricing power (as does the catch-all Other category). Additionally, the remaining eight industries exhibit conflicting pricing power patterns for price elasticities versus Lerner Indices.

These analyses reveal several important findings: First, it confirms that the two pricing power measures are distinct and represent unique sub-dimensions of overall pricing power construct, since, for about half the industries, each metric indicates distinct (relative to average), pricing power. Second, these analyses also provide additional face validity for the proposed measures, since the two types of industries for which both metrics are consistent with increased pricing power, also benefit greatly from trends in deregulation, globalization, and technology. Furthermore, those industries where both measures are aligned with decreased pricing power are experiencing the downside of technological change, such as the disintermediation of supply chains (Wholesale Trade) and new forms of competition such as Air BnB and meal delivery services (Accommodation & Food Services). The final example – Construction – is an outlier compared to other industries. Unlike most of the economy, the construction industry has not experienced the same level of improvement in productivity, often driven by technology, that most other sectors have enjoyed (Barbosa, et al. 2017).

Trends over time

To examine how pricing power, in the aggregate, has changed over the years, we plotted the average price elasticity and Lerner Index (Equation 3) over time. These graphical analyses are displayed in Figure 3. To detect changes in these time series, we used change-point analysis to identify any structural breaks and test for differences in slopes across regimes (Muggeo 2003). The results of these analyses are presented in Table 2.

The top panel in Figure 3, we see that price elasticity fell, in absolute value terms, from 1976 until the early 1990's. The only change-point identified in this data is in 1985. From 1976 to 1985, the average price elasticity fell (became less negative) 0.15 per year (95% C.I. = 0.13, 0.19). The average price elasticity increased (became more negative) from 1985 until the end of our data in 2016. The average change per year was -0.027 (95% C.I. = -0.023, -0.033). It is interesting to note that the rate of decline in pricing power from 1985 until the present day is much slower than the rapid increases in the mid-1970s.

The trend in the average Lerner Index (bottom panel in Figure 3) is very different.

From the beginning of our data, the average Lerner Index is generally increasing over time. There is a single breakpoint identified for the year 1998. Before that time, the average Lerner index was increasing slowly, 0.0008 per year (95% C.I. = 0.0004, 0.0011). With the end of the 1990's, the rate of increase accelerated to 0.024 per year (95% C.I. = 0.0019, 0.0029).

Relationship between the Two Measures

The time-trend analyses detailed above, also reveal a clear distinction between the two measures of pricing power. Overall, the Lerner Index experienced a pattern of increased pricing power over the entire time period analyzed, characterized by accelerating pricing power since 1985. However, the price elasticity trend is clearly distinct for the period prior to 1985 (i.e., decreasing pricing power), versus the period following 1985 (i.e., increasing pricing power).

Nonetheless, these findings are consistent with the conceptual distinctions between price elasticity and the Lerner Index. Theoretically, the Lerner Index captures the firm's static ability to set prices above its marginal costs, whereas price elasticity captures the firm's dynamic ability to increase prices without losing demand. From an economics perspective, the Lerner Index is similar to the negative inverse of price elasticity (NIPE), if a firm were to set prices that maximize profits. However, over the entire sample, the Pearson correlation between Lerner Index and NIPE is non-significant ($\rho = 0.003$, $t = 1.32$, $p = 0.18$). A possible explanation for this finding might be that firms are not setting prices according to the profit maximization rule.

There are two other competing explanations as well. First, that the Lerner Index reported in the bottom panel of Figure 3 is unadjusted for variations in the price-cost margins observed across industries (Gaspar and Massa 2006). For this reason, we employ the industry-adjusted Lerner Index (Equation 4 above) to measure the pricing power of the firm relative to others within its industry. Alternatively, due to mergers and acquisitions, mortality and new entrants, the sample of firms in our empirical analyses might have experienced important changes over the time period analyzed.

While both these measures (price elasticity and industry-adjusted Lerner Index) reflect the pricing power of an individual company, they are STILL not highly correlated. Over the entire sample, the Pearson correlation is 0.19. This figure is significantly different from zero due to the large sample size (over, 200,000 observations). However, it is not of practical significance.

In conclusion, the patterns of these measures of pricing power separately and together suggest that pricing power should be considered as a multi-dimensional construct. These measures should be treated as two dimensions of pricing power in our subsequent modeling efforts. In the next section, we evaluate the ability of these measures of pricing power to predict future cash flow level and variability.

Study 2: The Effects of Measures of Pricing Power on Cash Flow Level and Variability

The main purpose of Study 2 is to test the effects of measures of pricing power on future cash flow level and variability.

To test for the hypotheses in Section 3, we build our formulation based on recent models of annual future cash flows developed in the accounting literature (Folsom et al. 2017, Atwood et al. 2010). These newer models include firm-level controls to account for variations in firm size, growth, financial leverage, and firm complexity. These controls have been shown in prior research to affect the relationships among current and future cash flows and earnings (Folsom, et al. 2017). To these controls, we add our measures of pricing power: firm-level price elasticity and industry-weighted Lerner Index.

Conceptually, our model of future cash flow levels has the following form:

(9) $Cash\ flow_{(t+1)} = f\ (Cash\ flow_{(t)}; Earnings_{(t)}; Controls_{(t)}; Pricing\ Power\ Measures_{(t)})$

And the proposed conceptual model of cash flow variability is formulated as:

(10) *Cash Flow Variability*$_{(t+1)}$ = *f (Cash Flow Variability*$_{(t)}$*; Earnings*$_{(t)}$*; Controls*$_{(t)}$*; Pricing Power Measures*$_{(t)}$*)*

Model Estimation for Cash Flow Level and Cash Flow Variability

Cash flow Level Model

$$(11) \quad CF_{i,t+1} = \alpha t0 + \alpha s0 + \alpha_{s1} LI_{i,t} + \alpha_{s2} PE_{i,t} + \alpha_{s3} LI_{i,t} \times PE_{i,t} + \beta_1 CF_{i,t} + \beta_2 EARN_{i,t} + \beta_3 CF_{i,t} \times EARN_{i,t} + \gamma_1 Controls_{i,t} + \gamma_2 EARN_{i,t} \times Controls_{i,t}$$

For company i in year t, *CF* is cash flows from operation divided by total assets, *EARN* is earnings before extraordinary items divided by total assets, *PE* is price elasticity and *LI* is the industry-weighted Lerner Index.

