Journal of Industrial and Business Economics (2023) 50:575–603
https://doi.org/10.1007/s40812-023-00268-y

# Profits crisis: evolving patterns of firm size and performance in traditional U.S. industries

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Received: 1 August 2022 / Revised: 19 January 2023 / Accepted: 15 February 2023 /
Published online: 17 April 2023


## Abstract

With the arrival of the new millennium, many industries across the developed economies are increasingly facing **v**olatile, **u**ncertain, **c**omplex, and **a**mbiguous business environments—often characterized as VUCA—caused by a host of disruptive factors hyper-competition, globalized value chains, high-velocity business cycles, frequent technological changes, shorter product life cycles, unstable financial markets, and the rise of the digital economy. These disruptions are triggering serious financial crises within the traditional scale-economy industries by decoupling the link between the firms' size and growth-related strategies and profitability. By capturing the changes in firms' assets, revenue, and financial performance with the help of long-range panel data on public companies, this study traces the impact of such disruptions on the financial performance of firms operating in the traditional scale-based industries in the U.S. economy. The study indicates emerging challenges to corporate management due to disruptive technologies, widening global competition, dynamic consumer trends, and volatile financial markets and highlights further the implications for firms' strategy, corporate governance, and organizational design.

**Keywords** Firm size · Financial performance · Diminishing returns · Scale economy · Knowledge-economy · Technology disruptions · Market volatility

Other versions of this research study were presented at the Eastern Academy of Management Meetings (2021). We would like to thank the anonymous reviewers for providing valuable suggestions that greatly helped in improving the manuscript.

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**JEL Classification** G10 · G11 · G12 · G31 · M41 · M21

## 1 Introduction

With the arrival of the new millennium, many industries across the developed economies are increasingly facing highly turbulent socio-technical–economic environments—which is often characterized by social observers as VUCA—a state of high **V**olatility, **U**ncertainty, **C**omplexity, and **A**mbiguity (Bennett & Lemoine, 2014; D'aveni, 2010; Johansen, 2007; McKinsey & Company, 2020). Within the business academia, scholars have traced the cause of VUCA (**v**olatility, **u**ncertainty, **c**omplexity, and **a**mbiguity) impact on industries to a host of factors such as—hyper-competition, extensive globalization of value chains, high-velocity business cycles, dynamic innovations, short-lived product life-cycles, disruptive technologies, volatile financial markets, ever-changing consumer preferences, and the rise of digital/knowledge economy (Autio et al., 2021; Cavusgil et al., 2021; D'aveni, 2010; Doz & Kosonen, 2008; Millar et al., 2018).

Business press reports that the impact of VUCA environments is quite taxing on the management—as the speed, volume, and complexity of environmental change is so enormous—causing a large number of corporate failures (Autio et al., 2021; Bonnet et al., 2015; Cavusgil et al., 2021). Most corporate failures had occurred due to firms lacking agility, competence or technological capabilities, and responsive organizational designs to meet the emergent disruptions, and the failures are more pronounced among the large firms operating in traditional scale-economy industries. Although large firms are notionally associated with high profitability, market share, economies of scale, market capitalization, and innovation capabilities (Adler, 2012; Coase, 1937; Josefy et al., 2015; Mason, 1939), due to VUCA disruptions, the financial performance of large firms operating in traditional industries have become highly inconsistent and seem to be on a steady decline.

Since the year 2000, fifty-two percent (52%) of firms ranked in the 1990 Fortune 500 list had either gone bankrupt, been rescued out of crisis through acquisition, or ceased to exist as a result of global competition and digital disruption (Autio et al., 2021; Dobbs et al., 2015; Vermeulen, 2017; Watts, 2009). Some of the most publicized cases of such large corporate failures include Kodak, Chrysler, Compaq, Blockbuster, Polaroid, and K-Mart. The longevity of large firms is also on a steady decline across industries. The average tenure of large S&P 500 firms has shrunk from 35 to 20 years within the past two decades (Siegel & Schwartz, 2004).

Most extant studies on corporate financial performance have primarily focused on capturing the comparative influence of the firm-specific organizational antecedents vs. external industry factors on firm profitability with the help of cross-sectional industry data or short-range panel data (Barney, 1991; Goddard et al., 2004; Hitt et al, 2007; Mueller, 1990; Porter, 2008; Rumelt, 1991; Schmalensee, 1985, 1989; Wiersema & Bowen, 1997). With cross-sectional

or short-range data, however, one cannot easily detect the impact of economic environmental changes in the larger industry nor capture the effects of increasing intensity of competitive and disruptive environments on the firms' performance (Hitt et al, 2007; Kozlowski & Klein, 2000; Rousseau, 2000). However, the major economic changes impacting the industries—such as changes in industry and competition, volatility in stock markets, technology disruptions, global competition, and dynamic customer demographics—which affect the relations between management/organizational antecedents and financial results can be traced with the help of long-range data (Christensen, et al., 2011; Murray et al., 2000; Ravenscraft & Scherer, 1987a, 1987b; Weber & Camerer, 2003).

In this study, with the help of the long-range COMPUSTAT panel data (a sample of N = 1140 + firms in 1970 to 3400 + firms in 2013, and a total of 128,000 + firm-year observations between 1970 and 2013), we conduct an empirical examination of the systemic changes among the financial variables of U.S. public firms operating in traditional industries. First, the study illustrates the changing (declining) patterns of associations among firm assets, revenue, and financial performance ratios of the U.S. public firms over 3 decades. Second, the study addresses the emerging challenges to financial performance and firm governance—owing to the change from the scale economy to a globalized knowledge economy and the VUCA effect arising from disruptive technologies, widening global competition, and volatile financial markets. Third, with the help of statistical analysis, we trace the declining associations between firm assets and profitability/performance ratios with robust long-range panel data of U.S. public companies operating in two different scale-economy industries: Electrical and Electronics manufacturing (SIC 36), and Steel, Aluminum, and Metal Production (SIC 33). These two industries are presented as representative samples of the scale economy industries, for the reason, they represent some of the oldest established industries with an average firm age of 50 years and an average firm size to the tune of $3 billion in assets. The manuscript further addresses the implications for the strategy, governance, and organization design of corporations.

## 2 Firm size and financial performance: trends in the U.S. industrial economy

One of the central tenets of management is to increase the long-term profitability of the firm, and in turn enhance its shareholders' wealth (Barton et al., 2017; Donaldson, 1985; Rappaport, 2006). The world of management revolves around pursuing the best methods of managing manpower, material, suppliers, capital, knowledge, and technology to increase organizational productivity, profitability, and shareholder value. Right from the industrial revolution era to the modern digital economy, no stone was left unturned by management scholars in search of sources for greater profits, be it scientific management of men, incentive designs, human relations techniques, training and specialization, agency governance mechanisms, total quality management (TQM), working-capital management, mergers & acquisitions, strategic alliances, innovation processes, information technology, decision support systems (DSS), and customer relations management (CRM), and

so on. Despite remarkable progress in the sophistication of corporate governance reinforced with management expertise and professional controls, the large firms operating in traditional U.S. industries are increasingly experiencing severe financial crises.

The crises appear to have been more pronounced among the large firms operating in the scale-economy industries such as metals, transportation, construction, electrical & electronics, appliances, machine tools & industrial goods, automobiles, and durables, and there seems to be an increasing disconnect between the antecedents such as firm asset size, growth, and financial performance in these industries (Autio et al., 2021; Cutcher-Gershenfeld et al., 2015; Lincicome, 2021; Pieri & Verruso, 2019; Warrian, 2016). The financial performance of large firms is becoming more erratic due to the increased complexity of firm governance on the one hand, and the volatile industry and market environments on the other (Barton et al., 2017; Bower & Paine, 2017; Dobbs et al., 2015; Rappaport, 2006). Speaking of pragmatism, established management practices are having a less significant impact on firm performance; and speaking academically, the validity of theories linking management/organizational antecedents and financial performance has become debatable. We argue that this troubling trend has not been adequately examined, and there is a lack of explanation of how the systemic changes in technologies, financial markets, and competition impact the organizational and financial variables that are of interest to managers (Hitt et al., 2007; Rousseau, 2000).

