

Intangible Investments, Cost Structure, and the Dynamics of Corporate Profits*

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ABSTRACT

Intangible investments require substantial upfront costs, are difficult to repurpose if unsuccessful, involve considerable uncertainty, and once created, can be used at near-zero marginal costs. These characteristics shift firms' cost structures toward fixed costs and create economies of scale for successful firms, while exposing unsuccessful ones to significant fixed-cost burdens. Using firm-level data from 1970 to 2024, we show that rising intangible intensity increases both contribution margin ratios and the degree of operating leverage, with the former rising primarily among intangible-intensive firms that successfully scale up ("leaders") and the latter among those that do not ("laggards"). We document three consequences of these cost structure changes. First, profit dispersion widens substantially, with aggregate margins rising even as median margins decline. Second, the growing output of high-intangible leaders accounts for a significant portion of the secular rise in aggregate profits. Third, the operating leverage of laggards raises the procyclicality of aggregate profits. In sum, our findings suggest that the rise of intangibles has fundamentally altered the level, dispersion, and cyclical behavior of corporate profits.

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1. Introduction

Innovation generates intangible assets with distinct economic properties. They require large upfront investments with highly uncertain payoffs, are non-rivalrous in use, and can be used in production with near-zero marginal cost (e.g., Romer 1990; Chen, Harford, and Kamara 2019; Crouzet, Eberly, Eisfeldt, and Papanikolaou 2022; Glaeser and Lang 2024). These attributes generate scale and scope economies that enable successful incumbents to spread fixed costs over products, divisions, and regions, while other firms face high barriers to entry and lower survival rates (Crouzet et al. 2022).¹ Prior research has linked intangible investment to the rise in price markups, market concentration, and the emergence of superstar firms (Crouzet and Eberly 2021; Ayyagari, Demirgüç-Kunt, and Maksimovic 2024), but the economy-level effects of the rise in intangible intensity have received significantly less attention (De Ridder 2024). In this paper, we examine the heterogeneous consequences of the shift from tangible to intangible inputs to production, focusing on three main outcomes: the secular rise in aggregate profits, the widening dispersion in profits across firms, and the rising procyclicality of corporate profits.

Our predictions stem from the cost-structure implications of intangible intensity. Intangible-intensive firms have high fixed costs and, when operating at scale, low per-unit variable costs (e.g., Crouzet et al. 2022).^{2,3} This cost structure has markedly different consequences for

¹ Successful firms accumulate resources and expertise that enable them to absorb additional risk and expand into related areas. These dynamics are especially pronounced for platform businesses, where network effects and customer lock-ins amplify winners' advantages and entrench the dominant firms (Haskel and Westlake 2018).

² Intangible investments involve large upfront expenditures that remain relatively stable in the short term and do not vary proportionally with production volume. Intangibles also require ongoing maintenance in the form of R&D spending or other SG&A expenses that cannot be easily scaled down (Chen et al. 2019). For example, Curtis, McVay, and Toynbee (2020) show an increasing portion of R&D spending is allocated to "maintenance" projects, rather than strategic or truly innovative ones. Moreover, maintaining intangibles requires continuous innovation to prevent obsolescence, with outcomes that are more uncertain than those from replacing physical capital (Crouzet et al. 2022).

³ Importantly, this cost structure is a property of the production technology, not a strategic choice made by intangible-intensive firms.

successful and unsuccessful intangible-intensive firms (“leaders” and “laggards,” respectively).⁴ Leaders operate at scale and convert low variable costs to high contribution margins that help offset high fixed costs, yielding persistently high profits insulated from short-term demand fluctuations. In contrast, laggards’ lack of scale leads to slim contribution margins that are too close to their high fixed costs, leading to a high degree of operating leverage, where even modest percentage changes in sales can produce large percentage changes in profits. These observations generate three predictions: (1) a rise in dispersion of corporate profitability, driven by intangible-intensive firms, (2) a secular rise in aggregate corporate profits, driven by intangible-intensive leaders capturing an expanding share of aggregate output, and (3) amplified procyclicality of aggregate corporate profits, driven predominantly by intangible-intensive laggards with a high degree of operating leverage.

We test these predictions using firm-level Compustat data on non-financial corporations from 1970 to 2024, supplemented with macro-level data from the BEA’s National Income and Product Accounts (NIPA). We measure intangible intensity in two ways: R&D intensity, defined as the share of R&D in operating expenses, and knowledge capital, defined as the ratio of R&D-related assets to the total of R&D and physical assets (Peters and Taylor, 2017). The two measures are highly correlated in our sample (Spearman correlation of 0.90; Pearson correlation of 0.67). Among intangible-intensive firms—those with above-median intangible intensity—we classify firms with above-median net profit margin in the prior year as leaders and those with below-median net profit margin as laggards.

In line with prior research (e.g., Srivastava 2014; Bushman, Lerman, and Zhang 2016), we observe a marked rise in intangible intensity over our sample period. Between the 1970s and 2020s,

⁴ We use “leaders” (“laggards”) to refer to intangible-intensive firms that have (have not) successfully scaled their operations, and hence are more (less) profitable.

the median firm's R&D intensity increased by 5.2 percentage points (from 1.1% to 6.3% of operating expenses) and knowledge capital rose by 35.6 percentage points (from 15.3% to 50.9% of total capital). These increases were even more pronounced in the High Tech and Healthcare sectors, where the median trend-implied increases in R&D intensity are 11.88 and 14.58 percentage points, respectively, and in knowledge capital are 42.12 and 56.7 percentage points.⁵ These intangible-intensive industries also increased sharply as a share of public firms, from a combined 11.8% of firms in 1970 to 38.0% in 2024.

The rise in intangible intensity coincided with a notable divergence of aggregate profitability from that of a typical firm. While sales-weighted average net profit margin rose from 4.9% in the 1970s to 7.1% in the 2020s, the median profit margin fell from 4.2% to 2.9%, consistent with profitability gains concentrated among the largest firms. Similarly, we find a sharp rise in the dispersion of net profit margins. For the firms in the top decile, average margins have increased from 14.7% to 29.1% between the 1970s and the 2020s. During the same period, firms in the bottom decile saw margins decline from -1.3% to -141.2%. While the substantial increase in profit margins among top-tail firms has garnered considerable attention (e.g., Autor et al. 2020; Ayyagari et al. 2024; De Ridder 2024), our findings highlight the dramatic deterioration in profitability at the lower-tail of the distribution.

Our results point to the rise of intangible investment as a key structural force behind both the increase in aggregate profitability and the widening dispersion in corporate profits. First, the growing gap between the aggregate and median net profit margins is driven largely by intangible-intensive industries such as High Tech and Healthcare. Second, profit margin dispersion increases with intangible intensity: when firms are double-sorted by either measure of intangible intensity

⁵ The trend-implied changes are obtained by multiplying linear trend estimates representing average annual changes by the length of our sample period (54 years).

and profit margins, the spread between the top and bottom profitability deciles widens nearly monotonically across R&D intensity deciles and displays a hockey-stick pattern at the upper end of the distribution. Third, both the most and the least profitable firms exhibit high levels of intangible intensity, suggesting that intangible investment amplifies heterogeneity in outcomes. The widening divergence in firms' profitability, therefore, reflects the economics of intangible capital that amplifies both upside potential and downside risk.

To examine the cost-structure effects of intangible intensity, we rely on the cost–volume–profit (CVP) analysis framework. The CVP analysis utilizes income statement data, but sidesteps GAAP expense classification issues, such as the allocation of expenditures between COGS and SG&A, and instead relies on the behavior of total costs with respect to sales.⁶ We estimate two CVP-based measures: the contribution margin ratio (CMR), defined as the share of revenue in excess of variable costs, which we obtain by regressing operating income on sales; and the degree of operating leverage (DOL), proxied by the share of fixed costs in total operating costs, which we infer from regressions of the natural logarithm of total operating expenses on the natural logarithm of sales (Cadman and Ferracuti 2025).

Conceptually, the CMR captures the share of each sales dollar remaining after variable costs, which contributes toward covering fixed costs and, ultimately, generating profit.⁷ While a high-CMR firm does not necessarily have higher sales growth, a greater portion of each additional sales dollar is converted into profit. In contrast, the DOL captures risk amplification. Since fixed costs do not move with sales, a larger fixed-cost share magnifies the effect of sales fluctuations on

⁶ The CVP approach does not assume that COGS is variable and SG&A is fixed. Both line items contain a mix of variable and fixed components. Instead, the CVP framework extracts the variable–fixed split from the behavior of total operating costs with respect to sales, sidestepping the limitations of GAAP line classification and the concern that the secular reallocation between COGS and SG&A may partly reflect classification practices and outsourcing rather than a genuine change in cost structure (Shapiro and Yurukoglu 2026).