The control variables include *DIV* an indicator variable equal to one if the firm had dividend at that year, *AGE* the age of the firm in years based on initial pricing data availability on the CRSP monthly file, *BUSSEG* the number of operating segments reported by firm, *GEOSEG* the number of geographic segments reported by firm, *SIZE* firm size (log of sales), *BTM* the book-to-market ratio, and *LEVERAGE* the ratio of long-term debt to market value of equity. Note that, in this study we try to provide a list of financial control variables which come from a very recent accounting paper (Folsom, et al. 2017) that we believe is very exhaustive. Since we have a panel data, for the omitted industry-specific time-invariant variables that may affect cash flow level, we will control them with fixed sector effects. Additionally, we add fixed time effects to control for time-specific factors. Finally, by letting the coefficients of interests varies across industry sector, we control for other unobserved heterogeneity in the effect of pricing power[4].

[4] The coefficients for our models follow a multivariate normal distribution. $\begin{pmatrix}\alpha_{s1}\\ \alpha_{s2}\end{pmatrix} \sim N\left\{\begin{pmatrix}\alpha_1\\ \alpha_2\end{pmatrix}, \begin{pmatrix}\sigma_1^2 & \sigma_{12}\\ \sigma_{21} & \sigma_2^2\end{pmatrix}\right\}$

Table 3 summarizes the descriptive statistics of all variables. Table 4 is the correlation matrix of variables in Equation (11).

Cash flow Variability Model

$$(12) \qquad CFV_{i,t+1} = \alpha_{t0} + \alpha_{s0} + \alpha_{s1}LI_{i,t} + \alpha_{s2}PE_{i,t} + \alpha_{s3}LI_{i,t} \times PE_{i,t} + \beta_1 CF_{i,t} + \beta_2 EARN_{i,t} + \beta_3 CF_{i,t} \times EARN_{i,t} + \gamma_1 Controls_{i,t} + \gamma_2 EARN_{i,t} \times Controls_{i,t}$$

The term *CFV* is cash flow variability. Following Rajgopal and Shevlin (2002), we first compute the coefficient of variation of quarterly cash flows for each firm (i.e., standard deviation divided by the mean). This figure is then standardized via overall stock market's coefficient of variation (we use quarterly cash flow data for the S&P 500.) This standardized measure of cash flow variability compares the variability of an individual firm's cash flows to variability in the overall market's cash flows. Table 5 is the correlation matrix of variables in Equation (12).

Model Identification

Since we are analyzing panel data, it is always a concern of unobserved heterogeneity. If a heterogeneity is present, OLS estimates may be biased. For a panel (longitudinal) data analysis, we need to test if there is heterogeneous intercept (α_0) and heterogenous coefficients (α_1, α_2). For our data, the Lagrange Multiplier Tests shows significant individual-sector level effects (α_{s0}). This precludes us from simply using OLS model. Additionally, since there exists strong heterogeneity (variance) in the pricing power coefficients[5], we need to allow the coefficients vary across industry sector (Fitzmaurice, Laird, and Ware, 2011). Finally, we wish to consider

[5] This is shown by high Intraclass Correlation Coefficient: ICC = $\frac{\sigma_1^2+\sigma_2^2}{\sigma^2+\sigma_1^2+\sigma_2^2}$. In model (11), ICC = 0.39; in model (12), ICC = 0.18.

time effects (α_{t0}). Therefore, the models are estimated with random coefficients and fixed industry and time effects (industry and year are added as dummy variables).

Robustness Test

To test the robustness of the estimates reported here, we also estimated a number of alternative specifications. These included OLS estimation, a random effects model, a fixed effect model, a random coefficients model, and an AR(1) model. All of these yield estimates similar to those reported next. Details are available from the authors.

Findings

In Tables 6 and 7, we summarize our model estimates. For both models, each column reports increasingly complex formulations. The first model only includes the control variables. The second model adds only price elasticity ($PE_{i,t}$) while the third model add only the industry-adjusted Lerner Index ($LI_{i,t}$). The last model contains both measures of pricing power as well as a term for their interaction (Models 11 and 12 respectively). Fit measures are reported at the bottom of both tables.

The results in Table 6 indicate that both measures of pricing power – separately and together – positively impact future cash flows. There is a positive and significant ($p < 0.04$) influence of price elasticity on future cash flow. Likewise, the influence of the industry-adjusted Lerner index is positive and significant ($p < 0.00$). Therefore, we find support for Hypotheses H_{1A} and H_{1B}.

The impacts of the measures of pricing power on future cash flow variability are likewise significant and in the expected direction, i.e. negative. The results in Table 7 show that price elasticity has a negative and significant ($p < 0.00$) impact on future cash flow variability. Similarly, the industry-adjusted Lerner Index has a negative and significant ($p < 0.00$) impact on future cash flow variability. These results provide support for H_{2A} and H_{2B}.

The random coefficient formulation can produce industry level estimates of the impacts of price elasticity and the industry-adjusted Lerner index on cash flow growth and future variability. In Figure 5, we plot the industry-level estimates for the impact of price elasticity on cash flow growth (X-axis) and future variability (Y-axis). Figure 6 is similarly constructed for the industry-level estimates for the impacts of the industry-adjusted Lerner index on the two measures of future cash flows. The Y-axes in Figures 5 and 6 are reversed so that the industries where the pricing power metric has more positive influences on firm value appear in the upper right-hand quadrants. The origin is set at the average estimates reported in Tables 6 and 7.

With few notable exceptions, a company with lower price elasticity due to a strong brand name, more satisfied customers, etc. will benefit by either higher future cash flows or lower future variability. Construction is an exception perhaps due to the long inter-purchase cycle. Carry-over of effects of sales in a given year may not be realized in a near enough period to show up in a firm’s cash flow figures. Retail is another outlier. It appears that having lower price elasticity is good for future cash flows but has a negative impact on future variability. In a perverse way, this makes sense. If a retailer’s customers are not highly price sensitive, they will not react negatively to a price increase. At the same time, they will also not respond drastically to price cuts. The typical retailer realizes a high proportion of its sales in the fourth quarter, hence the nickname of “Black Friday.” During other, less frenzied shopping seasons, periodic sales events can boost revenues and smooth out cash flow across the year. However, if customers do not react to these lower prices (due to a low price elasticity), the intended smoothing effect would not be realized.

The true winners at the industry level are finance/insurance and professional & business services. For these two industries, firms with lower price elasticity (in an absolute sense) benefit from both drivers of firm value. Information which includes many companies in the technology sector seems to lose out with respect to cash flow variability. However, this may be due to the high growth rates of these companies. Continual growth is desirable but it may appear as a variation akin to seasonality in our metric of future cash flow stability.