The following table and charts (Table 1, Figs. 1 and 2) capture the systemic changes in the relationships among assets, revenue, net income, profitability ratios, market capitalization (market cap), and the stock price-earnings ratio of U.S. public companies operating in traditional industries over 4 decades. Our study focused only on firms founded before the year 1990,—because the structure, scope, and strategies of the traditional-industrial firms have been predominantly scale-economy driven as they were founded long before the arrival of information and internet technologies. The sample did not include the firms that were founded after the 1990s operating in the information-driven digital economy such as computers, software, internet, and mobile & wireless telecommunications, given their high growth and high profitability.

The above data on the yearly averages of the firm asset size, revenue, market capitalization, and the performance (profitability ratios and asset turnover) of the listed U.S. public companies operating in traditional industries reveal that, between 1970 and 2013, on average the asset size of the U.S. public firms has increased by more than 20 times whereas the revenue and net income has increased by 10 times; on the other hand, their profitability and asset turnover ratios have declined by half, and the stock price to earnings ratio (P–E ratio) has doubled. The decline in financial performance ratios has become acute since the 1990s. These findings confirm the trends projected by other similar studies. According to a recent study, the predictability of profits has dramatically decreased, and since the year 2000, the average level of volatility of returns on assets or returns on invested capital (ROA & ROIC) has been about 60% greater than the levels that prevailed from 1965 to 1980 (Dobbs et al., 2015).

**Table 1** U.S. Public Firms Financial and Performance Ratios (1970–2013) (Firms founded after 1990 are not included)

| Years | Number of Firm-Year Obs | Assets million | Revenue million | Net Income | ROS | ROIC | ROA | ROE | Asset Turnover | Market Cap million | P/E Ratio |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1970–1974 | 8011 | 831.35 | 493.65 | 29.78 | 0.061 | 0.080 | 0.055 | 0.094 | 1.16 | 382.55 | 14.34 |
| 1975–1979 | 9683 | 1302.74 | 818.92 | 47.46 | 0.060 | 0.099 | 0.062 | 0.138 | 1.23 | 396.25 | 9.24 |
| 1980–1984 | 10,069 | 2144.50 | 1337.08 | 65.93 | 0.050 | 0.084 | 0.050 | 0.109 | 1.12 | 628.16 | 16.24 |
| 1985–1989 | 11,353 | 3161.65 | 1485.57 | 74.34 | 0.029 | 0.056 | 0.033 | 0.073 | .98 | 1017.17 | 21.97 |
| 1990–1994 | 14,798 | 3641.15 | 1535.21 | 60.64 | 0.027 | 0.046 | 0.025 | 0.058 | .93 | 1313.45 | 26.15 |
| 1995–1999 | 22,155 | 4292.32 | 1601.21 | 97.89 | – 0.009 | 0.029 | 0.011 | 0.029 | .87 | 2465.35 | 31.82 |
| 2000–2004 | 20,409 | 8742.18 | 2615.17 | 119.19 | – 0.107 | – 0.006 | – 0.012 | 0.001 | .79 | 3649.37 | 30.98 |
| 2005–2009 | 18,625 | 15,199.01 | 3925.71 | 261.40 | – 0.038 | 0.022 | 0.011 | 0.040 | .76 | 4988.35 | 29.95 |
| 2010–2013 | 13,655 | 18,239.98 | 4824.40 | 361.79 | – 0.001 | 0.032 | 0.019 | 0.042 | .73 | 6065.10 | 31.24 |

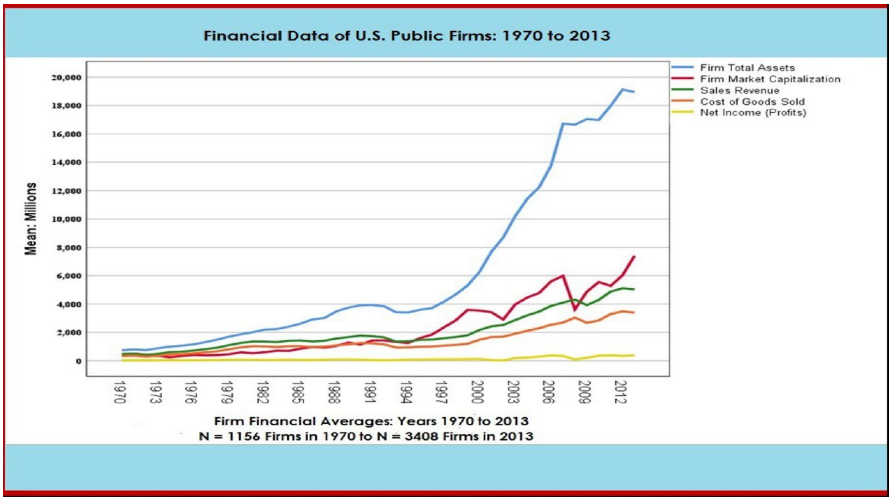


**Fig. 1** Financial data (averages) of U.S. public firms (1970–2013) N = 1156 firms in 1970 and N = 3408 firms in 2013; Firms founded after 1990 not included

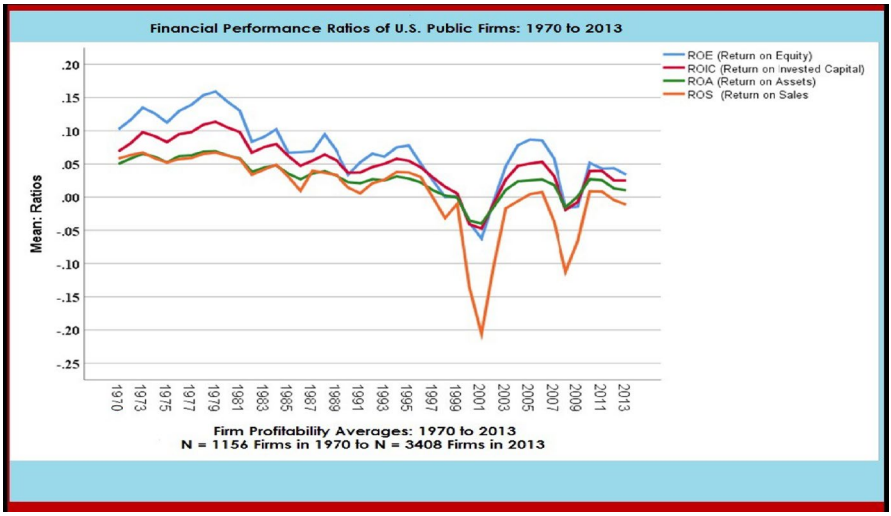


**Fig. 2** Profitability ratios (averages) of U.S. public firms (1970–2013) N = 1156 firms in 1970 and N = 3408 firms in 2013; Firms founded after 1990 not included

The trends observed in the financial data suggest that many U.S. industrial and business organizations are facing acute crises from the 1990s onwards due to the emergent new state of demand, cost, competition, and profit conditions. However, the firms' governance and strategies don't seem to reflect yet a good adaptation to counter the challenges. From the aggregate data, we can conjecture that the profitability is below the cost of capital for a substantial number of U.S. public

companies operating in the traditional industrial economy. New research evidence corroborates this trend (Josefy et al., 2015). Josefy and colleagues (2015) presented evidence that the associations between the revenue, assets, employees, and market capitalization of the Fortune 1000 and the wealthiest Fortune 100 firms are steadily fading. The statistical correlations between firm assets, revenue, employees, net income, and the market capitalization of the wealthiest companies in the 2010s have declined to half their size in comparison to that of the 1970s. More specifically firms' shareholder wealth creation did not correspond with the growth in the respective asset sizes (Josefy et al., 2015), a disturbing trend given that more than $45 Trillion, about 80% of the U.S. investment assets are vested with Fortune 1000 companies. General Electric (GE) is one such classic case; although GE's sales revenue increased gradually, its asset base built on numerous mergers has grown exceedingly large over the past 2 decades without generating a proportionate level of revenue and net income. Now, GE's long-term profitability appears unsustainable, and its return on equity (ROE) and market cap has plunged dramatically (The Economist, 2017).