⁷ The CMR is conceptually related to, but distinct from, the price-over-marginal-cost markup studied in the macro-IO literature; we do not estimate output elasticities and do not interpret CMR as a direct measure of market power.

operating income, so that a given percentage change in sales produces a larger percentage change in profit, boosting earnings when sales rise but exacerbating losses when they fall.

Both CMR and DOL increase with intangible intensity, but through distinct groups of firms. Leaders exhibit the highest CMRs, consistent with low average variable costs once the intangible is developed and the firm is operating at scale. Laggards, by contrast, often have negative CMRs, suggesting the absence of economies of scale. The relation between intangible intensity and operating leverage is similarly heterogeneous: relatively weak for leaders, who operate at a greater scale and thus have higher contribution margins and lower fraction of fixed costs, but substantially stronger for laggards, whose limited scale implies that fixed costs account for a larger share of total operating costs. These cross-sectional patterns also hold in the time series: the secular rise in CMR is driven by high-intangible leaders, while the rise in DOL is driven by high-intangible laggards.

We next examine the macro-level implications of rising intangible investments. Our results yield two insights. First, high-intangible leaders significantly contribute to the rise in aggregate profits. Their CMRs explain an increasing portion of the aggregate profit share, consistent with intangible-intensive leaders capturing an expanding share of aggregate output, and accounting for roughly one-third of the secular rise in the corporate profit share. Second, high-intangible laggards drive the rise in corporate profit procyclicality. In particular, we find that aggregate profits have become increasingly sensitive to GDP growth, and this increase in procyclicality is concentrated among high-intangible laggards. Together, these findings show that the macroeconomic effects of rising intangibles arise from different segments of the intangible-intensive sector rather than from the sector as a whole. These patterns hold when intangible intensity is measured through either

R&D intensity or knowledge capital. Overall, the transition toward an intangible-intensive economy fundamentally altered the level, dispersion, and cyclical behavior of corporate profits.

Our paper contributes to the literature in three ways. First, we contribute to the debate on the underlying drivers in the rise of corporate profits (e.g., Karabarbounis and Neiman 2019). Corporate profits have risen sharply in recent decades, drawing attention from scholars and policymakers (Autor et al. 2020; Barkai 2020; De Loecker, Eeckhout, and Unger 2020; Koneczal 2022; Albrecht and Decker 2024). The sustained increase in aggregate profits has raised concerns about inequality and broader macroeconomic consequences, prompting calls for stronger antitrust and regulatory enforcement (Gutiérrez and Philippon 2017; Karabarbounis and Neiman 2019). However, the structural drivers of this trend remain poorly understood (Grossman and Oberfield 2022). Our findings indicate that the reallocation of economic output toward corporate profits is closely tied to the growing importance of intangible capital. We complement prior work linking intangible-intensive production to rising aggregate markups (De Loecker et al. 2020; De Ridder 2024) by showing that much of the secular rise in the profit share reflects the growing share of aggregate output produced by highly profitable intangible-intensive firms.

Second, our results document a transformation in the risk profile of the corporate sector tied to the rise of the intangible economy. Rising intangible intensity is associated with a more polarized environment, marked by a widening gap in profitability between high-intangible leaders and laggards. It reshapes not only the cross-sectional distribution of profits but also their sensitivity to macroeconomic conditions, with laggards' elevated operating leverage contributing to the growing procyclicality of corporate profits.⁸

⁸ Our study is also related to the literature examining the valuation of intangible assets in capital markets (e.g., Eisfeldt and Papanikolaou 2013; Raval 2016; Peters and Taylor 2017; Enache and Srivastava 2018; Ewens, Peters, and Wang 2025; Iqbal, Rajgopal, Srivastava, and Zhao 2025; Rajgopal, Basirian, Iqbal, and Srivastava 2025), and a stream of research investigating how the accounting treatment of intangible assets contributes to observed trends in

Third, our CVP-based approach offers a methodological contribution relative to prior work on rising markups. Estimating markups from financial statements requires designating some reported expenses as variable costs. The widely adopted De Loecker et al. (2020) markup measure, used, for example, to link intangibles to higher markups (De Ridder 2024), treats cost of goods sold (COGS) as variable and excludes selling, general, and administrative expenses (SG&A), which mechanically inflates measured markups, especially for the intangible-intensive production that shifts costs from COGS toward SG&A (Traina 2018). By instead focusing on the behavior of operating expenses in relation to sales, we circumvent the need to rely on accounting classification of expenses, generating alternative measures of cost structure and profitability.

Our findings carry important policy implications. While rising profits have prompted calls for stronger antitrust enforcement, our evidence suggests that the aggregate profit surge reflects deeper structural issues driven by intangible investments, rather than a generalized increase in market power. While it is possible that firms that succeed with intangible investments subsequently use their position to exercise market power (Autor et al. 2020; Grossman and Oberfield 2022), the antitrust enforcement efforts need to be balanced against the dangers of stymying innovation. The increasing uncertainty and sensitivity to macroeconomic fluctuations associated with intangible investments impose additional costs on entrepreneurs that require a greater reward, which often comes in the form of eventually achieving “superstar” status. Hence, policies addressing inequality and competition must account for the underlying economics of intangible capital, which amplifies both risk and reward across firms.

macroeconomic measures, such as productivity, and profit and labor shares (Koh, Santaclàudia-Llopis, and Zheng 2020; Barkai, Nallareddy, and Ogneva 2025; Kepler, McClure, and Stewart 2025). We extend this literature by showing that the distinct economic properties of intangible investments, together with their rising prevalence, are central to explaining recent shifts in aggregate corporate profits.

2. Variable Measurement, Sample Details, and Descriptive Statistics

We use two complementary measures of intangible intensity. Our primary measure, *R&D Intensity*, is the ratio of R&D expenditures to total operating expenses (e.g., Srivastava 2014). *R&D Intensity* captures the flow of resources devoted to intangible investment and reflects how aggressively a firm is investing in intangibles. Our second measure, *Knowledge Capital*, captures the accumulated stock of intangibles relative to a firm's overall capital base. Following Peters and Taylor (2017), we define *Knowledge Capital* as net R&D divided by the sum of net R&D and net property, plant, and equipment (PP&E), where net R&D is the perpetual-inventory stock of past R&D expenditures, amortized annually using the BEA industry-specific depreciation rates.⁹ *Knowledge Capital* reflects how central accumulated intangibles are to the firm's capital base.

Our sample includes all firm-year observations in the Compustat annual file between 1970 and 2024 that have non-missing sales, operating expenses, operating income, net income, stock price, and number of shares outstanding; we exclude small firms with less than \$10 million in sales or stock prices below \$1, as well as firms in the financial sector (e.g., Bushman et al. 2016; Nallareddy, Sethuraman, and Venkatachalam 2020). Starting our sample in 1970 ensures that information on R&D expenses, which we use to measure intangible intensity, is broadly available.¹⁰ *Knowledge Capital* data is collected from WRDS and is available only until 2023. Panel A of Table 1 details our sample construction steps. Our final sample consists of 203,790

⁹ Iqbal et al. (2025) propose an alternative measure of knowledge capital that uses industry-year-specific capitalization and amortization rates. We do not use their measure in our primary analysis because its stricter data requirements would substantially shorten our sample period and reduce firm coverage. Both are important considerations for our time-series and aggregate analysis. We use their measure as a robustness check and obtain similar results (untabulated).

¹⁰ To avoid assuming firms with missing R&D expenses do not have intangible investments (Koh and Reeb 2015), we require R&D expenses to be non-missing for our measure of *R&D Intensity*. For our measure of *Knowledge Capital*, Peters and Taylor (2017) set missing R&D expenses to zero, but we require firms to have at least one non-missing year of R&D expenses in the current year or previous seven years.

firm-year observations. To mitigate the influence of outliers, we winsorize all variables at the 1st and 99th percentiles in each fiscal year. Appendix provides detailed variable definitions.