With respect to industry-adjusted Lerner index, we see a very different pattern across industries. [This should be expected since these two measures of pricing power are not highly correlated.] As in the case of price elasticity, retailers are the outliers but in a favorable direction with respect to future cash flow variability. Those retailers with relatively more cushion have more stable cash flows in the future. Their business model can accommodate the deep discounting necessary to smooth out cash flows over the year. So, it seems that, for retailers, it is better to be well-run than sell to the well-heeled.

Compared to the impact of price elasticity, the relative position of the finance/insurance industry is flipped when considering the industry-adjusted Lerner index. In fact, this industry is relatively worse off than all others. Having higher margins in this industry increases cash flow variability (at the margin) and has comparatively little effect on cash flow growth. This is unlikely to be a growth situation as we see with the information industry and price elasticity. Firms in the finance/insurance are selling risk goods that suffer from adverse selection (Cao and Gruca 2005). Therefore, very high growth is not necessarily a good thing for the firm. Since we do not know what creates price-cost margin advantages for firms in the finance/insurance industry, the puzzling finding should be an interesting area for future research.

When we compare the two sets of results, we see only one winning industry: professional and business services. These are companies in the consulting, information tech services, marketing services, etc. fields. It is very surprising to see that service providers in the B2B space are best at converting pricing power into firm value. This again is a very fruitful area for further research.

In summary, we find that higher levels of pricing power – whether measured using price elasticity or the industry-adjusted Lerner Index - contribute to the creation of shareholder value. Furthermore, the relative effects of different aspects of pricing power have varying impact on the two building blocks of firm value: cash flow growth and future cash flow stability.

5. Implications for Theory and Practice

The studies reported here make significant contributions to our theoretical understanding of pricing power. We identify two different metrics to measure pricing power. Using a large sample of publicly traded firms across a 40-year period, show that these measures are distinct, valid, and predictive of key components of firm value. Specifically, price elasticity and industry-adjusted Lerner Index – favorably shape both future cash flows and cash flow variability in a direction that increases the overall value of the firm.

Both of these measures of pricing power can be readily estimated from financial data. This will facilitate an expected stream of future research on the antecedents of pricing power. Furthermore, these measures can be employed in studies of the effects of mergers, acquisitions, changes in regulations, and other elements of industry evolution. The enterprise level estimate of price elasticity is especially useful since it has been measured using various indirect proxies in prior research.

For managers, these results make tangible and measurable the idea of pricing power. These measures may be used to benchmark sub-units of the company, competitors or acquisition targets. Managers can now track how their pricing power stacks up to others in their industry and how it changes over time. The results presented here provide two alternative metrics for managers to incorporate into their strategic dashboards to monitor whether, in Warren Buffett's opinion, they have a great business or a terrible one.

Our study also adds a crucially important twist on the Oracle of Omaha's focus on pricing power. The results reported above show clearly that having pricing power – as measured by both metrics – does increase firm value. However, not all industries are equal in their propensity to translate pricing power into firm value. For example, with respect to price elasticity, the finance/insurance industry is a star. We note, perhaps not coincidentally, that of 70 subsidiaries listed in Bekshire Hathaway's most recent SEC filings, 11 are in the finance/insurance industries as is a large proportion of the company's holdings in public companies. Perhaps this is one of the, heretofore, unobservable reasons for Buffett's success over time.

Finally, our 40-year study of pricing power confirms the paradox of today's business environment. While the Lerner Index suggests that companies have more pricing power than at any time since the mid 1970's, there appears to be widespread concern over commoditization in most industries. With commoditization comes an accompanying loss in pricing power and a reduction in margins. We find that managers do indeed have reason for concern. Customers have been becoming more and more price sensitive over the last 30 years as indicated by the trend of increasing (more negative) price elasticity.

6. Conclusions and Limitations

As a first step, we are very encouraged about the future of pricing power as a key construct in marketing. Its importance to managers is already established. This research identifies two theoretically sound consistent and empirically-validated measures of pricing power: price elasticity and industry-adjusted Lerner Index. In addition to showing how these measures have evolved over a 40-year time span, we show that they both contribute significantly to shareholder value. We hope that future research uses these metrics to enhance our understanding of how marketing contributes to building and maintaining the value of all types of firms.

However, as a first step, this research does not answer every question about pricing power. Obviously, the issue of what are the key antecedents of pricing power were not addressed in this research. One reason we chose this path was to involve as large a sample of publicly traded firms as possible. To properly measure the antecedents of pricing power will require a longitudinal database of firm-level measures that are created independently of the firm's income statement. This may be more difficult to obtain that appears at first glance. For example, while brand equity would seem to be a logical antecedent of pricing power, some of the major commercial measurement systems providing estimate of brand equity are based, at least in part, on income statement data at the company level. In other cases, the data are created independently – e.g., through customer surveys – but the scope of companies is limited to the large companies primarily selling in B2B markets.

We expect there to be a great deal of subsequent research on the antecedents of pricing power. Other researchers will focus on the effects of mergers or variations in pricing organization across firms. No matter what the research question, this study provides transparent, easily estimated and value relevant measures of pricing power at the firm level. Since those most concerned with pricing power tend to be C-suite executives and financiers, we hope this metric is a step in raising the profile of marketing's crucial role in creating shareholder value.

TABLE 1
Average Price Elasticity and Lerner Index (1976-2016)

Industry/Sector	NAICS Code	Price Elasticity	Lerner Index	Number of Firms	Number of Observations
Mining and Logging	1133, 21	-3.74	0.37	2,142	16,985
Construction	23	-5.43	0.13	376	3,835
Durable Goods Manufacturing	321, 327, 33	-3.56	0.13	4,932	58,464
Nondurable Goods Manufacturing	31, 322-326	-3.57	0.15	2,813	31,047
Wholesale Trade	42	-4.75	0.08	854	8,948
Retail Trade	44, 45	-3.33	0.08	1,045	12,007
Transportation, Warehousing, and Utilities	48, 49, 22	-4.34	0.25	1,251	18,636
Information	51	-2.17	0.23	2,651	22,234
Finance and Insurance	52	-3.21	0.34	1,883	14,983
Real Estate and Rental and Leasing	53	-3.08	0.35	899	8,434
Professional and Business Services	54, 55, 56	-3.19	0.14	1,580	14,421
Educational Services	61	-2.88	0.17	99	930
Health Care and Social Assistance	62	-3.46	0.15	473	4,464
Arts, Entertainment, and Recreation	71	-3.53	0.21	200	1,841
Accommodation and Food Services	72	-4.83	0.14	502	5,523
Other Services	81	-3.44	0.14	107	1105
Other	All Other	-3.81	0.18	399	2,977
Total Sample		-3.66		22,206	226,834