Most studies on the profitability of U.S. industries that examined the data from the past decades revealed that the management antecedents (conceptualized as net firm effects) account for a substantial variance in profitability (ROA, or ROIC) ranging from 20% to as much as 90%+(Goddard et al., 2009; Rumelt, 1991; Schmalensee, 1985; Schumacher & Boland, 2005). The remaining variance was usually attributed to industry, national, or economic contexts (McGahan & Porter, 2002; McNamara et al., 2005). Albeit extensive research works have been done to trace the internal and external sources of variance in firm profitability, the extant studies do not explain in full the reasons for the steady erosion of profitability as firms kept growing in their size. The espoused links between organizational antecedents and firm profitability are turning out to be ambiguous, and the disconnect between firm size, revenue, profitability, and shareholder value has become more prominent. There is a lack of explanation as to what systemic changes are causing the attrition of managerial effectiveness and firm performance. Given the trying industry and global competitive environments, wanting answers, the science of management is in dire straits. Besides examining the profitability crisis, we highlight the emerging challenges to the practice of management from disruptive technologies, global competition, dynamic consumer markets, and volatile financial markets and address the implications for the strategy, governance, and organization design of corporations.

## 3 Firm size and performance: in the context of rising competition, cost, and disruptions

Firm size, particularly the asset base of a firm, has long been a key facet of management research and practice (Adler, 2012; Afuah, 2003; Axioglou & Christodoulakis, 2021; Coase, 1937; Williamson, 1985). Right from the days of the industrial revolution to the mass production economy, the integration of assets to build a larger enterprise has always been a core strategy for achieving greater

productivity, realizing better economies of scale and scope, and fostering innovation and knowledge-based capabilities (Adler, 1995, 2012; Buzzell, 1983; Chandler, 1962, 1977, 1990). Even in modern times, given the significance of global markets and acquiring critical resources for sustaining competitive advantage, integrating more assets and expanding firm size is considered a critical strategy. Nearly 20% of the articles published in top-tier management journals have addressed firm asset size and growth as critical antecedents or mediating variables in explaining financial performance (Josefy et al., 2015). Past research has established that the firm's asset size is positively associated with market share, economies of scale, profits, return on assets, market capitalization, competitive advantage, and innovation capabilities (Adler, 2012; Josefy, et al., 2015). However, in recent times, the links between firm asset size and profitability, or shareholder returns have become unpredictable due to several endogenous and exogenous disruptions resulting from systemic changes across industries.

Despite the economic significance of firm size and growth in scale-economy industries, the VUCA environments, however,—such as the frequent technological changes, global competition, customers demanding more product variations, and volatile financial markets—have rendered many large integrated firms less responsive and dysfunctional. The emergent global competitive landscape demands a high degree of flexibility, agility, and continuous change which large companies are finding difficult to deliver (Josefy et al., 2015; Miller, 1994; Williamson, 1985). Due to their tall hierarchy and structural complexity limiting agility and changeability, organizations with large assets carry high bureaucratic costs and high investment risk (Adler, 2001; Canbäck, 2004; Chandler, 1977; Williamson, 2002). The troubles at large firms General Electric, General Motors, Ford, and Xerox have been quite well-documented uncovering the adverse impact of VUCA disruptions on the firm governance and performance (The Economist, 2016, 2017, 2022).

It is becoming increasingly apparent that there are limits to efficiency gains accruing from a larger asset base, because, beyond a threshold level, a large firm can experience the diseconomies of scale arising from employee alienation, coordination lapses, information delays, compounding of errors, and bottlenecks (Arrow, 1983; Blau & Meyer, 1987; Child, 1973; Riordan & Williamson, 1985; Williamson, 1975). As the size or scope of business operations expands with increases in assets, the number of bureaucratic layers increases, information processing errors and delays compound, and the power distance between organization layers increases. In large organizations, managers often become more concerned with acquiring greater resource control resulting in turf wars, power conflicts, and political coalitions reducing the synergy among management layers and subunits (Riordan & Williamson, 1985; Williamson, 1975).

Global competition is another dimension causing a vast change in the risk-return configuration of many industries like automobiles, steel, consumer electronics, and appliances (Cutcher-Gershenfeld et al., 2015; Lincicome, 2021; Pieri & Verruso, 2019; Warrian, 2016). Increased global competition; especially due to the increase in the number of global competitors from emerging economies, now there is more intense rivalry, which in turn, poses a threat to the profitability of established large MNCs. The number of companies with a global reach has increased from about

40,000 in 1990 to around 85,000 in 2015. Given the size and stellar expansion of markets in emerging economies like India, China, Brazil, and Southeast Asian countries, there are more MNCs now. The McKinsey report estimates that in 1990 only 5% of the Fortune 500 firms belonged to emerging economies; in 2013 it was 26% and by 2025 it will be 45% (Dobbs et al., 2015). The competitors from the emerging economies display tremendous competitive vitality, have flexible group/family-based corporate structures, carry a longer investment horizon, and operate with a focus on growth than catering to the quarterly earnings reports. The rise of the Tata group from India, Hyundai and Samsung groups from South Korea, and Haier electronics group from China in the automotive, consumer electronics, and appliances industries toppling some of the extant industry leaders from the advanced industrial economies foretell the impact of global rivalry and its consequences for profits.

Moreover, we are witnessing a change from the scale economy to the knowledge economy across many industries impacting the cost, revenue, and critical financial variables (Abramovitz & David, 1996; Adler, 2001; Josefy et al., 2015). The knowledge economy denotes the rise of knowledge-driven technology-intensive firms with production and service operations that generate more value from intellectual capabilities than tangible, or material resources (Abramovitz & David, 1996; Afuah, 2003). At this point, we would like to highlight that the cost structure of firms in the knowledge economy reveals quite a different pattern in comparison to that of the scale economy (Afuah, 2003). The knowledge economy engenders

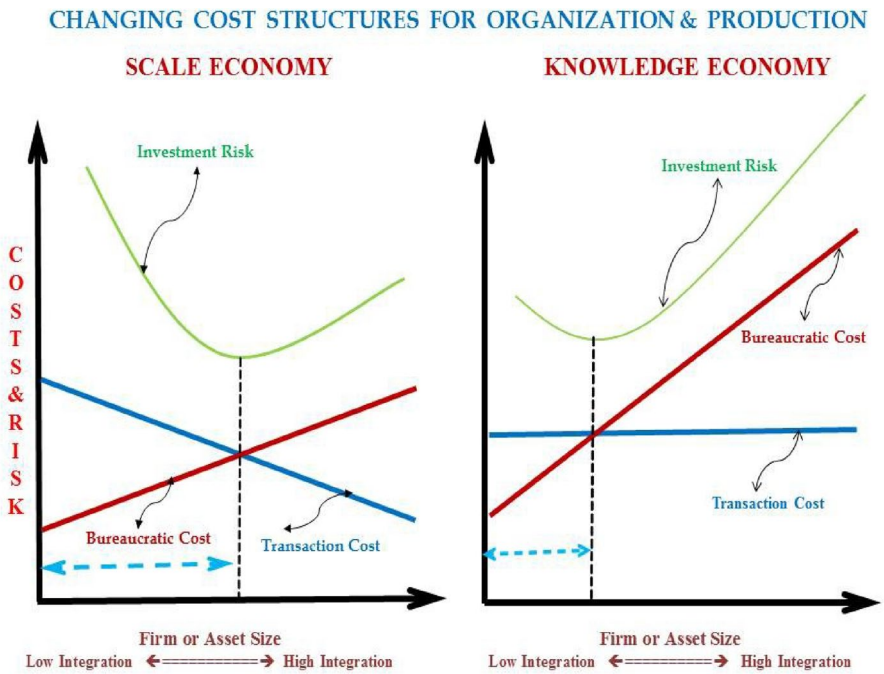


**Fig. 3** Cost and risk patterns in scale economy vs. knowledge economy

more dynamic markets, complex technologies, and high uncertainty than the scale economy (Adler, 2001; Felin et al., 2009). Under such turbulent economic and industry conditions, the large integrated hierarchies carrying huge assets would not only be straining but also their bureaucratic costs would accelerate further as they become less responsive to dynamic market and technological changes (see Fig. 3).