Panel B of Table 1 reports descriptive statistics for our measures of intangible intensity and profitability. On average, R&D expenses account for 7.9% of total operating expenses, and *Knowledge Capital* represents 37.3% of firms' capital base. Both measures of intangible intensity are right-skewed, with the median firm having *R&D Intensity* of 2.7% and *Knowledge Capital* of 31.7%. In contrast, the distributions of operating income margin and net profit margin are left-skewed, with means of 2.9% and -2.9% well below the respective medians of 7.4% and 3.7%. Panel C shows correlations among these variables. The two measures of intangible intensity are highly correlated, with Pearson (Spearman) correlations of 0.67 (0.90). Both measures of intangible intensity are negatively correlated with profit margins, consistent with intangible investments being costly, uncertain, and weighing on contemporaneous profitability.

3. The Evolution of Intangible Intensity and Profit Margins

In this section, we examine the evolution of intangible intensity and profit margins between 1970 and 2024. The economic properties of intangible investments described in Section 1 motivate two expectations. First, given the secular shift in the U.S. economy toward the healthcare and technology sectors (e.g., Srivastava 2014; Bushman et al. 2016), we expect intangible intensity to have risen substantially across the sample period, with the largest increases concentrated in industries that rely most heavily on intangible inputs. Second, because intangibles benefit successful firms through low marginal costs and scalability, while penalizing those that fail to scale due to high fixed and sunk costs, we expect any change in profit margins to be heterogeneous. In particular, aggregate profits, driven by large successful firms, may rise even as the typical firm

experiences declining profitability. We examine both sales-weighted averages, which capture aggregate patterns, and median values, which reflect changes for the typical firm.

3.1. Evolution of Intangible Intensity

Table 2, Panel A, documents the evolution of intangible intensity in each decade of our sample period, along with the annual trend estimates. Consistent with the first expectation above, intangible intensity has risen substantially over the sample period. Average *R&D Intensity* almost tripled from 2.0% in the 1970s to 5.5% in the 2020s (column 1), while average *Knowledge Capital* increased from 18.5% to 30.1% (column 3) over the same period. These changes are even sharper for the median firm each decade. Between the 1970s and the 2020s, median R&D expenses as a share of total operating expenses increased by 5.2 percentage points, from 1.1% to 6.3% (column 2). Concurrently, *Knowledge Capital* rose by approximately 35.6 percentage points, from 15.3% in the 1970s to 50.9% in the 2020s (column 4).

Figure 1 plots year-by-year values and shows the steady increase in *R&D Intensity* both on average and for the median firm (Panel A), and the corresponding rise in *Knowledge Capital* (Panel B).¹¹ These trends are statistically significant and large in magnitude, as shown at the bottom of Table 2, Panel A. Overall, average (median) *R&D Intensity* has risen 3.5 (4.6) percentage points between 1970 and 2024, whereas average (median) *Knowledge Capital* has increased 15.8 (34.0) percentage points between 1970 and 2023.

The rise in intangible intensity is broad-based but, as expected, particularly pronounced in intangible-heavy sectors. Table 2, Panel B, contains linear trend estimates of annual *R&D Intensity* and *Knowledge Capital* for each Fama-French 5 industry category.¹² While the increase in

¹¹ In untabulated analyses, we also examine changes in cost of goods sold (COGS) and SG&A expenses during our sample period. We find a steady decrease in COGS and offsetting increase in SG&A expenses, which is also consistent with a gradual increase in firms' intangible intensity.

¹² Consistent with our focus on non-financial firms, we exclude finance firms from the Other industry category.

intangible intensity is present for all industries on average, and for the median firm in all but the Consumer Goods industry (columns 1 to 4), the changes are especially pronounced for the median firms in the more intangible-heavy High Tech and Healthcare industries. We provide a visualization of these results in Panels C and D of Figure 1, which plots annual denominator-weighted average *R&D Intensity* and *Knowledge Capital*, respectively, for each Fama-French 5 industry. While intangible intensity has consistently increased across all industries, High Tech and Healthcare exhibit the strongest positive trends. Panel B of Table 2 also shows that the representation of these industries within the public firm sample has grown substantially, from a combined 11.8% in 1970 to 38.0% in 2024 (columns 5 and 6). This changing industry composition has accelerated the observed aggregate shift in expense composition. Overall, we observe a widespread increase in intangible intensity, particularly in industries where intangible capital plays a central role in production.

3.2. Evolution of Profit Margins

We next examine how profit margins have evolved alongside the rise in intangible intensity. The economic properties of intangible investments motivate a specific prediction. Because intangibles enable substantial economies of scale for successful firms, the largest and most profitable firms can capture an increasing share of corporate output, raising the sales-weighted average margin. Network effects in platform businesses and the ability of leading firms to leverage their intangibles across products, customers, and geographies reinforce this dynamic (Crouzet et al. 2022). At the same time, the high upfront and sunk costs of intangible investment, combined with uncertain returns, imply that many firms incur substantial unrecoverable losses, depressing margins for the typical firm. We therefore expect a widening gap between the sales-weighted average and the median profit margins, particularly in intangible-intensive industries.

We find evidence consistent with this prediction. Table 3 reports sales-weighted averages and medians of operating and net profit margins for each decade. We find that average profit margins increased modestly, whereas median margins declined. Specifically, average operating income as a percentage of sales rose from 9.9% in the 1970s to 11.9% in the 2020s, while the median operating income margin declined from 8.6% to 6.5%. Similarly, average net profit margins increased from 4.9% to 7.1%, but the median value fell from 4.2% to 2.9%. These patterns indicate that aggregate profitability has increased, but the typical firm has experienced a decline in profit margins. Panel A of Figure 2 highlights this widening gap between aggregate and median profit margins: aggregate (sales-weighted average) margins are trending upward, while median margins are trending downward.

Our findings contrast with those of prior research claiming a drastic increase in corporate profitability and markups (e.g., De Loecker et al. 2020). For example, our findings that pre-tax operating income margins increased from 9.9% in the 1970s to 11.9% in the 2020s (and from 9.6% in the 1980s to 11.3% in the 2010s) stand in stark contrast with the markup increases from 21% in 1980 to 61% in 2016 documented by De Loecker et al. (2020). The difference in the findings stems from De Loecker et al. relying on gross margins or markups calculated without accounting for SG&A expenses. The dramatic increase in markups estimated by De Loecker et al. likely reflects a shift in the structure of operating expenses away from COGS and towards SG&A rather than solely an increase in firms' pricing power (Traina 2018; Ayyagari et al. 2024).

The aggregate-median divergence in profit margins is concentrated in intangible-intensive industries, consistent with the cost-structure mechanism described above. Panel B of Figure 2 plots sales-weighted average and median margins separately by intangible-intensive industries (High Tech and Healthcare) and other industries. The divergence is most pronounced in High Tech and

Healthcare, the two industries with the steepest increases in intangible intensity. By contrast, the divergence is muted or absent in less intangible-intensive industries, providing further support for the link between intangible intensity and profit margin divergence.

In summary, the rise in intangible intensity has produced modest increases in aggregate profit margins alongside declining margins for the typical firm. The resulting divergence is concentrated in industries where intangible capital plays a central role in production. These findings have two implications for the interpretation of prior work on corporate profitability. First, much of the apparent rise in markups documented in the literature reflects changes in cost composition rather than an expansion in firms' pricing power. Second, the heterogeneous effects of intangible-intensive production across firms motivate a closer examination of firm-level outcomes, which we undertake in the next section.

4. Firm-Level Consequences of Intangible Investments

In this section, we analyze how rising intangible investment shapes key firm-level outcomes. We begin by examining the relation between intangible intensity and the cross-sectional distribution of profits, focusing on whether the economic characteristics of intangible investments, including high upfront and sunk costs, low marginal costs, and uncertain payoffs, translate into greater dispersion in realized profit margins across firms. We then extend this analysis by examining how intangible intensity alters firms' cost structures, using the managerial accounting concepts of contribution margin ratios and operating leverage.

4.1. Intangible Intensity and Profit Dispersion

Our findings, thus far, suggest that the changing landscape of corporate expenses has implications for the distribution of profits across firms. Specifically, we predict that increases in intangible intensity will lead to greater cross-sectional dispersion in firm profit margins. This

prediction is driven by the features of intangible investments that are often characterized by substantial upfront fixed and sunk costs, as their initial development and creation typically entail significant, largely irreversible expenditures that do not scale directly with short-term production volumes. Furthermore, once established, many intangible assets, such as new software, digital platforms, or pharmaceutical formulas, can be scaled or deployed to additional users or products at a relatively low marginal cost (Crouzet et al. 2022; Glaeser and Lang 2024). This combination of high fixed and sunk costs with low and scalable marginal costs implies that successful intangible investments can yield high profit margins. However, the success of intangible investments is often subject to considerable uncertainty (Dixit and Pindyck 1994; Curtis et al. 2020). Unsuccessful investments result in significant unrecoverable costs, which depress profitability. The inherent uncertainty surrounding the payoff to these investments creates the potential for wide variation in realized profit margins across firms.