TABLE 2
Join-Point Results for Price Elasticity and Lerner Index

Estimated Slopes for Price Elasticity

	Years	Estimate	Standard Error	t- value	95% CI	
					Lower	Upper
Slope1	1976-1985	0.1585	0.0154	10.33	0.1274	0.1896
Slope2	1985-2016	-0.0273	0.0028	-9.74	-0.0329	-0.0216

Single line regression: Multiple R-square: 0.00; Adjusted R-square: -0.02
Joint point regression: Multiple R-square: 0.87; Adjusted R-square: 0.86

Estimated Slopes for Lerner Index

	Years	Estimate	Standard Error	t- value	95% CI	
					Lower	Upper
Slope1	1976-1985	0.0008	0.00017	4.66	0.0004	0.0011
Slope2	1985-2016	-0.0024	0.00025	9.74	0.0019	0.0029

Single line regression: Multiple R-square: 0.86; Adjusted R-square: 0.86
Joint point regression: Multiple R-square: 0.93; Adjusted R-square: 0.92

TABLE 3
Descriptive Statistics for Cash Flow Models (1987-2016)

Variables	**Label**	**Mean**	**Standard Deviation**	**Min.**	**Max.**
Cash Flow§	CF_{t+1}	0.09	0.09	-0.98	1.03
Cash Flow Variability	CF_t	0.08	120.97	6.27	13.13
Lerner Index (Industry-Adjusted)	LI_t	-0.01	0.13	-1.57	0.78
Price Elasticity	PE_t	-3.60	1.35	-15.78	1.15
Earnings§	$EARN_t$	0.04	0.09	-0.77	0.36
Volatility of Earnings	$EARNVOL_t$	0.10	0.13	0.00	1.19
Firm Size (log sales in $ millions)	$SIZE_t$	6.05	2.17	-1.85	13.09
Firm Age	AGE_t	19.78	12.06	1.00	57.00
Book to Market Ratio	BTM_t	0.64	0.66	-7.12	6.06
Dividend Indicator	DVTt	0.52	0.50	0.00	1.00
Leverage	$LEVERAGE_t$	5.23	4.00	0.00	20.40
Number of Operating Segments	$BUSSEG_t$	2.69	2.16	0.00	23.00
Number of Geographic Segments	$GEOSEG_t$	2.63	2.44	0.00	51.00

Note: § Scaled by total assets.

TABLE 4
Correlation Matrix for the Cash Flow Growth Model

	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**
1. CF_{t+1}	1.00												
2. CF_t	0.51	1.00											
3. LI_t	0.26	0.31	1.00										
4. PE_t	0.08	0.10	0.20	1.00									
5. $EARN_t$	0.34	0.45	0.42	0.11	1.00								
6. $Time_t$	0.05	0.05	0.02	-0.16	-0.01	1.00							
7. $EARNVOL_t$	-0.07	-0.06	-0.15	0.04	-0.12	0.03	1.00						
8. $SIZE_t$	0.15	0.14	0.13	-0.16	0.12	0.27	-0.32	1.00					
9. AGE_t	-0.01	0.00	0.00	-0.10	0.03	0.29	-0.15	0.34	1.00				
10. BTM_t	-0.15	-0.16	-0.13	-0.10	-0.16	-0.04	-0.07	-0.15	-0.02	1.00			
11. $LEVERAGE_t$	0.01	-0.04	0.14	-0.10	-0.12	0.20	-0.18	0.72	0.25	-0.06	1.00		
12. $BUSSEG_t$	-0.02	-0.02	-0.03	-0.12	-0.02	0.29	-0.12	0.42	0.28	-0.02	0.39	1.00	
13. $GEOSEG_t$	0.01	0.02	0.03	0.02	0.01	0.17	0.01	0.26	0.09	-0.06	0.20	0.21	1.00

Note: Correlation coefficients with absolute value larger than 0.12 are significant at $p < 0.05$ level.

TABLE 5

Correlation Matrix for the Cash Flow Variability Model

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. CFV_{t+1}	1.00													
2. CFV_t	0.75	1.00												
3. LI_t	-0.19	-0.22	1.00											
4. PE_t	-0.07	-0.07	0.20	1.00										
5. $EARN_t$	-0.15	-0.20	0.41	0.11	1.00									
6. $Time_t$	0.12	0.13	-0.14	0.05	-0.11	1.00								
7. $EARNVOL_t$	-0.22	-0.23	0.10	-0.16	0.11	-0.32	1.00							
8. $SIZE_t$	-0.07	-0.08	-0.01	-0.09	0.02	-0.16	0.36	1.00						
9. AGE_t	0.13	0.14	-0.13	-0.11	-0.17	-0.07	-0.15	-0.01	1.00					
10. BTM_t	-0.14	-0.15	0.12	-0.03	0.12	-0.27	0.35	0.34	-0.05	1.00				
11. DVT_t	-0.16	-0.16	0.11	-0.10	-0.14	-0.18	0.71	0.27	-0.06	0.26	1.00			
12. $LEVERAGE_t$	-0.06	-0.06	-0.04	-0.12	-0.03	-0.12	0.41	0.30	-0.02	0.19	0.38	1.00		
13. $BUSSEG_t$	-0.06	-0.06	0.02	0.02	0.00	0.01	0.25	0.09	-0.07	0.03	0.18	0.20	1.00	
14. $GEOSEG_t$	-0.07	-0.07	0.01	-0.14	-0.02	0.03	0.24	0.22	-0.03	-0.06	0.19	0.29	0.14	1.00

Note: Correlation coefficients with absolute value larger than 0.09 are significant at $p < 0.05$ level.