The knowledge economy, however, has spawned new alternatives for business growth without incurring huge investments. Foremost, the knowledge economy has significantly flattened transaction costs by reducing information asymmetry and enhancing the mutual power and interdependence among the buyers and suppliers in many industries (Adler, 2001; Felin et al., 2009). Knowledge-era firms with lean asset structure, modular product architecture, and outsourced operations coordinated seamlessly using e-commerce and internet-driven technologies carry much lower coordination costs than heavily integrated organizations (Afuah, 2003; Baldwin & Clark, 2000; Ethiraj & Levinthal, 2004; Kaplinsky, 2000; Langlois, 2002; Levy & Dunning, 1993). In industries such as apparel, breweries, food processing, and telecommunication, now many successful global companies are operating profitably with a lean asset structure—by disaggregating their core activities, outsourcing, and banding with a chain of contract suppliers and franchisees to achieve product variety and customization—and spawning more than 60% of the value creation outside the firm boundaries (Contractor et al., 2010). This possibility was envisioned by Coase himself in his seminal work on the theory of the firm. As Coase (1937) stated,

> "When we are considering how large a firm will be the principle of marginalism works smoothly. The question always is, will it pay to bring an extra exchange transaction under the organising authority? At the margin, the costs of organising within the firm will be equal either to the costs of organising in another firm or to the costs involved in leaving the transaction to be organised by the price mechanism. Businessmen will be constantly experimenting, controlling more or less, and in this way, equilibrium will be maintained. This gives the position of equilibrium for static analysis. But, it is clear that the dynamic factors are also of considerable importance, and an investigation of the effect changes have on the cost of organising within the firm and on marketing costs generally will enable one to explain why firms get larger and smaller. We thus have a theory of moving equilibrium." (p. 404).

It is becoming evident now that the knowledge economy is gradually moving the cost equilibrium—in relation to firm asset size—in a reverse direction. The changing industry structure and performance of companies in the U.S. manufacturing sector attest to this phenomenon. As the new millennium arrived, many large U.S. firms that enjoyed the competitive advantage in manufacturing from the 1940s through the 1980s could sustain neither their market dominance nor their profitability (The Economist, 2017; Vermeulen, 2017).

Frequent technological disruption is another feature of the knowledge economy that impairs the strategy, scale, and profitability of companies. The product, service, and manufacturing technologies are experiencing tumultuous transformations as their life-cycle span is getting shorter (Gate, 2000; Tuma, 2018). Shortened life cycles of the product and technology bring enormous competitive pressure on

the venture scale, product pricing, and sustainability of advantage (Christensen et al., 2015; Tuma, 2018). Technology-based disruption is the most common reason for the failure of established large companies (Bower & Christensen, 1995; Christensen et al., 2015; Vermeulen, 2017; Wang, et al., 2021). Often large established companies are taken by surprise when technology-driven knowledge-era firms enter into markets where they are not expected. The e-commerce giants like Alibaba, Tencent, and JD.com are making quite a storm in financial services by expanding into small-business lending, consumer finance, and money market funds. With extensive databases and decision support systems about their vendors and customers, these companies have achieved far better loan-to-performance ratios than the large incumbent players in the financial services industry (Dobbs et al., 2015).

Another major impact of technological disruption is the disappearance of industry borders owing to the convergence of technologies and markets (Borés et al., 2003; Giachetti & Dagnino, 2015; Hacklin et al., 2005; Roco et al., 2013). Several technologies that independently served as the core for many different industries and products are now getting integrated into a single product/machine/service center resulting in the creation of completely new industries (Gate, 2000; Hacklin et al., 2005; Roco et al., 2013; Tuma, 2018). For instance, more than a dozen independent technologies from information technology, telecommunication, and consumer electronics, to entertainment and healthcare have converged into a few digital products such as mobile phones, tablets, and home security devices (Borés et al., 2003; Gate, 2000; Hacklin et al., 2005; Roco et al., 2013).

Given these changes, now it has become intricately complex to delineate the borders of many industries; especially, consumer electronics, computers, electrical, automotive, and the internet. In such contexts, firms cannot define their markets unequivocally and they simultaneously belong to many industries. The idea of industry competition would not make much sense in such situations, given that firms will face rivalry from unrelated quarters of the global economy. Such a complex business environment demands a radical redefinition of the firm. A new configuration is needed to define the right size and scope of the firm. The traditional logic of economies of scale will be defunct in this context. And even the economies of scope will have limitations, given the dynamic changes, combination, and recombination of technologies required to better serve the markets. The scaling of a business, for instance, ought to be a multi-firm configuration demanding a new conception of the financial model of the corporation. As firms' technologies and markets are changing dynamically, long-term returns will be a challenge for large companies. Continuing on the mergers and acquisitions to sustain the growth and sales revenue—without simultaneously building flexible organizational structures and technology platforms to compete in a more agile, speedy, and responsive manner—will be antithetical to value creation.

Most importantly, we would like to address how large firms are becoming vulnerable to the increasing volatility and short-termism in the financial markets—a major feature of the VUCA business environment. The market prices of stocks, bonds, foreign exchange, and other investment assets, have shown striking increases in volatility over time (Shiller, 1992, 2005). For every kind of asset, now stock prices display highly unpredictable movements from day to day or month to month. High

stock price volatility and the fleeting nature of stock ownership in the United States have rekindled the decades-old debate on whether financial markets, especially stock markets are holding efficient mechanisms for investments and resource allocation (Banerjee, 1992; Martin, 2011; Seyhun, 1992; Seyhun & Bradley, 1997). The Aspen Institute's Corporate Values Strategy Group (Aspen Institute Report, 2009) which has been working on promoting long-term orientation in business decision-making/investing has issued a call to end the value-destroying short-termism in the financial markets—which has been endorsed by twenty-eight leaders representing business, investment, government and academia (including Warren Buffett—CEO of Berkshire Hathaway, Lou Gerstner—former CEO of IBM, Roger Ferguson—President of TIAA-CREF, and James Wolfensohn—former President of the World Bank).

Notwithstanding the entrenched opinion that stock markets are functioning efficiently, researchers have established that there are market forces that would routinely render the stock market inefficient; namely greed, insider trading, attractive corporate announcements, the sheer popularity of the firm, crowding effect, or a high volume of investment flows to fewer firms, and herd behavior (Cella et al., 2013; Rozeff & Zaman, 1998; Shiller, 2005). Short-term orientation, speculative inducements, and herd behavior of markets drive investors to hop from one stock to the other frequently resulting in a conspicuous disconnect between the market prices and the intrinsic asset value of many large companies (Barton et al., 2017; Cella et al., 2013; Graham et al., 2006; Rappaport, 2006; Rozeff & Zaman, 1998; Shiller, 2005).

A new research study observes that the average holding period of stocks for U.S. public companies has dropped from 5 years in the 1970s to less than 6 months in 2015 (Bower & Paine, 2017). Speculation-driven short-termism in investment markets and the resulting volatility have undesirable effects on corporate governance practices, companies' financial performance, and returns to long-term investors (Barton et al., 2017; Cella et al., 2013; Graham et al., 2006; Shiller, 2005). To sustain, or increase the demand for the stocks, or under pressure to meet the quarterly earnings benchmark, managers often resort to short-term measures including slicing value-creating allocations on research and development, advertising, maintenance, quality improvements, and training (Appel et al., 2016; Edmans et al., 2014). Martin (2011) documents how managers have frequently resorted to economically calamitous practices just to meet the quarterly targets and achieve faster growth of stock value, such as risking the firm's pension funds, needless downsizing, cutting back on worker benefits, and outsourcing critical competencies to foreign countries while sacrificing innovation and R&D.