To examine the dispersion of profit margins over time, we group firms into deciles based on their net profit margins for each year in our sample. We then analyze the sales-weighted average net profit margin for firms in each decile for each decade (1970s to 2020s). We find a dramatic increase in dispersion in profit margins across firms, as shown in Panel A of Table 4. The difference in profit margins between the top (10th) and bottom (1st) deciles expanded significantly, from 16.0 percentage points of sales in the 1970s (calculated as 14.7% for the top decile minus -1.3% for the bottom decile) to 170.3 percentage points in the 2020s (29.1% minus -141.2%). This widening is not confined to the extremes; it is also evident across other deciles. For instance, firms in the eighth decile of net profit margins reported an aggregate net profit margin of 7.2% in the 1970s, which rose to 10.0% by the 2020s, a 39% increase. Conversely, profit margins of firms in the third decile deteriorated sharply, falling from 2.1% in the 1970s to -10.4% in the 2020s. During our sample

period, the top four deciles of firms experienced a statistically significant positive trend in net profit margins, while the bottom five deciles saw a decreasing trend. Figure 3 visually confirms this increased dispersion by plotting net profit margins across quartiles for each year of our sample period, clearly showing the widening gap between high- and low-profitability firms over time.¹³

To examine the link between intangible investment and profitability dispersion, we sort all firm-years into deciles of intangible intensity and, within each intangible intensity decile, into *Net Profit Margin* deciles.¹⁴ A clear pattern emerges from the variation in sales-weighted *Net Profit Margin* in Table 4, Panels B and C. Namely, intangible intensity is strongly associated with profit dispersion. The spread between the highest and lowest net-profit-margin deciles within each *R&D Intensity* (Panel B) or *Knowledge Capital* (Panel C) group (“10–1”) increases dramatically with intangible intensity: from 23.0 (23.6) percentage points in the lowest *R&D Intensity* (*Knowledge Capital*) decile to a striking 616.8 (401.2) in the highest. The increasing spread is driven by both upside and downside outcomes, although the downside pattern is more drastic. In lower intangible intensity deciles (1-5), bottom-profit-decile firms are only modestly unprofitable, whereas in high-intangible deciles (6-10), they exhibit sharply negative margins. Similarly, the top-profit-decile firms in high-intangible deciles (6-10) report substantially higher margins compared to firms in low-intangible deciles (1-5). In other words, moving from low to high intangible intensity makes low-margin firms increasingly less profitable and high-margin firms increasingly more profitable, indicating that intangibles magnify both upside potential and downside risk.

¹³ We partition firms into quartiles, rather than the deciles used in Table 4, Panel A, to simplify the presentation and improve clarity. Including all deciles would require us to extend the scale of the figure to include the extreme negative margins of firms in the lowest deciles in recent decades, which would make changes for the top deciles more difficult to discern.

¹⁴ Throughout all our analyses, we use prior year values when sorting firms into groups based on their intangible intensity and net profit margins to avoid introducing mechanical relations.

We next examine how rising intangible intensity contributes to the widening dispersion in profit margins by studying the joint evolution of our measures of intangible intensity and profitability distributions. Specifically, we estimate sales-weighted average *R&D Intensity* and *Knowledge Capital* for firms in each decile of profit margins, by decade, across our sample period, and present the results in Panel D of Table 4. Consistent with the rise in intangible investments being a key driver of profit dispersion, the increase in intangible intensity is most pronounced among firms at the extremes of profitability. Specifically, firms in the lowest profit-margin deciles (1 and 2) and those in the highest deciles (9 and 10) exhibit substantially higher levels of both *R&D Intensity* and *Knowledge Capital*, consistent with the idea that intangible-intensive production magnifies both severe underperformance and outsized success.

Further, in the 1970s, firms in all deciles of net profit margins had relatively low intangible intensity, with a maximum difference in *R&D Intensity* (*Knowledge Capital*) across deciles of 3.7 (9.0) percentage points between deciles 2 and 10 (5 and 7). By the 2020s, firms in the top (bottom) profitability decile had 14.7 (35.6) percentage points higher *R&D Intensity* and 26.4 (52.6) higher *Knowledge Capital* than those in the fifth decile. These patterns point to the scalability enabled by intangible investments as an important factor behind the rise of superstar firms (Autor et al. 2020; Ayyagari et al. 2024). While most prior literature focuses on these highly profitable firms, our results also highlight a dramatic increase in the proportion of firms with steep losses.

Taken together, the evidence shows that rising intangible intensity amplifies the dispersion of firm performance by propelling the most successful firms further ahead while pulling the least profitable further behind. In effect, intangibles increase both the upside potential for leaders and the downside risk for laggards, generating a pronounced divergence in firm outcomes.

4.2. Intangible Intensity, Contribution Margin, and Operating Leverage

The rise in intangible intensity among public firms reflects growing investment in generating knowledge capital, such as novel products, processes, or technological systems. These investments typically require upfront expenditures at a stage when commercial success is highly uncertain. Importantly, these costs are largely fixed: they are incurred regardless of output levels. Consider a car manufacturer versus a software firm. Although both incur management and administrative expenses, the car manufacturer's costs vary closely with production volume: materials, labor, and overhead all rise as more cars are produced. In contrast, most of the software firm's costs arise from maintaining its existing products and developing new offerings, including attracting the specialized labor and computing infrastructure required to continue innovating. These costs are largely fixed, and the marginal cost of serving an additional customer is close to zero. Moreover, the software firm faces greater uncertainty about the commercial viability of new products, whereas returns from a new manufacturing plant are relatively more predictable. Taken together, these considerations imply that greater intangible intensity increases firms' fixed cost bases while lowering their marginal costs (e.g., Anderson, Banker, and Janakiraman 2003; Chen et al. 2019).

Our evidence, an increase in intangible intensity that is more pronounced for the most and least profitable firms, is consistent with this view. To provide more direct evidence on how intangible investments shape firms' cost structures and profit margins, we leverage managerial accounting cost–volume–profit (CVP) analysis that uses income statement data and relies on total-cost behavior with respect to sales.¹⁵ Our CVP approach does not rely on the classification of

¹⁵ Our focus differs from that of the literature on cost stickiness (e.g., Anderson et al. 2003; Banker and Byzalov 2014). Cost stickiness emphasizes the asymmetry in cost behavior that arises from asymmetric adjustment costs and managerial discretion leading to costs declining less when sales fall than they increase when sales rise. Our analysis centers on the fixed versus variable cost structure associated with intangible intensity.

operating expenses to specific GAAP accounts (i.e., COGS, SG&A, depreciation and amortization), which has several advantages. First, it avoids attributing specific cost behavior to different accounts (e.g., Chen et al. 2019). Second, it is not sensitive to managers' expense allocation decisions among operating accounts (Poonawala and Nagar 2019). Lastly, it accommodates economic trends, such as increased reliance on outsourcing, that can affect the evolution of different operating line items (Shapiro and Yurukoglu 2026).

We estimate two CVP-based measures: the contribution margin ratio (*CMR*), defined as the share of revenue in excess of variable costs, and the degree of operating leverage (*DOL*), proxied by the share of fixed costs in total operating costs. Conceptually, contribution margins are related to markups, i.e., prices in excess of variable costs, but do not require estimation of output elasticities, and do not have a direct interpretation as a measure of market power. The degree of operating leverage measures profit elasticity with respect to sales and thus captures the importance of fixed costs on firms' overall cost structures (Cadman and Ferracuti 2025).

We use the following regression model to estimate contribution margin ratios, *CMR*:

$$Op\ Inc_i = \alpha + \beta Sales_i + \varepsilon_i, \quad (1)$$

where *Op Inc* is the annual operating income after depreciation, and *Sales* is the annual sales for firm *i*. We scale both measures by the number of common shares outstanding. Our measure of *CMR* is the β coefficient from Equation (1).