TABLE 6

Cash Flow Growth (CF_{t+1}) Model Estimates

	Base Model	Price Elasticity Model	Lerner Index Model	Full Model
Pricing Power				
$LI_{j,t}$			0.0868^{***}	0.0997^{***}
PE_t		0.0021^{***}		0.0012^{*}
$LI_{j,t} \times PE_t$				0.0046\`
Controls				
$EARN_t$	0.0592^{***}	0.0609^{***}	-0.0071	-0.0072
CF_t	0.3553^{***}	0.3521^{***}	0.3277^{***}	0.3268^{***}
$EARNVOL_t$	-0.0182^{***}	-0.0179^{***}	-0.0095^{***}	-0.0096^{***}
$SIZE_t$	0.0041^{***}	0.0046^{***}	0.0048^{***}	0.0048^{***}
AGE_t	-0.0002^{***}	-0.0002^{***}	-0.0002^{***}	-0.0002^{***}
BTM_t	-0.0065^{***}	-0.0061^{***}	-0.0049^{***}	-0.0048^{***}
DVT_t	0.0001	0.0001	-0.0006	-0.0006
$LEVERAGE_t$	-0.0005^{***}	-0.0006^{***}	-0.0014^{***}	-0.0014^{***}
$BUSSEG_t$	-0.0017^{***}	-0.0017^{***}	-0.0015^{***}	-0.0015^{***}
$GEOSEG_t$	-0.0004^{**}	-0.0005^{***}	-0.0004^{**}	-0.0004^{**}
$EARN_t \times CF_t$	0.4130^{***}	0.4113^{***}	0.4006^{***}	0.3987^{***}
$EARN_t \times EARNVOL_t$	-0.0645^{***}	-0.0594^{**}	-0.0382^{*}	-0.0375^{*}
$EARN_t \times SIZE_t$	0.0199^{***}	0.0189^{***}	0.0234^{***}	0.0235^{***}
$EARN_t \times AGE_t$	0.0007^{*}	0.0006^{*}	0.0006\`	0.0006\`
$EARN_t \times BTM_t$	-0.0477^{***}	-0.0462^{***}	-0.0452^{***}	-0.0449^{***}
$EARN_t \times DVT_t$	0.0783^{***}	0.0779^{***}	0.0737^{***}	0.0741^{***}
$EARN_t \times LEVERAGE_t$	-0.0095^{***}	-0.0093^{***}	-0.0088^{***}	-0.0087^{***}
$EARN_t \times BUSSEG_t$	-0.0024	-0.0026	-0.0021	-0.0022
$EARN_t \times GEOSEG_t$	-0.0036^{**}	-0.0035^{*}	-0.0064^{***}	-0.0065^{***}
FE				
Industry				
Time				
Fit Statistics				
AIC	-164,183	-163,539	-164,443	-164,437
Log-Likelihood	82,156	81,836	82,288	82,289

Note: *** significant at $p < 0.001$; ** significant at $p < 0.01$; * significant at $p < 0.05$; \` significant at $p<0.10$.

TABLE 7

Cash Flow Variability (CFV_{t+1}) Model Estimates

	Base Model	Price Elasticity Model	Lerner Index Model	Full Model
Pricing Power				
$LI_{j,t}$			-3.1298***	-3.2217*
PE_t		-0.1888***		-0.1696*
$LI_{j,t} \times PE_t$				-0.0752
Controls				
$EARN_t$	-12.4300***	-12.5400***	-9.8207***	-10.3112***
CFV_t	0.7055***	0.7031***	0.6996***	0.6981***
$EARNVOL_t$	0.6529*	0.6759*	0.3797	0.4205
$SIZE_t$	-0.2238***	-0.2653***	-0.2608***	-0.2896***
AGE_t	0.0064	0.0054	0.0034	0.0026
BTM_t	0.4736***	0.4178***	0.3966***	0.3592***
DVT_t	-0.2164*	-0.2178*	-0.1887*	-0.1877*
$LEVERAGE_t$	-0.0564***	-0.0472**	-0.0234	-0.0201
$BUSSEG_t$	0.0614**	0.0571*	0.0594**	0.0577**
$GEOSEG_t$	0.0058	0.0152	0.0088	0.0156
$EARN_t \times CF_t$	0.6843***	0.6798***	0.6707***	0.6695***
$EARN_t \times EARNVOL_t$	5.1045*	4.6499`	4.4790`	4.2430`
$EARN_t \times SIZE_t$	0.1882	0.2909	0.1966	0.3266
$EARN_t \times AGE_t$	-0.0300	-0.0215	-0.0231	-0.0166
$EARN_t \times BTM_t$	2.6489***	2.4745***	2.4065***	2.2987***
$EARN_t \times DVT_t$	-2.0638*	-1.9697*	-1.9576*	-1.9591*
$EARN_t \times LEVERAGE_t$	0.1232	0.1205	0.0160	0.0135
$EARN_t \times BUSSEG_t$	0.1291	0.1196	0.0934	0.0652
$EARN_t \times GEOSEG_t$	-0.0061	-0.0053	0.0808	0.0626
FE				
Industry				
Time				
Fit Statistics				
AIC	373,640	373,708	373,666	373,638
Log-Likelihood	-186,760	-186,792	-186,771	-186,753

Note: *** significant at $p < 0.001$; ** significant at $p < 0.01$; * significant at $p < 0.05$; ` significant at $p<0.10$.