At this point, it is logical to reexamine the predominant agency theory-based approach to corporate governance and assess why the incentive designs endorsed by it tend to propel managerial decisions more toward short-term interests. What Adam Smith said about governing joint-stock companies in his classical work—"…directors of such companies, however being the managers of other people's money rarely watch over it with the same anxious vigilance with which partners in a private company watch over their own" (Smith, 1776)—has been the core premise of the agency theory. Agency theory has been a leading theoretical

framework to devise corporate governance mechanisms, rules, and incentives to monitor managerial actions so that a firm's financial and human capital will be efficiently managed in the interests of shareholders (Appel et al., 2016; Jensen & Meckling, 1979; Williamson, 2002). From the agency theory perspective, the stock-option-based managerial compensation is considered beneficial to shareholders because it is an effective method to align the interests of managerial agents and shareholders so that company decision-making will focus on maximizing shareholder value (Jensen & Meckling, 1979; Williamson, 2002).

However, the idea of maximizing shareholders' value as the primary responsibility has become debatable given the high volatility and increasing disconnect between stock price, firm performance, and long-term returns (Bower & Paine, 2017; Fahlenbrach & Stulz, 2011; Ghoshal, 2005). Some scholars contend that the notion of "maximizing shareholder value" is in direct conflict with corporate law and other key stakeholders, and has guided managers in the wrong direction creating a huge accountability crisis (Bower & Paine, 2017; Ghoshal, 2005). Rather, the "company's financial health" and the "long-term value creation" should be the primary accountability of corporate managers.

New research evidence vindicates the above line of argument by citing weak statistical associations between firm financial performance, shareholder returns, and managerial compensation (Bower & Paine, 2017; Cooper et al., 2014; Crumley, 2008; Fahlenbrach & Stulz, 2011). In addition to volatility and inefficient market condition, the executive compensation methods are further complementing the managerial urge toward high-stake decisions like expensive mergers (Langevoort, 2011; Ravenscraft & Scherer, 1987a, 1987b). While inefficient market condition dogs the firm's finance, short-termism in corporate decision-making can wear down the managerial effectiveness. As Ghoshal (2005) had articulated, bad management theories can destroy good management practices, like agency theory assumptions about managerial self-interests and opportunism have engendered incentives that are antithetical to the interests of shareholders.

Given the tumultuous VUCA business contexts the industries face, we draw the following hypothesis on the relationships between firm asset size and profitability particularly for the industrial-era companies that had been built on the premises of industrial mass production, and economies of scale. Because many industries in the U.S. economy are experiencing a transition from scale-based and domestic-focused competition to a more dynamic, knowledge-centered, and global competition (since the 1990s), we posit that the companies that are relatively leaner and agile will perform better than the large integrated companies that are still functioning on the premise of the scale economy. In this light, relatively speaking, the smaller, leaner, and agile companies will have the natural advantage of entrepreneurial drive, innovation, and flexibility to continuously adapt their strategy and structure to the persistent changes. In contrast, the large integrated firms with huge asset-base would suffer from slow responsiveness, as they are challenged by the technology and market disruptions, and will be experiencing diminishing returns to both assets and stock-investments value. Thus,

*Hypothesis 1: As industries in the U.S. economy are facing volatile, complex, uncertain, and ambiguous business environments caused by a host of factors—global competition, increase in bureaucratic cost, unstable financial markets, and frequent technological changes—the association between the firm's asset size and financial performance (ROIC, ROA, ROE, Asset Turnover) is declining or becoming negative for the scale-economy firms (firms founded before 1990 and operating in traditional industries).*

## 4 Analysis and findings

With the COMPUSTAT database, we gathered the data available on all U.S. public companies founded before the year 1990 in terms of assets, revenue, net income, profitability ratios, asset turnover, market capitalization, and price-earnings ratio. Our study focused only on firms operating in traditional industries founded before the 1990s,—because the structure, scope, and strategies of the traditional industry firms have been predominantly scale-economy driven as they were founded before the arrival of information and internet technologies in the 1990s onwards. The sample data examined for the study excluded the knowledge-era economy firms that were founded after the year 1990 and operating in computers, software, internet, and mobile & wireless telecommunications because these industries are enjoying high growth and high profitability in comparison to traditional industries.

After omitting the observations with missing data, we compiled the data for the period from 1970 to 2013 with the sample size of firms for each year ranging from N = 1150 to N = 4560 encompassing a total of 128,758 firm-year observations. The firm asset size ranged from a minimum of about $10 million to a maximum of $49.64 billion in 1970; a maximum of $173.59 billion in 1985; a maximum of $902.21 billion in 2000; and a maximum of $2.67 trillion in 2013. First, to trace the evolving generic growth and profit trends in the U.S. industrial economy, we examined the entire data set for all 44 years with five-year cumulative averages of major finance variables (reported in Table 1) and conducted a correlation analysis among critical variables for select years. The cumulative averages and the correlations data of firm-level variables from the 1970s to 2013 suggest that the profitability ratios and the associations between firm assets, revenue, net income, and market capitalization have been acutely declining since the 1990s.

Because the firm size and profitability relations may vary in each industry due to the respective structure, competition, and environment, we further examined the relationships between yearly financial variables assets, revenue, and profitability ratios of firms within two different sample industries: Electrical & Electronics manufacturers (SIC 36), and Steel, Aluminum, and Metal manufacturers (SIC 33). These two industries were presented as representative samples of the scale economy industries, for the reason, they represent some of the oldest established industries; as of the year, 2000, the average age of firms in the samples is more than 50 years and their average size of assets is larger than $3 billion. In recent times, these industries have been subject to ominous challenges from global competition,

disruptive technologies, and ever-changing market and regulatory pressures. Also, because these industries have distinct financial structures in terms of the assets, revenue, income, and profitability ratios, analyzing these dissimilar industries would be a robust approach to examine the impact of industry/environment disruptions on firms' financial variables and strengthen the external validity of the study findings.

The empirical examination included four different financial performance ratios: return on assets (ROA), return on invested capital (ROIC), return on equity (ROE), and asset turnover (sales/assets) to provide depth and breadth to the analysis of firm performance (Houghton & Woodliff, 1987; Srinivasan & Narayanan, 2017). Return on assets (ROA) is calculated as net operating profit after tax (NOPAT) divided by total assets. This measure captures the returns the company can generate relative to its entire asset base. Although ROA is a good metric to use in comparing firms, in comparison to ROIC, the ROA measure can be inflated or skewed when a company is holding lots of excess cash or cash equivalents. Return on invested capital (ROIC) is calculated as net operating profit after tax (NOPAT) divided by operating net working capital plus operating fixed assets. Operating fixed assets are any assets that are expected to contribute to earnings such as equipment, land (if not excess), goodwill, and intangible assets, but excluding cash thus providing a measure of a company's actual capacity to generate returns through its productive assets.

Return on equity (ROE) is calculated as net income after tax divided by total equity (excluding preferred shares), which explains the percentage return earned on each dollar invested by the shareholders. This metric is quite germane for the comparison of companies with similar capital structures in terms of debt, and shareholders' equity (Houghton & Woodliff, 1987). Unlike the ROA metric—which is stable across all types of capital structures, ROE can swing to extremes while comparing companies with divergent debt-equity structures. Asset turnover or capital turnover is an important measure of the ability to deal with competition and the sales-generating ability of the firm's assets, and it is calculated as net sales revenue divided by total assets (Srinivasan & Narayanan, 2017).

The analyses of yearly data of the financial variables and performance ratios for the two industries—Electrical & Electronics manufacturers, and Steel, Aluminum, & Metal producers) indicate a declining association between firm asset- size and profitability ratios. The following tables present the aggregate data of the financial variables of firms in the two sample industries: Electronics & Electrical manufacturing (SIC 36), and Steel, Aluminum, and Metal production (SIC 33) (see Table 2a, b).