To estimate the degree of operating leverage (*DOL*), we regress log operating costs on log sales (e.g., Noreen and Soderstrom 1994; Cadman and Ferracuti 2025):

$$Ln(Op\ Exp)_i = \alpha + \beta Ln(Sales)_i + \varepsilon_i, \quad (2)$$

where *Op Exp* is annual operating expenses, including COGS, SG&A expenses, and depreciation and amortization. Our measure of *DOL* is one minus the β coefficient from Equation (2).¹⁶

To provide intuition behind these measures, consider a stylized example with a single product and a linear cost function. Let P denote price per unit and Q denote quantity sold, so that revenue is $S = P \times Q$. Further, let VC denote total variable costs, so that $VC = v \times Q$, where v is variable cost per unit, and let FC denote total fixed costs. Thus, operating profit is $\Pi = S - VC - FC$. Total contribution margin is defined as $CM = S - VC = (P - v) \times Q$, i.e., the portion of sales that contributes to covering fixed costs. The contribution margin ratio equals CM scaled by sales: $CMR = CM / S = (S - VC) / S = 1 - (VC / S) = (P - v) / P$. The operating profit margin can then be written as $\Pi / S = (S - VC - FC) / S = CMR - (FC / S)$, so profit margins are higher when contribution margin ratios $(P - v) / P$ are higher and/or when fixed costs (FC) are smaller relative to sales. Operating leverage captures the sensitivity of operating profit to changes in sales and can be measured by the degree of operating leverage (*DOL*), defined as $DOL = (\% \Delta \Pi) / (\% \Delta S)$. Under a linear cost structure with VC proportional to Q and P held constant, *DOL* can also be expressed as $DOL = CM / \Pi$, so for a given contribution margin $(P - v) \times Q$, higher fixed costs (and thus lower Π) imply greater operating leverage and a more elastic response of profits to changes in Q (and hence S). Conversely, a greater contribution margin may lead to lower *DOL*, despite higher fixed costs.

As firms become more intangible-intensive, we expect them to have higher fixed costs and, when they operate at scale, lower per-unit variable costs. Importantly, the effects that such cost

¹⁶ Because the natural logarithm transformations allow us to capture percentage differences across firms, consistent with prior studies we use unscaled measures of *Op Exp* and *Sales* when calculating *DOL* (e.g., Cadman and Ferracuti 2025). Under the assumption of cost linearity within a relevant activity range, the slope coefficient in the cost regression captures the variable-cost share, and one minus this slope yields the fixed-cost share, which we interpret as operating leverage (see also Noreen and Soderstrom 1994; Kallapur and Eldenburg 2005; Aboody, Levi, and Weiss 2018).

structures have on the CMRs and DOL should vary across intangible-intensive firms. Successful high-intangible firms (leaders) can spread fixed costs over large sales volumes, producing high contribution margins and relatively moderate operating leverage. In contrast, high-intangible firms that have not scaled up (laggards) must absorb the same fixed costs over much smaller revenue bases, resulting in elevated operating leverage and lower, possibly negative, contribution margins. Thus, heterogeneity arises because the same cost structure that creates substantial economies of scale for leaders also imposes financial strain on laggards.

We use profit margins to distinguish between leaders and laggards, analogous to Ayyagari et al. (2024), who classify “superstar” firms as those in the top decile of ROIC each year. Applying their approach, we find that superstars are increasingly intangible-intensive. For example, in the 1970s, 47.7% (52.3%) of superstar firms had below- (above-) median *R&D Intensity*. By the 2020s, only 22.5% had below-median *R&D Intensity*, while 77.4% were above the median (untabulated).¹⁷ The pronounced shift toward high-intangible superstars over time is consistent with our findings.

Table 5 shows how cost structures vary jointly with intangible intensity and profitability by estimating *CMR* and *DOL* for the 100 groups of firms double-sorted by our measures of intangible intensity and *Net Profit Margin* deciles (as in Table 4, Panels B and C). We present the *CMR* and *DOL* results using *R&D Intensity (Knowledge Capital)* as the measure of intangible intensity in Panels A and B (C and D), respectively. The bottom rows of Panels A and B reveal two strong patterns. First, both *CMR* and *DOL* increase nearly monotonically with *R&D Intensity*, with the most significant increases at the top deciles. In Panel A, *CMR* rises from 0.04 in the lowest

¹⁷ This pattern is even more striking when using *Knowledge Capital* as a proxy for intangible intensity. Specifically, 44.8% (55.2%) of superstar firms had below- (above-) median *Knowledge Capital* in the 1970s, whereas 19.2% (80.8%) had below- (above-) median *Knowledge Capital* in the 2020s.

R&D Intensity decile to 0.25 in the highest. Panel B shows a corresponding pattern for *DOL*, which increases from 0.01 to 0.18 across the same deciles. The results are similar for *Knowledge Capital* in Panels C and D, although somewhat weaker for *CMR*. Overall, these patterns provide direct evidence that intangible-intensive firms operate with fundamentally different cost structures, marked by higher fixed costs, lower marginal costs, and thus higher sensitivity of profits to changes in sales.

Panel A of Figure 4 plots time-series patterns in *CMR* and *DOL* obtained by estimating Equations (1) and (2) for each year of our sample period. Both measures display a steady, long-run increase throughout the sample period, consistent with greater intangible intensity leading to higher contribution margin ratios and operating leverage.

Consistent with our predictions, we also observe substantial heterogeneity among high-intangible firms. We expect high-intangible leaders that successfully commercialize their intangible investments to fully capitalize on economies of scale, realizing low marginal costs and reducing their effective operating leverage. In contrast, we expect high-intangible laggards to face the same fixed cost structure without the accompanying sales volume, resulting in higher marginal costs and disproportionately high operating leverage. Table 5 provides clear evidence of this asymmetry. In Panels A and C, *CMR* rises with intangible intensity only among the most profitable firms. For low-profitability firms, *CMR* declines with intangible intensity and becomes negative in the highest intangible intensity deciles, consistent with variable costs exceeding sales prices. These results indicate that the aggregate rise in markups documented in prior work (e.g., De Loecker et al. 2020) is driven primarily by successful intangible-intensive firms (Ayyagari et al.

2024; De Ridder 2024), while unsuccessful intangible-intensive firms experience substantial cost pressures.

Panels B and D document differences in *DOL* across the same double-sorted groups. Operating leverage increases with intangible intensity for all firms, but the increase is far greater for unprofitable firms, driving the overall rise in *DOL* across intangible intensity deciles. These results are consistent with our argument that the fixed-cost nature of intangible investments disproportionately raises operational risk for laggards.¹⁸

We extend this analysis to identify the drivers behind the upward trends in *CMR* and *DOL* over our sample period. Each year, we sort firms sequentially into above- and below-median intangible intensity and *Net Profit Margin* bins, resulting in four groups of firms for each measure of intangible intensity. We estimate Equations (1) and (2) for each group in each year and plot the resulting estimates for *CMR* and *DOL* using *R&D Intensity (Knowledge Capital)* in panels B and C (D and E) of Figure 4, respectively. The graphs confirm that the increasing trends in *CMR* and *DOL* depicted in Panel A of Figure 4 are driven by distinct groups of high-intangible firms. Namely, high-intangible leaders drive the rise in *CMR* and high-intangible laggards drive the rise in *DOL*, with other groups exhibiting much weaker trends. In untabulated results, we confirm the annual trends in *CMR* and *DOL* for high-intangible leaders and laggards, respectively, are statistically significant and higher than the trends for any of the other groups by a wide margin. For example, the annual trend in *CMR* for high-intangible leaders is about three (two) times as

¹⁸ In untabulated analyses, we also create firm-specific measures of contribution margin ratios and the degree of operating leverage by estimating Equations (1) and (2), respectively, for each firm using rolling regressions over the previous 12 quarters. We then compute measures across firms by taking sales-weighted averages or the median of the firm-specific values (Cadman and Ferracuti 2025). We prefer our measures derived from cross-sectional regressions because they do not impose survivorship requirements on individual firms and only use contemporaneous information, which yields a more accurate snapshot among public firms each year, which is necessary for some of our later analyses. However, we find similar patterns when using this alternative firm-specific approach.

large as the next highest trend when using *R&D Intensity (Knowledge Capital)* to measure intangible intensity.

To formally assess how intangible intensity shapes *CMR* and *DOL*, we extend Equations (1) and (2) to incorporate *R&D Intensity* or *Knowledge Capital* directly into the estimation. We estimate these modified specifications in a panel regression framework and report the results in Tables 6 and 7.

First, we use the following model to examine how *R&D Intensity* relates to *CMR*:

$$Op\ Inc_{i,t} = \alpha + \beta_1 Intangible\ Intensity \times Sales_{i,t} + \beta_2 Intangible\ Intensity_{i,t} + \beta_3 Sales_{i,t} + \delta_i + \varepsilon_{i,t} \quad (3)$$

where β_1 is the coefficient of interest that captures the association between intangible intensity and *CMR*. We include firm fixed effects (δ_i) in all specifications and, to simplify coefficient interpretation, we standardize all variables to have a mean of zero and a variance of one.