FIGURE 1

Conceptual Framework

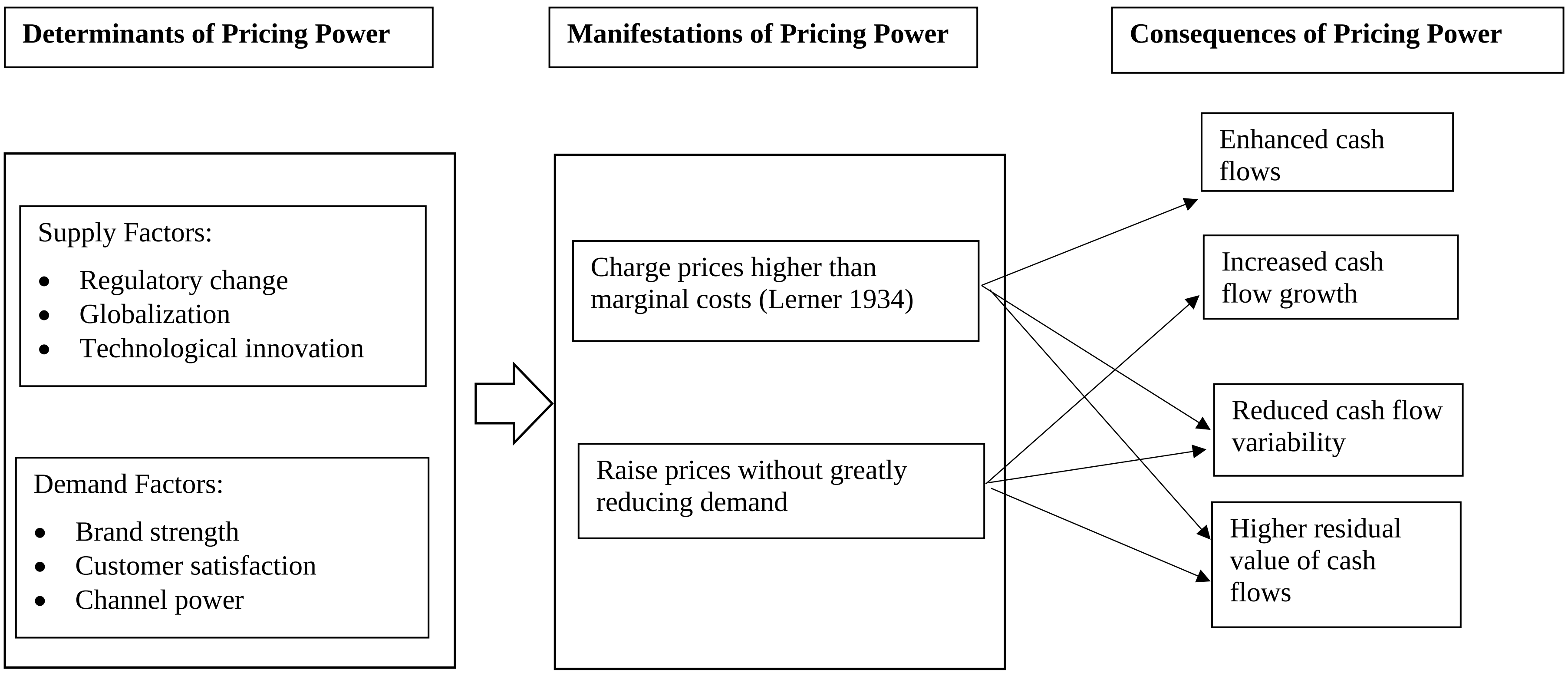
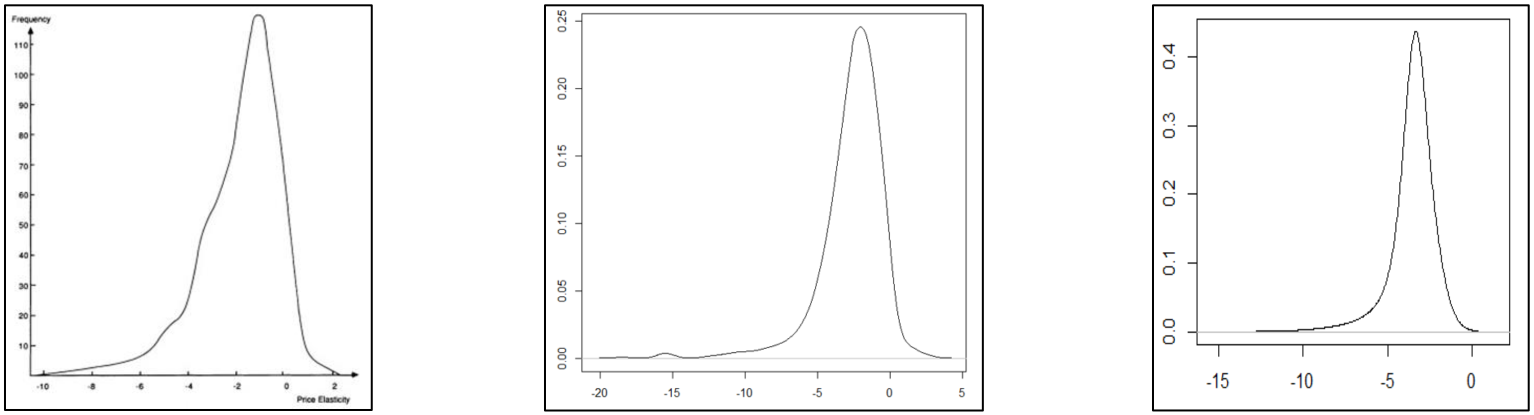


Figure 2

Distributions of Price

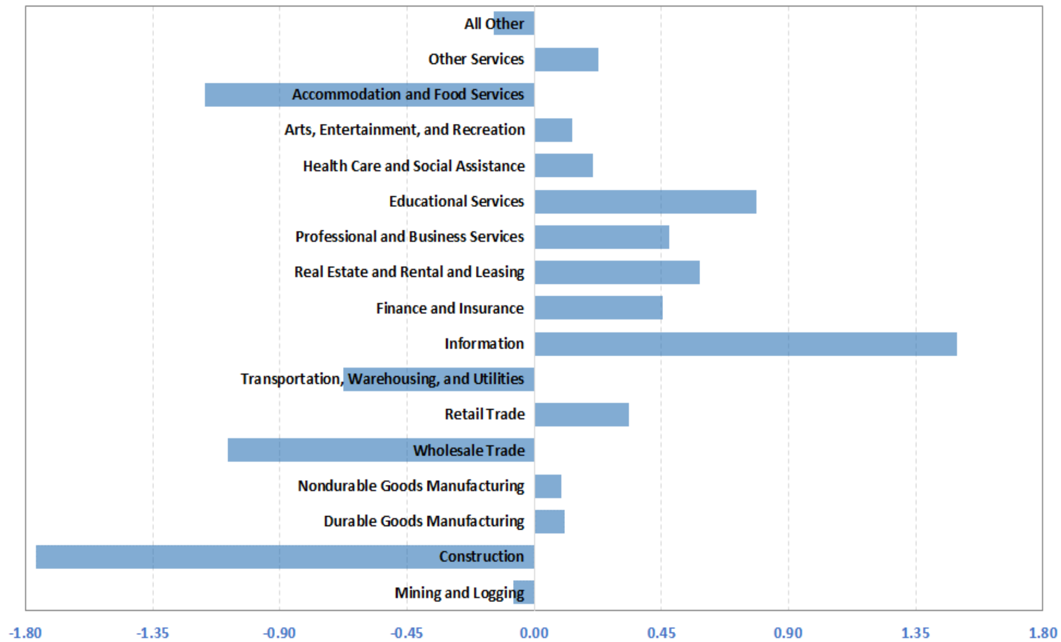
Elasticity Estimates



Tellis (1962-1985)	Bijmoldt, et al. (1962-2005)	Current Study (1976-2016)
N = 367	N = 1,851	N = 226,834