A separate regression analysis was carried out for each sample industry. The regression models included the entire panel data for a period of 24 years (1990–2013) and controlled for several variables that significantly affect the firm performance and industry environment. The regression models included a variable 'crisis/recession years' (1990, 1991, 2001, 2002, 2008 & 2009) to control for the effects of harsh economic recessions observed in those years (as per NBER—National Bureau of Economic Research and U.S. Bureau of Economic Analysis). A control variable 'the number of business segments' the firm generates revenue from was included. The number of business segments in the sample ranged from 1 to 7. The COMPUSTAT data provide segment data based on the number of product

**Table 2** Industry averages of firm size and performance ratios (a) (SIC 36) (U.S. electronics & electrical manufacturers; firms founded after 1990 not included), (b) (SIC 33) (U.S. steel, aluminum and metal manufacturers; firms founded after 1990 not included)

| Years | Number of firm-year obs | Assets million | Revenue million | Net income | ROS | ROIC | ROA | ROE | Asset turnover | Market cap million | P/E ratio |
|---|---|---|---|---|---|---|---|---|---|---|---|
| (a) | | | | | | | | | | | |
| 1985–1989 | 610 | 1857.23 | 1786.05 | 116.26 | 0.057 | 0.074 | 0.057 | 0.114 | 1.19 | 1641.95 | 21.01 |
| 1990–1994 | 590 | 2826.53 | 2533.31 | 83.20 | 0.035 | 0.057 | 0.040 | 0.041 | 1.13 | 1972.17 | 21.12 |
| 1995–1999 | 574 | 3193.33 | 2711.82 | 212.70 | 0.045 | 0.076 | 0.054 | – 0.027 | 1.02 | 5756.49 | 32.43 |
| 2000–2004 | 556 | 3981.18 | 3336.19 | 186.35 | – 0.063 | 0.008 | 0.001 | 0.028 | 0.93 | 7121.83 | 41.68 |
| 2005–2009 | 530 | 4973.97 | 4494.74 | 327.70 | 0.003 | 0.056 | 0.022 | 0.157 | 0.99 | 6348.52 | 26.92 |
| 2010–2013 | 440 | 6125.84 | 4911.10 | 460.75 | 0.031 | – 0.002 | 0.025 | – 0.018 | 0.97 | 7177.50 | 25.85 |
| (b) | | | | | | | | | | | |
| 1985–1989 | 487 | 891.16 | 906.74 | 19.27 | 0.018 | 0.030 | 0.031 | 0.018 | 1.32 | 443.52 | 18.51 |
| 1990–1994 | 488 | 1144.12 | 1084.90 | 13.44 | 0.016 | 0.045 | 0.030 | 0.071 | 1.26 | 736.37 | 22.60 |
| 1995–1999 | 610 | 1598.06 | 1433.70 | 68.75 | 0.036 | 0.083 | 0.051 | 0.102 | 1.18 | 1327.72 | 22.72 |
| 2000–2004 | 495 | 3331.84 | 2492.10 | – 23.36 | – 0.014 | 0.019 | 0.016 | 0.066 | 1.08 | 2313.72 | 26.65 |
| 2005–2009 | 390 | 5090.40 | 4211.58 | 343.92 | 0.041 | 0.102 | 0.066 | 0.111 | 1.14 | 4099.41 | 24.19 |
| 2010–2013 | 266 | 7295.22 | 5615.64 | 142.36 | 0.038 | 0.055 | 0.043 | 0.047 | 1.06 | 3868.23 | 27.71 |

lines or distinct market segments from which the firm generates revenue yearly. The regressions included a control variable for the effect of mergers/acquisitions (in terms of the number of mergers/acquisitions firms made in the study period range—from 1990 to 2013). This measure additively captured the number of mergers each firm made as time progressed between the years 1990–2013; the number of mergers/acquisitions in the samples ranged from '0' to '4'. To capture another time-line and growth-related effects on the firm performance, another control variable 'firm age' was included in the regressions.

Since the firm revenue directly relates to net income, and in turn directly influences all profitability ratios, and because the firm size, growth, and profitability are always the joint outcome of the revenue and assets, the variable firm revenue was included in all regressions to account for its confounding effect on the dependent variables (profitability ratios). The dependent variables and the independent variables on assets and revenue were log-transformed to reduce the skewness and kurtosis and meet the normal distribution condition. The main predictor variables and their interactions were mean-centered to limit the impact of multicollinearity. The regression analysis of profitability ratios on assets, revenue, firm age, the number of business segments, and the number of mergers/acquisitions (of U.S. public companies founded before 1990) in two industries—Electrical & Electronics manufacturers (SIC 36); and Steel, Aluminum Metal manufacturers (SIC 33)—reveal a consistent negative relationship between firm asset size and profitability ratios (performance metrics). The correlation analyses and the regression models for the two industry groups (SIC 36 and SIC 33) including both control variables, main predictors, and their interaction terms are presented in the following Tables 3a, b and 4a, b.

The validity of the measures and findings was confirmed by the following analyses. The aggregates reflecting the impact of recessions on the data charts extend the validity to both samples and research findings. In addition to controlling for the crisis/recession years, the regression models included several control variables that explain the firm performance in terms of their impact size, growth, diversification, age, and timeline enhancing the validity of the research findings. To verify the theoretical and external validity of the hypothesized theoretical relationship, this study examined the relationships among the variables with additional sample industry groups: Transportation equipment, automobile parts & components (SIC 37), and Banking firms (SIC 60). We found similar patterns of declining associations between firm asset size, performance ratios, and market cap across these industries.

To further validate the results of the relationships between asset size and performance metrics, segmented regressions were examined for 4 ranges of asset sizes in the industry samples for 1990 to 2013: (a) $10 million to $100 million; (b) $100 million + to $1 billion; (c) $1 billion + to $10 billion; and d) greater than $10B. The segmented regressions revealed that, as the firm asset-size range increased, the negative associations between firms' asset size and performance variables were increasingly negative, that is the slope of the negative coefficient increased for larger asset sizes. For the asset-size range up to $100 million, the asset-performance relationship is positive; however, for the ranges larger than $100 million, the asset-performance relationship became increasingly negative. Similar results were

**Table 3** Descriptive statistics and correlations

| Variables | Mean | SD | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (a) Industry Sample SIC 36—electrical & electronics manufacturers | | | | | | | | | | | | |
| 1. Crisis/Recession periods | 0.25 | 0.43 | 1.00 | | | | | | | | | |
| 2. No. of business segments | 2.50 | 1.33 | − 0.003 | 1.00 | | | | | | | | |
| 3. No. of Mergers/Acquisitions | 2.29 | 0.96 | − 0.017 | .372** | 1.00 | | | | | | | |
| 4. Firm Age | 52.63 | 30.80 | − 0.009 | .397** | 0.242** | 1.00 | | | | | | |
| 5. Revenue (millions) | 3401.30 | 10,006.21 | − 0.018 | .431** | 0.162** | 0.277** | 1.00 | | | | | |
| 6. Total Assets (millions) | 4043.95 | 12,293.41 | − 0.011 | .437** | 0.155** | 0.244** | 0.977** | 1.00 | | | | |
| 7. ROIC | 0.038 | 0.49 | − 0.030 | .064** | 0.069** | 0.042* | 0.054** | 0.047* | 1.00 | | | |
| 8. ROA | 0.031 | 0.15 | − 0.116** | .095** | 0.098** | 0.037 | 0.070** | 0.061** | 0.511** | 1.00 | | |
| 9. ROE | 0.059 | 2.10 | .023 | .026 | 0.004 | 0.011 | 0.025 | 0.023 | 0.196** | 0.107** | 1.00 | |
| 10. Asset Turnover | 1.04 | 0.39 | − 0.013 | − 0.125** | − 0.207** | 0.055** | − 0.106** | − 0.164** | 0.083** | 0.076** | 0.017 | 1.00 |
| (b) Industry Sample SIC 33—steel, aluminum & metal manufacturers | | | | | | | | | | | | |
| 1. Crisis/Recession Periods | 0.25 | 0.43 | 1.00 | | | | | | | | | |
| 2. No. of Business Segments | 2.87 | 1.28 | − 0.013 | 1.00 | | | | | | | | |
| 3. No. of Mergers/Acquisitions | 1.90 | 1.09 | − 0.003 | 0.192** | 1.00 | | | | | | | |
| 4. Firm Age | 59.10 | 32.72 | − 0.016 | 0.164** | 0.114** | 1.00 | | | | | | |
| 5. Revenue (millions) | 2535.65 | 7310.64 | − 0.020 | 0.218** | 0.262** | 0.052* | 1.00 | | | | | |
| 6. Total Assets (millions) | 3030.22 | 9883.28 | − 0.015 | 0.224** | 0.255** | 0.050* | 0.965** | 1.00 | | | | |
| 7. ROIC | 0.066 | 0.17 | − 0.077** | 0.023 | 0.023 | − 0.003 | 0.033 | 0.019 | 1.00 | | | |
| 8. ROA | 0.045 | 0.08 | − 0.088** | − 0.007 | 0.028 | − 0.024 | 0.026 | 0.013 | 0.860** | 1.00 | | |
| 9. ROE | 0.080 | 0.35 | − 0.034 | 0.023 | .015 | − 0.041 | 0.026 | 0.023 | 0.639** | 0.607** | 1.00 | |