Table 6 summarizes estimation results. Columns 1 and 2 report coefficients estimated separately for firms above and below the median of *Net Profit Margin*, respectively, to capture differential associations for leaders and laggards.¹⁹ The results indicate that intangible intensity significantly increases *CMR* among high-profit firms, whereas the effect is insignificant for low-profit firms, with a much smaller coefficient magnitude. Columns 3 and 4 show that these results persist after including year fixed effects: the relation between intangible intensity and *CMR* remains positive and significant for above-median-profit firms, but it is much weaker and statistically insignificant for below-median-profit firms. In the full sample (column 5), *CMR* significantly increases with intangible intensity, consistent with the association among high-profit firms dominating the aggregate relationship.

¹⁹ We find similar (untabulated) results in Tables 6 and 7 when examining separately firms in the top and bottom quartiles of *Net Profit Margin*, instead of above and below the median.

Second, we use the following model to examine the association between intangible intensity and *DOL*:

$$\begin{aligned} \ln(\text{Sales} / \text{Op Exp})_{i,t} = & \alpha + \beta_1 \text{Intangible Intensity} \times \ln(\text{Sales})_{i,t} + \beta_2 \\ & \text{Intangible Intensity}_{i,t} + \beta_3 \ln(\text{Sales})_{i,t} + \delta_i + \varepsilon_{i,t} \end{aligned} \quad (4)$$

where β_1 is the coefficient of interest that captures the association between intangible-intensity and *DOL*.²⁰

Table 7 summarizes estimation results. Consistent with intangible-intensive firms having a higher share of fixed costs, we find a positive, statistically significant association between *DOL* and both *R&D Intensity* (Panel A) and *Knowledge Capital* (Panel B) across all specifications. However, in line with our predictions, the association is much stronger for less profitable firms. In specifications with firm and year fixed effects, the coefficients on the interaction term for below-median-profit-margin firms (column 4) are more than three times as large as those for above-median-profit-margin firms (column 3).

Overall, our evidence shows that rising intangible intensity fundamentally reshapes firms' cost structures by increasing both contribution margins and operating leverage, but in a highly asymmetric manner. Because intangible investments involve large upfront fixed costs and very low marginal costs, successful firms that scale their intangible assets (leaders) achieve high contribution margins and face relatively modest operating leverage. In contrast, firms that fail to commercialize their intangible investments (laggards) must absorb the same fixed costs over much smaller revenue bases, resulting in disproportionately high operating leverage and, in many cases, negative contribution margins. These asymmetries appear prominently in both cross-sectional (Table 5) and time-series (Figure 4) comparisons and are reinforced by panel regression evidence

²⁰ This model relies on the fact that the coefficient from a regression of $\ln(\text{Sales} / \text{Op Exp})$ on $\ln(\text{Sales})$ equals one minus the β coefficient from Equation (2), which is our measure of *DOL*. The proof of this result is available upon request.

(Tables 6 and 7). Taken together, our evidence indicates that the shift toward intangible investment amplifies the divergence between leaders and laggards by raising margins for the leaders while increasing operational risk for the laggards.²¹

5. Macroeconomic Consequences of Changing Cost Structures

Having established that the rise of intangible investments has fundamentally altered firms' cost structures, we next examine the implications of these micro-level changes for aggregate profit dynamics.

5.1. Consequences for the Dynamics of Aggregate Profits

A central question in economics is why corporate profits have grown faster than economic output in recent decades (Autor et al. 2020; Barkai 2020; De Loecker et al. 2020). The documented shift in firms' cost structures points to one mechanism that could contribute to these dynamics. The transition toward intangible-intensive production has raised firms' contribution margin ratios (*CMR*), enabling successful firms to convert sales into profits more efficiently and benefit substantially from scale. A larger scale of high-intangible leaders may have a disproportionate effect on aggregate profitability and contribute to the rise in the share of corporate profits in GDP.

Contribution margin ratios map directly into the corporate profit share. A firm's profit equals its *CMR* times its sales, less fixed costs. Aggregating across firms, a group's contribution to the aggregate profit share therefore includes the product of two terms: the group's *CMR* and its share of aggregate output. This decomposition implies that a group's contribution to the profit share can grow through an intensive margin (rising *CMR*) or an extensive margin (rising output

²¹ The classification of high-intangible leaders and laggards is moderately persistent. Among firms classified as high-intangible leaders (laggards) by *R&D Intensity* in a given year, 76.1% (74.6%) retain the same classification the following year, and the serial correlation of classification ranges from 0.67 to 0.69 depending on the measure of intangible intensity (untabulated).

share). Our mechanism predicts that intangible-intensive leaders drive the secular rise in the profit share along both channels. Their CMRs rise as scale economies materialize, and their output share rises as they capture an expanding share of corporate output. By contrast, high-intangible laggards exhibit neither a rising CMR nor an expanding output share over the sample period, and hence are less likely to contribute to the secular rise in the aggregate profit share.

To test this prediction, we merge our annual *CMR* estimates constructed from firm-level Compustat data with macroeconomic data from the BEA's National Income and Product Accounts (NIPA). We define the profit share as after-tax corporate profits divided by the gross value added for the non-financial corporate sector (*Profit Share*). We then estimate time-series regressions of the profit share on *CMR* computed separately for high-intangible leaders and high-intangible laggards, using both *R&D Intensity* and *Knowledge Capital* to identify high-intangible firms. In each specification, we interact each group's *CMR* with a time trend. The main effect of each group's *CMR* equals the group's share of aggregate output in the base year, and the coefficient on the interaction term measures how that share evolves over time.²² A positive interaction coefficient indicates that the group's contribution margins have become an increasingly important driver of the aggregate profit share, consistent with the group accounting for a growing share of aggregate output.

Table 8 reports the results. Column 1 confirms the well-documented upward trend in the aggregate profit share, with a time-trend coefficient of 0.122 ($t = 9.04$). Columns 2 and 3 add the *CMR* of high-intangible leaders and its interaction with the time trend. The interaction is positive

²² Strictly speaking, the interaction coefficient captures the extensive margin only if the group's output share trends linearly over time. Because the profit share depends on the product of each group's output share and contribution margin, if the trend in the output share is non-linear the interaction coefficient may also partly reflect a trend in the group's contribution margins. We therefore interpret the coefficient as primarily capturing an extensive-margin effect but also capturing an intensive-margin effect to the extent the output share departs from a linear path.

and statistically significant, with coefficients of 0.024 ($t = 2.15$) for *R&D Intensity* and 0.032 ($t = 2.49$) for *Knowledge Capital*. This pattern is consistent with high-intangible leaders accounting for a growing share of aggregate output over the sample period. Controlling for the increase in the leaders' output accounts for a significant fraction of the trend in the profit share: the linear trend coefficient drops from 0.122 in column 1 to 0.085 and 0.089 in columns 2 and 3, respectively, indicating that roughly 27 to 30 percent of the secular rise in the profit share can be attributed to the growing output of high-intangible leaders.

The corresponding results for laggards are presented in columns 4 and 5. The interaction between laggards' *CMR* and the time trend is small in magnitude and statistically indistinguishable from zero (-0.019 with $t = -0.82$ using *R&D Intensity*, and -0.023 with $t = -1.38$ using *Knowledge Capital*). Hence, we find no evidence of high-intangible laggards accounting for a growing share of aggregate output. Columns 6 and 7 include both groups simultaneously. The leader interaction remains positive and significant (0.026 with $t = 2.40$ in column 6 and 0.042 with $t = 2.93$ in column 7), confirming that the leader result is robust to controlling for the *CMR* of laggards. In the *Knowledge Capital* specification (column 7), the laggard interaction turns weakly negative (-0.020 with $t = -1.81$), suggesting that high-intangible laggards may have lost some relative economic weight over the sample period.