FIGURE 3
Price Elasticity and Lerner Index Mean Deviations by Industry

Price Elasticity



Lerner Index

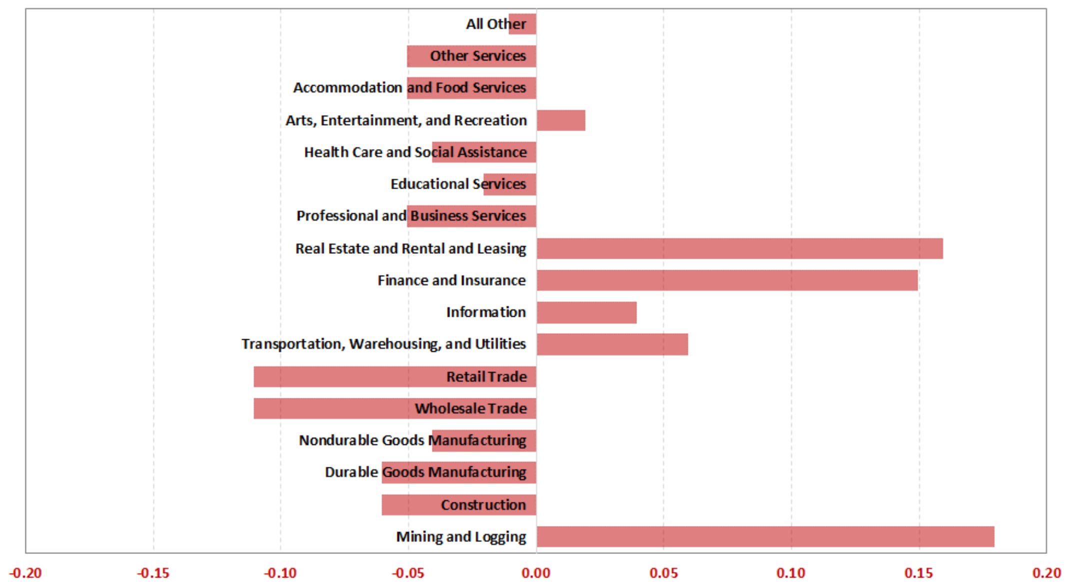
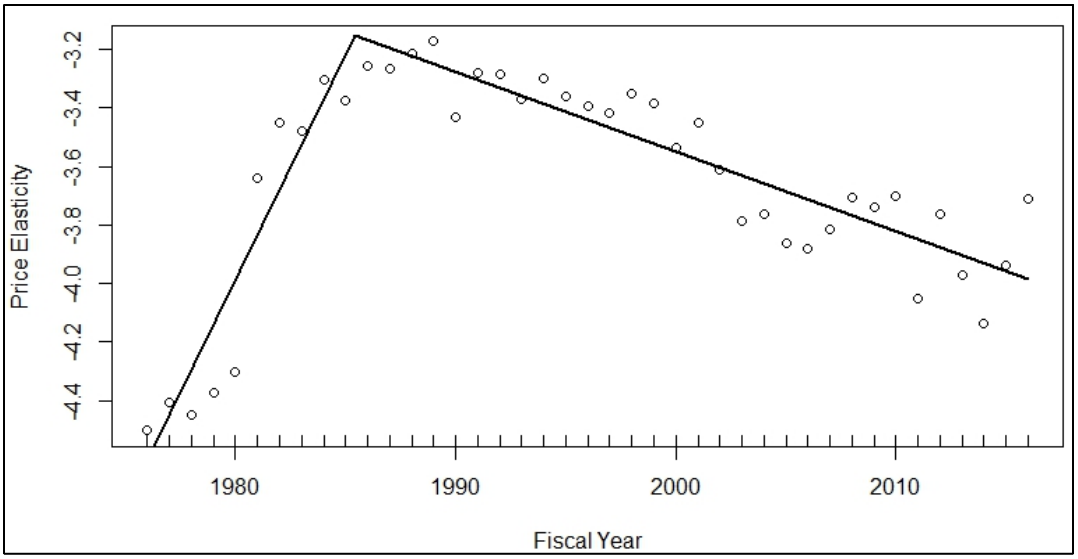


FIGURE 4
Trends in Price Elasticity and Lerner Index (1976-2016)

Price Elasticity



Lerner Index

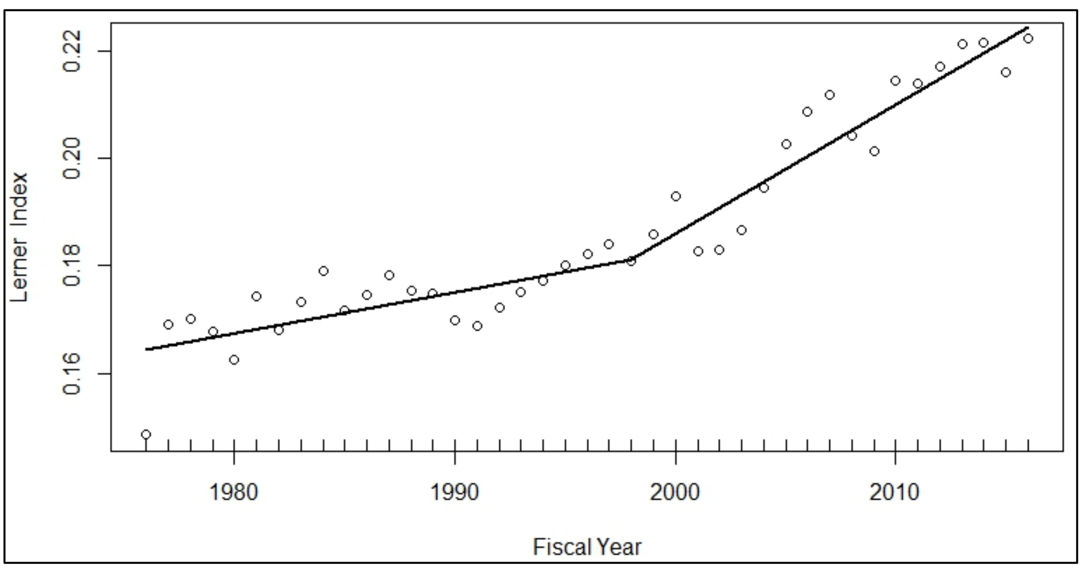


FIGURE 5
Impact of Price Elasticity on Cash Flow Growth and Future Variability Deviations by Industry