**Table 3** (continued)

| Variables | Mean | SD | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10. Asset Turnover | 1.17 | 0.45 | 0.011 | − 0.111** | − 0.177** | 0.030 | − 0.162** | − 0.227** | 0.062** | 0.112** | 0.044 | 1.00 |

Mean, Standard Deviations (SD), & Correlations are based on N = 2677; (Data Period 1990–2013)

Mean, Standard Deviations (SD), & Correlations are based on N = 1907; (Data Period 1990–2013)

All correlations above 0.042 are significant at $p < 0.05$ (two-tailed test)

All correlations above 0.050 are significant at $p < 0.05$ (two-tailed test)

**Table 4** Regression of firm performance on firm assets and revenue

| Variables | ROIC | ROA | ROE | Asset Turnover (Revenue/ Assets) |
|---|---|---|---|---|
| | β | β | β | β |
| (a) Panel Data of publicly listed U.S. electronics & electrical manufacturers (SIC 36) (Data range 1990–2013) | | | | |
| Crisis/recession Periods | – 0.073*** | – 0.053*** | – 0.071*** | – 0.003*** |
| No. of business segments | – 0.291*** | – 0.284*** | – 0.263*** | – 0.032*** |
| No. of Mergers/acquisitions | – 0.580*** | – 0.603*** | – 0.581*** | – 0.093*** |
| Firm age | – 0.018* | – 0.023** | – 0.019* | 0.000 |
| Revenue | .323*** | .216*** | .381*** | 4.45*** |
| Total assets | – 0.039** | – 0.059** | – 0.041** | – 4.56*** |
| Firm age * Total assets | 0.022* | 0.001 | 0.053** | 0.001 |
| Revenue * Total Assets | – 0.125*** | – 0.133*** | – 0.139*** | – 0.020*** |
| $R^2$ | 0.85 | 0.88 | 0.81 | 0.99 |
| Adj. $R^2$ | 0.85 | 0.88 | 0.81 | 0.99 |
| F | 1926.84 | 2575.49 | 1424.40 | 471,921.43 |
| N (firm-year obs.) | 2677 | 2677 | 2677 | 2677 |
| (b) Panel Data of publicly listed U.S. Metals, Steel, Aluminum Firms (SIC 33)—firms founded before 1990; (Data range 1990–2013) | | | | |
| Crisis/recession Periods | – 0.073*** | – 0.052*** | – 0.082*** | – 0.010*** |
| No. of business segments | – 0.544*** | – 0.638*** | – 0.500*** | .090*** |
| No. of Mergers/acquisitions | – 0.324*** | – 0.263*** | – 0.322*** | .060*** |
| Firm age | 0.032** | .033** | .026** | – 0.005** |
| Revenue | . 267*** | .163*** | .272*** | 4.16*** |
| Total assets | – 0.142** | – 0.047 | – 0.119** | – 4.48*** |
| Firm Age * Total Assets | 0.003 | – 0.004 | 0.021 | 0.001 |
| Revenue * Total Assets | – 0.043** | – 0.044*** | – 0.045*** | 0.007*** |
| $R^2$ | 0.79 | 0.82 | 0.72 | 0.99 |
| Adj. $R^2$ | 0.79 | 0.82 | 0.72 | 0.99 |
| F | 907.92 | 1115.84 | 623.11 | 94,217.24 |
| N (firm-year obs.) | 1907 | 1907 | 1907 | 1907 |

Table reports standardized beta coefficients; *** $p < 0.001$; ** $p < 0.01$; *$p < 0.05$ (2-tailed test)

The variables ROIC, ROA, ROE, Asset Turnover, Revenue, and Total Assets were log-transformed

observed for all four dependent variables (ROIC, ROA, ROE, and Asset Turnover) for both industry samples SIC 36 and SIC 33 supporting the findings.

The overall findings of the study support the hypothesis that the larger the firm assets the weaker the financial performance between the years 1990 and 2013 among the U.S. public firms operating in traditional scale-economy industries. The inability of the larger firms to sustain better financial performance can be attributed to dis-economies of scale, inefficiency, lack of agility, bureaucratic complexity, and firm governance catering to short-termism, besides the disruptions arising

from the turbulent global competition and technological changes. The negative or weaker associations of the size/scope, and growth-related variables firm age, the number of business segments, mergers/acquisitions, and the firm asset size with the performance ratios (ROIC, ROA, ROE, & Asset-Turnover) across the two industries examined in our study conjointly reveal that the performance of larger companies has been affected by both the organizational and environmental factors. On the one hand, Firm asset size appears to be excessively growing without producing matching net income, on the other hand, the profitability is getting squeezed by the adverse business environments. The significant negative coefficients of interaction terms (Revenue * Total Assets) in the regressions on multiple performance metrics across the industry samples confirm that as firms got bigger, their performance weakened. The negative association between asset turnover and firm asset size over time indicates the impact of the rising competitive threats and increasing organizational inefficiency.

The results of the study imply that as firms grew bigger, the costs associated with corporate governance may be unduly rising; specifically, the bureaucratic costs may be rising fast due to a lack of agility and responsiveness to meet the volatile, uncertain, complex, and ambiguous (VUCA) business environments. Not surprisingly, the mergers/acquisitions did not have any positive impact on firm performance suggesting the negative impact of the external environment and such costly integration strategies are not paying off. While it is undeniable that the size of firm assets shall also reflect the intangible resources, intellectual capital, organizational capabilities, and significant management factors that are consequential to financial performance, however, the long-range data indicating negative associations between firm asset size and performance ratios is a clear suggestion that many large firms are operating at a threshold of diminishing returns to both the assets and stock value. The negative associations between the ROE and the firm asset size, and the time variable indicate the risk accruing to long-term investors.

The sliding profitability and asset-turnover ratio consistently observed over time and across multiple industries unequivocally imply that firm governance is being challenged by several disruptive forces arising out of the major changes in the industries and economy. Since the data drawn for this study reflect the trends in the traditional U.S. industries, the findings can be considered a revelation of the challenges from the disruptions due to shortened technology and product life cycles, increasing global competition, and intense rivalry. The findings concerning the electrical and electronics manufacturing industry attest to this trend. Despite tremendous demand and global growth opportunities in this industry, the profitability has been quite ephemeral for most large companies.