Taken together, these results indicate that the rise in aggregate corporate profits cannot be fully understood without accounting for the changing cost structures associated with intangible-intensive production, and in particular the growing contribution of intangible-intensive leaders. Our findings complement prior research linking intangibles to higher aggregate markups (De Ridder 2024). That literature has drawn scrutiny because its markup estimates rest on the income-statement classification of expenses (De Loecker et al. 2020). This reliance is problematic on two

grounds: reported line items do not map cleanly into variable and fixed costs, and a growing share of firms' costs falls outside cost of goods sold. Once selling, general, and administrative expenses are treated as partly variable, the estimated rise in markups shrinks substantially, suggesting that it has been overstated (Traina 2018). Contribution margin ratios sidestep these classification issues, because they are identified from the behavior of total costs with respect to sales rather than from the allocation of costs across accounts. They also differ from markups conceptually: a contribution margin ratio measures price in excess of average variable cost rather than marginal cost, so it does not by itself indicate market power but instead proxies for the scalability of a firm's operations.²³ Our evidence therefore complements market-power explanations for the long-run rise in the corporate profit share, underscoring the macroeconomic significance of the cost-structure shift induced by intangibles.

5.2. Implications for Procyclicality of Corporate Profits

Lastly, we examine the implications of the rise in operating leverage for the cyclical behavior of aggregate corporate profits. The motivation for this analysis stems from the observation that, as fixed operating costs grow relative to variable costs, profits should become more sensitive to fluctuations in macroeconomic activity. When a firm has a higher degree of operating leverage, any change in sales results in a larger change in profitability. During expansions, rising demand is met with minimal additional variable costs, allowing profits to increase disproportionately. Conversely, during downturns, declining sales leave the firm with a

²³ For intangible-intensive firms with near-zero marginal costs, the CMR and the markup are likely to be highly correlated, since both approach one as marginal cost approaches zero. The two diverge, with a high CMR coinciding with a low markup, only when marginal cost lies well above average variable cost. This divergence requires variable costs to be convex, so that marginal cost rises over the relevant range, as for a firm operating near capacity. High-intangible firms with near-zero marginal costs do not fit this case, so for them the CMR remains a close proxy for the markup.

large fixed-cost base that is difficult to scale back, causing profits to fall more sharply. If these micro-level dynamics have become more prevalent over time, as our evidence on rising operating leverage suggests, then aggregate corporate profits should exhibit increasing procyclicality. Accordingly, we make three predictions: (i) the sensitivity of profit margins to GDP growth rises over time; (ii) this increase is concentrated among high-intangible laggards, the group most responsible for the rise in operating leverage; and (iii) the rise in operating leverage helps account for the increase in procyclicality.

To test these predictions, we estimate time-series regressions of annual changes in sales-weighted net profit margins on real GDP growth (*GDP Growth*), a time trend, and the interaction of *GDP growth* with the time trend. To evaluate the high-intangible laggards' contribution into rising procyclicality we separately consider the sales-weighted net profit margins for the firms we identify as laggards, i.e., firms with above-median intangible intensity and below-median net profit margins, both based on prior-year values. To benchmark the results for laggards, we also consider changes in procyclicality for high-intangible leaders (i.e., firms with high intangible intensity and high net profit margins). Because Section 4.2 identifies laggards as the primary driver of the rise in operating leverage, we expect the procyclicality of their profits to increase more than that of leaders if operating leverage is the channel through which intangible intensity affects procyclicality.

Table 9 reports the results. In column 1, the interaction of *GDP Growth* and the time trend is positive and statistically significant (coeff. = 0.028, $t = 2.07$), indicating that profits have become more procyclical over time, consistent with our first prediction. Columns 2 through 5 examine leaders and laggards separately. For high-*R&D Intensity* firms, the increase in procyclicality is significant for laggards (coeff. = 0.084, $t = 2.29$), but not for leaders (coeff. = 0.019, $t = 1.47$). For

high-*Knowledge Capital* firms, procyclicality increases significantly for both laggards (coeff. = 0.079, $t = 2.44$) and leaders (coeff. = 0.022, $t = 2.40$), though the effect is nearly four times as large for laggards. Taken together, these results are broadly consistent with our second prediction that the increase in procyclicality is concentrated primarily among laggards.

In column 6, we add *DOL* and its interaction with *GDP Growth* to the full-sample regression from column 1. The interaction $DOL \times GDP\ Growth$ is positive and significant (coeff. = 0.011, $t = 1.84$), indicating that higher operating leverage amplifies the sensitivity of profits to GDP growth. Once this interaction is included, the $GDP\ Growth \times Time\ Trend$ coefficient becomes statistically indistinguishable from zero (coeff. = -0.036, $t = -0.95$). This result is consistent with our third prediction that the rise in operating leverage contributes to the observed increase in procyclicality.

Taken together, the evidence suggests that the rise in intangible intensity has reshaped not only the level of aggregate profits but also their responsiveness to macroeconomic conditions. High-intangible, high-margin leaders contribute to the rise in the profit share of output through their high contribution margins (Section 5.1), while high-intangible, low-margin laggards amplify aggregate profit procyclicality through elevated operating leverage. This asymmetry suggests that intangible intensity shapes aggregate earnings through a heterogeneous effect on firms, one that depends on where a firm falls in the profitability distribution within the intangible-intensive group. The same cost structure that allows successful intangible-intensive firms to scale up at low marginal cost may leave less successful firms with a large fixed-cost base that is difficult to adjust over the cycle. In sum, our findings link changes in micro-level cost structures to two features of aggregate profit dynamics: a higher profit share and greater profit cyclicity.

6. Conclusions and Interpretation of Findings

We document that the rise of intangible-intensive production has fundamentally altered firms' cost structures and generated substantial heterogeneity in economic outcomes. Intangible investments shift operating costs toward fixed components, creating strong scale economies for firms that successfully commercialize their intangible capital while exposing unsuccessful firms to significant fixed-cost burdens. This structural transformation helps explain why aggregate profit shares rise even as median profit margins decline, why the dispersion in profitability widens, and why profits have become increasingly procyclical. Importantly, these patterns do not arise because all firms enjoy rising markups or increasing market power; rather, the distribution of outcomes becomes more polarized. High-intangible leaders benefit from scalability and near-zero marginal cost, whereas high-intangible laggards bear the irreversibility of intangible investment and the heightened operating leverage that follows.

Our findings suggest that debates about rising corporate profits should explicitly incorporate the economics of intangible capital and its asymmetric implications. Future research may examine how capital markets price the dispersion and procyclicality associated with intangible-heavy firms, how managerial incentives shape investment in risky intangible assets, and how heterogeneous cost structures aggregate into macroeconomic statistics. Understanding the interaction between intangible investment, governance, and executive incentives may also illuminate how firms balance the long-term, high-variance nature of intangible investments in a rapidly evolving economic environment.

Our findings also call for a more nuanced interpretation of the long-run rise in corporate profits. Attributing this trend solely to weakened competition can be misleading. Market power remains relevant, particularly for firms that scale intangibles effectively, but our evidence points

to a broader, structural transformation driven by the nature of intangible capital itself. The attributes that allow a small subset of firms to earn outsized profits simultaneously increase downside risk for many others, contributing to a corporate sector characterized by both higher aggregate profits and greater inequality in outcomes. Recognizing this duality is essential for assessing the sustainability of corporate profitability and for shaping policy responses suited to an economy increasingly reliant on intangible investment.

Implications of our findings extend directly to current policy debates. Interpreting the profit boom exclusively as a failure of antitrust oversight risks overlooking the deeper structural forces at work. Effective regulatory responses must account not only for market power but also for the cost structures that enable scalable success, the measurement challenges associated with expensed intangible investment, and the heightened fragility among firms that fail to scale.²⁴ Understanding this intangibles-driven transformation is therefore critical for developing policies that accurately target the underlying economic forces shaping modern corporate performance.

²⁴ For example, the rise in intangible investments can bias measures of profitability and market power used in regulatory and antitrust evaluation, given that U.S. GAAP often understates intangible capital (Kepler, McClure, and Stewart 2026).