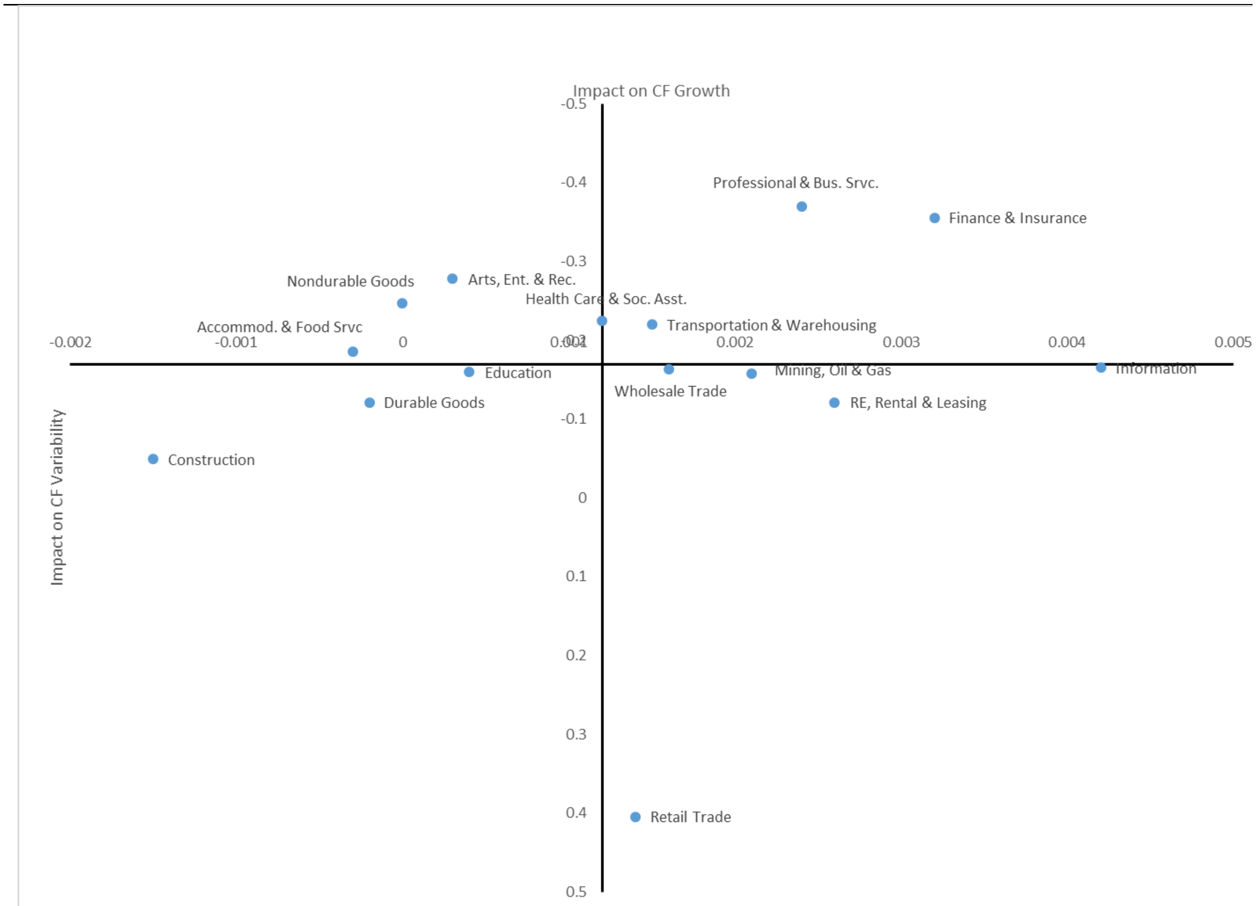
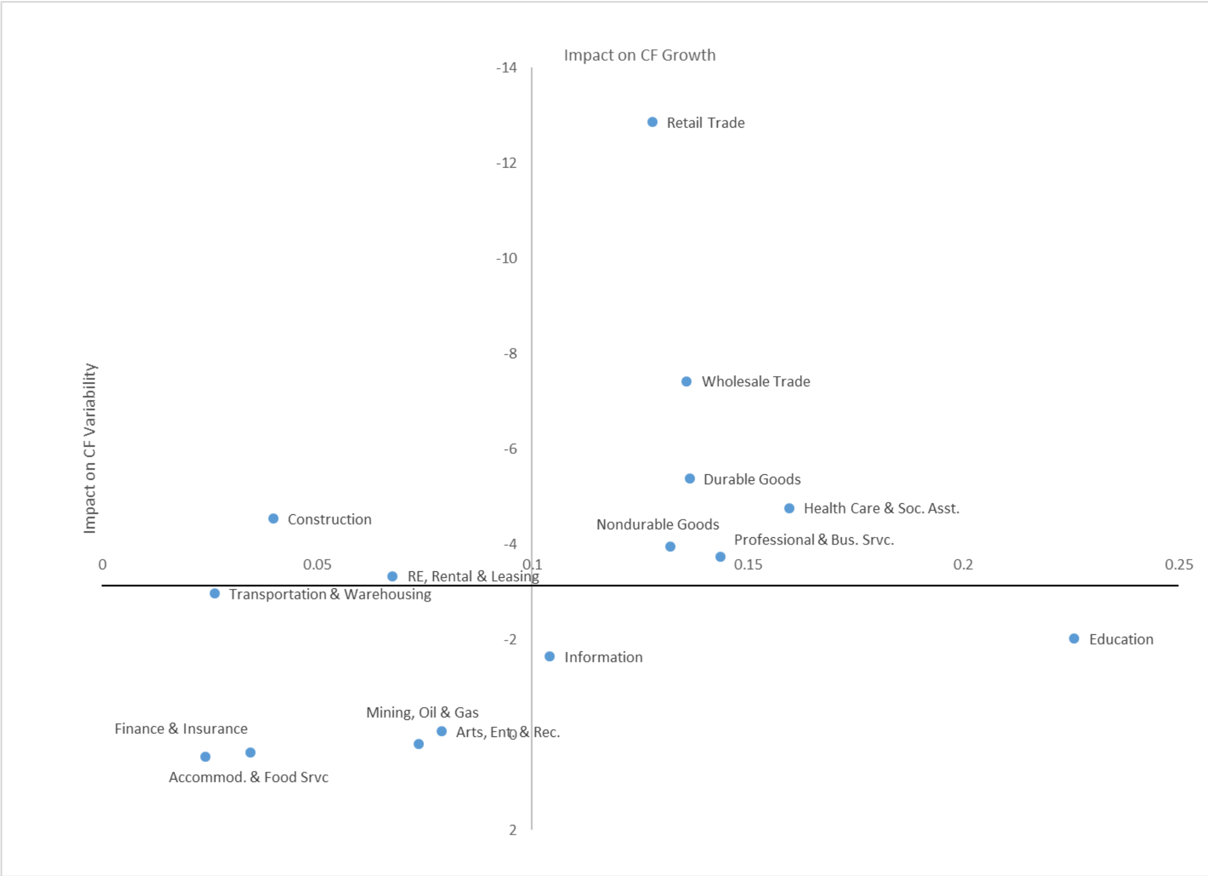


FIGURE 6
Impact of Industry-Adjusted Lerner Index on Cash Flow Growth and Future Variability Deviations by Industry



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