Consider, for example, the impact of VUCA disruptions arising from the dynamic technological changes. With the technologies and markets frequently shifting trajectories, the return on assets, and return on equities are getting truncated. Integration or diversification through mergers, acquisitions, and recurrent scaling up of investments within large corporate entities will be dysfunctional from the perspective of long-term shareholder value. Let us consider the case of the Time Warner—AOL merger (in the year 2000), which was one of the biggest corporate

mergers in U.S. business history—about $150 billion in value. At the time of the merger, it was expected that AOL would be the information and media highway for the Time Warner group. However, within 2 years, it became quite apparent that this merger was a strategic blunder, because the technologies from other industries converging through the internet challenged AOL's dominance, eventually replacing its modem technology with several other new options for consumers. None of the benefits envisioned during the merger were realized, resulting in a more than 70% erosion of shareholders' value (McGrath, 2015). The financial crisis in the year 2008 experienced by the entire global economy and particularly construction, real estate, steel, automobiles, and manufacturing may be a culmination of this trend—heavy asset-laden corporations that were built through expensive, high-risk mergers are seriously challenged by the emergent turbulent economic and industry conditions.

## 5 Conclusions

Firm asset size is the most fundamental construct explaining the link between several significant management antecedents and firm performance. There are traditional sayings in business, like "big fish eats small fish", "bigger the better", or "too big to fail" suggesting that the larger business entity could secure advantages against rivals and can fetch higher returns. Although it has been a well-established notion in business that a large organization with more capital and assets will enjoy the advantage in terms of economies of scale, power, and profitability, many large firms especially those operating in traditional industries are increasingly experiencing the financial crisis. This study examined, with long-range panel data, whether large firms (with a huge asset base) can sustain their financial power and profit advantages, given that the industries in the advanced economies are witnessing turbulent changes in the economic environment. With long-range panel data on U.S. public firms operating in the traditional industrial economy, we found empirical support for the hypothesis that the *larger* the size of firm assets, the weaker the association with firm performance and profitability ratios.

The extant studies in the fields of finance and management often fail to capture the challenges arising from disruptive technologies, global competition, and financial volatility (Hitt et al., 2007; Rousseau, 2000). The typical cross-sectional data or short-range data cannot reveal the systemic changes among the variables of interest when the organizational population is encountering system-wide changes. We can have a better understanding of the impact of major economic changes on firms' performance only by tracing the evolving patterns of organizational antecedents, performance variables, and the changing relationships between them. Our study captures the evolving patterns of both the antecedents, firm performance outcomes and their relationships over time.

Our study results reveal a declining trend in the profitability ratios over time, whereas the size of the firm assets and the price-earnings ratio of the stocks are on a dramatic rise. This trend explicitly implies the weak links between firm governance, capital structure, and financial ratios, and points to the rise of investment risk to long-term investors. The accustomed routine of pursuing mergers and acquisitions

to realize quick growth, industry consolidation, or diversification is not translating into shareholder value for many large companies. In this light, any growth strategy must encompass building organizational capabilities for increasing agility and responsiveness. Firms need to cut bureaucratic costs through innovations in organizational structure and improve the trust equity with employees, suppliers, and customers. Instead of a contract-bound organization structure that carries high transaction costs, or a hierarchy-laden integrated structure with high bureaucratic costs, firms need to build a trust-driven, symbiotic, and less-hierarchical organization that simultaneously renders organic growth, agility, and dynamic capability (Contractor et al., 2010; Dobbs et al., 2015).

One prominent message extending from this study is the impact of short-termism in financial markets and its influence on corporate governance—which is increasingly cited as a source of corporate malaise (Donaldson, 1985; Martin, 2011; Rappaport, 2006; Shiller, 2005). Given the stellar rise in the size of firm assets disproportionate to the size of the revenue and net income, rather it is not surprising there is a disconnect between Price-Earnings Ratio (P/E), firm size, and financial performance metrics. The findings of the study underpin the notion that corporate governance is more inclined toward quarterly benchmarks and empire-building in the guise of aggressive growth, rather than pursuing efficiency, innovation, and profitable growth to sustain long-term returns to shareholders. Notwithstanding the benefits of synergy, size, scope, or diversification espoused in the mergers and acquisitions, the increasing disconnect—between the firm asset size, performance measures, and shareholders' value—captured in this study denotes a crisis for the large firms as many of them experiencing diminishing returns to assets and stock value.

A steady decline in the average profitability of firms across industries is a consequence of changing industry structures, disruptive technologies, and turbulent markets. Especially with the internet and digital revolutions, and the product domains and technologies fast converging causing the dramatic change in competition, cost, and profitability. With these changes, in many industries, now it is becoming almost impossible to define industry borders. Thus, companies cannot have an unambiguous specification of their products, markets, or segments. Firms may simultaneously belong to many industries and markets. The idea of industry competition would not make much sense in many a case, given that firms will face rivalry from distant and unrelated sectors of the global economy.

VUCA business environment, diminishing returns to assets, and high-risk contexts are forcing firms to reconfigure their strategy, value chain, and organization. Through the dis-aggregation of assets, ownership sharing, franchising, and transfer pricing arrangements, firms can contain not only the agency cost but also can reduce the investment risk and transaction cost (Contractor et al., 2010). Through modularized products and production organization, and disaggregated operations firms can increase agility, product variety, innovation, and customer responsiveness (Baldwin & Clark, 2000; Ethiraj & Levinthal, 2004; Langlois, 2002). The sustained performance of Nucor in the highly competitive steel industry is often credited to its lean, agile, and dispersed organizational structure. On other hand, we are also

witnessing that small and mid-cap firms are outperforming large-cap companies in every aspect of performance.

Given the significance of collaborative strategies like alliances or networking to serve the markets better and secure competitive advantage, divisional/functional autonomy, cross-industry franchises, scale reduction, and disaggregated forms of organization are inevitable in the coming years (Contractor et al., 2010; Faustino & Leitao, 2011). As evidenced in recent times, many large corporations such as GE, HP, ALCOA, and Danaher have sliced the corporation into relatively smaller, independent, but interlocked companies to achieve nimbleness and agility, and sustain performance and investor attractiveness. The beer industry casts good evidence on how microbreweries like Samuel Adams and the Sierra Nevada were able to challenge the giant industry rivals by working with a band of contract brewers, bottlers, and distributors and operating as a school of fish. With product variety and multipronged strategy, the smaller brewers have registered higher sales growth, profitability, and returns to shareholders than the large integrated beer companies (Brewers Association Report, 2017). For instance, the smaller brewer Samuel Adams (Boston Beers) has outperformed the world's largest beer company Anheuser-Busch InBev in every aspect of profit performance and delivered 5 times more shareholder returns than Anheuser-Busch InBev. Also, the digital economy has enabled the creation of lean, dispersed, and disaggregated organizations that spans the globe. Uber, Airbnb, and AAA are exemplars of how large global companies can be built at once with a lean organization and dispersed ownership of assets (Lassiter & Richardson, 2011; Moon, 2015).

From the investment angle, disaggregation – slicing a large firm into relatively smaller units with multiple stock listings but nested within one holding company (group) for synergy – can bring more agility to corporate strategy and help realize the benefits of both integration and diversification. Through multiple listings, stocks of the sliced assets can fetch higher returns to shareholders than they would do under a single listing. Many large business houses already operate like a School of Fish; for instance, Tata Group of India, and Samsung Group of South Korea are a few well-known corporate icons controlling many independent—but interdependent—business units with multiple stock listings. Also, shoaling is an effective framework to slice, scale down, or restructure the assets into high-value creating configurations before pursuing new mergers.

The findings of the study imply that economic and regulatory institutions have a greater role to play in improving business performance given the disruptions from volatile financial markets. Reforms in the financial markets addressing dividend distributions and long-term shareholders' value shall provide incentives for both managers and investors so that corporate governance will be directed toward the financial health of companies rather than playing to the short-term interests. Until major policy changes occur at the national level, in terms of regulations or incentives promoting the interests of long-term investors, the links among firm strategy, assets, and financial performance may get further weakened thus exacerbating the investment risk.

## Declarations

**Conflict of interest** No conflict of interest. The author or the research work does not have any conflict of interest with sources or individuals or companies reported in the manuscript. All the information presented in the manuscript is from published secondary resources and included with full recognition of the sources.

**Research involving human participants and/or animals** Not applicable. This research does not involve any human participants or animals.

**Informed consent** Not applicable. All the information presented is from published secondary resources and did not require any consent.

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