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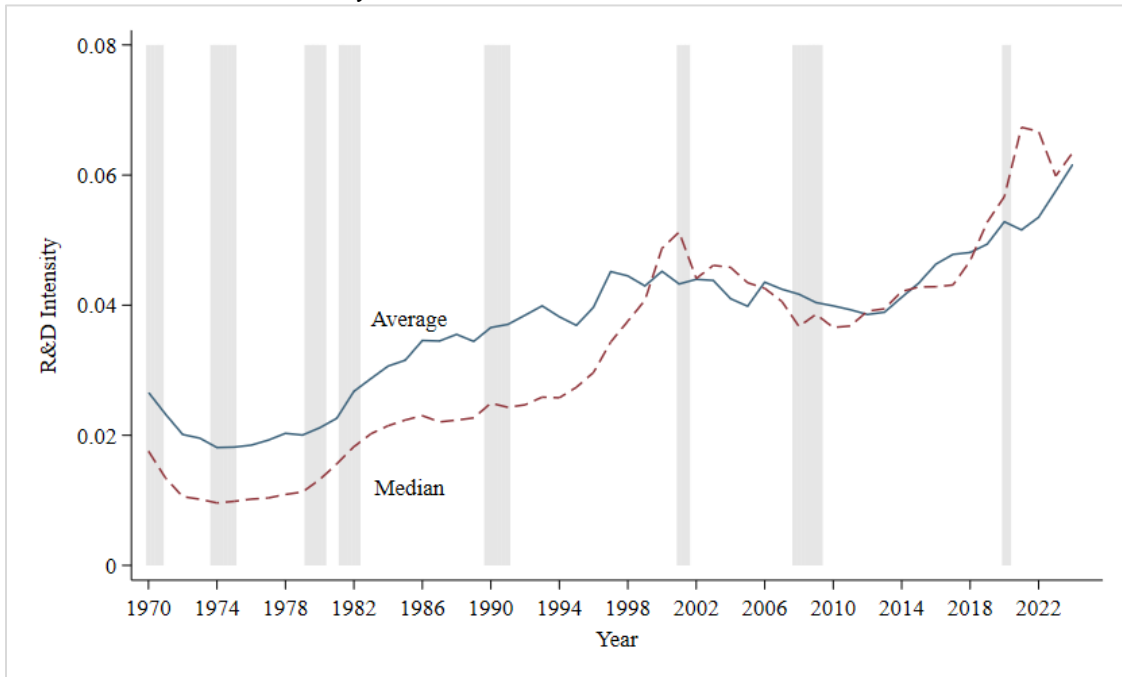
Appendix: Variable Definitions

Variable	Definition	Data source
<i>Op Exp</i>	Total operating expenses (including depreciation and amortization).	Compustat
<i>Op Inc</i>	Operating income after depreciation and amortization	Compustat
<i>Operating Income Margin</i>	<i>Op Inc</i> divided by sales	Compustat
<i>Net Profit Margin</i>	Bottom-line earnings divided by sales	Compustat
<i>R&D Intensity</i>	Research and development expenses divided by <i>Op Exp</i> .	Compustat
<i>Knowledge Capital</i>	Stock of knowledge capital divided by the sum of (net) physical and intangible capital, from Peters and Taylor (2017). Set to missing for firms with missing research and development expenses in the current and previous seven years.	Peters and Taylor (2017); Compustat
<i>Sales</i>	Net sales	Compustat
<i>CMR</i>	Contribution margin ratio, obtained from regressions of <i>Op Inc</i> on <i>Sales</i> , both scaled by the number of common shares outstanding (see Equation (1)).	
<i>DOL</i>	Degree of operating leverage, calculated as one minus the coefficient from regressions of the natural logarithm of <i>Op Exp</i> on the natural logarithm of <i>Sales</i> (see Equation (2)).	Compustat
<i>GDP Growth</i>	Percentage change in real U.S. GDP	FRED
<i>Profit Share</i>	Non-financial corporate profits after tax divided by gross value added by the non-financial corporate sector	NIPA

This appendix presents the definition of each variable used in the empirical analyses, with the respective data source in the last column. Variables from Compustat are winsorized at the 1st and 99th percentiles in each fiscal year.

Figure 1: Trends in Intangible Intensity

Panel A: Trends in *R&D Intensity*



Panel B: Trends in *Knowledge Capital*

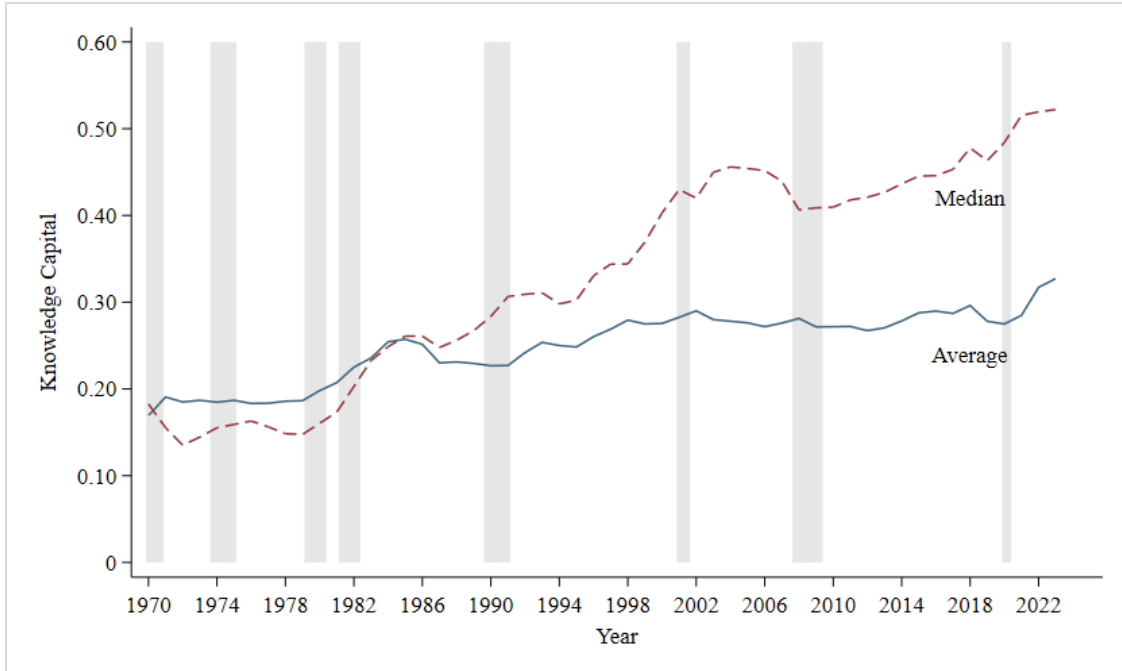
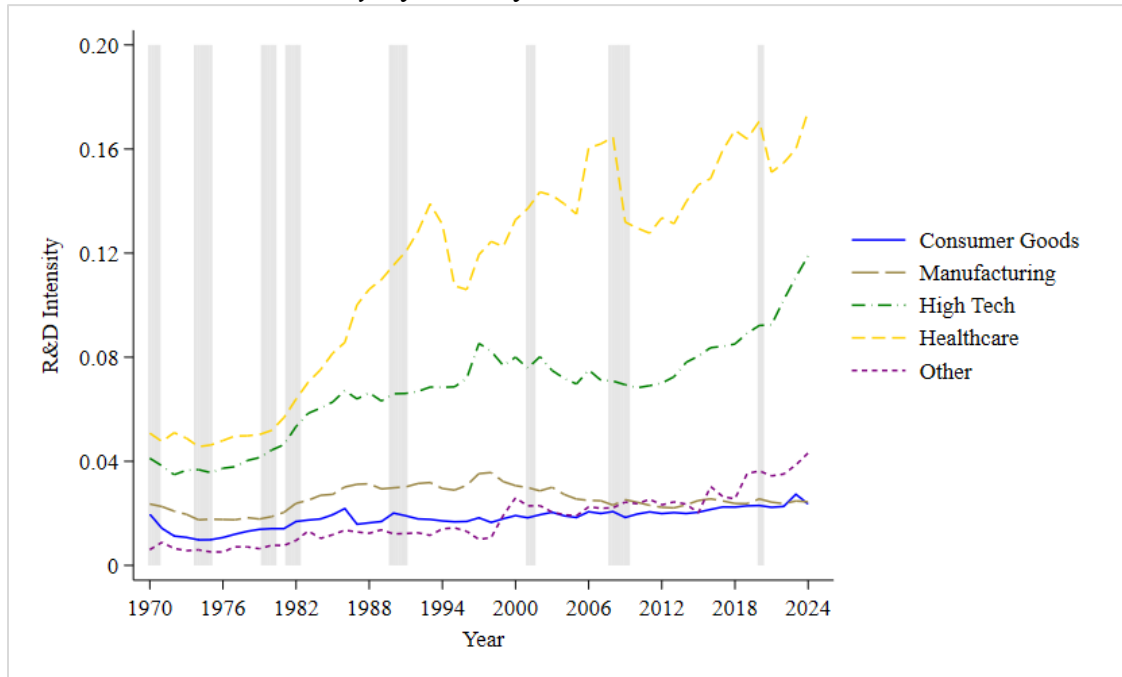


Figure 1 (continued)

Panel C: Trends in *R&D Intensity* by industry



Panel D: Trends in *Knowledge Capital* by industry

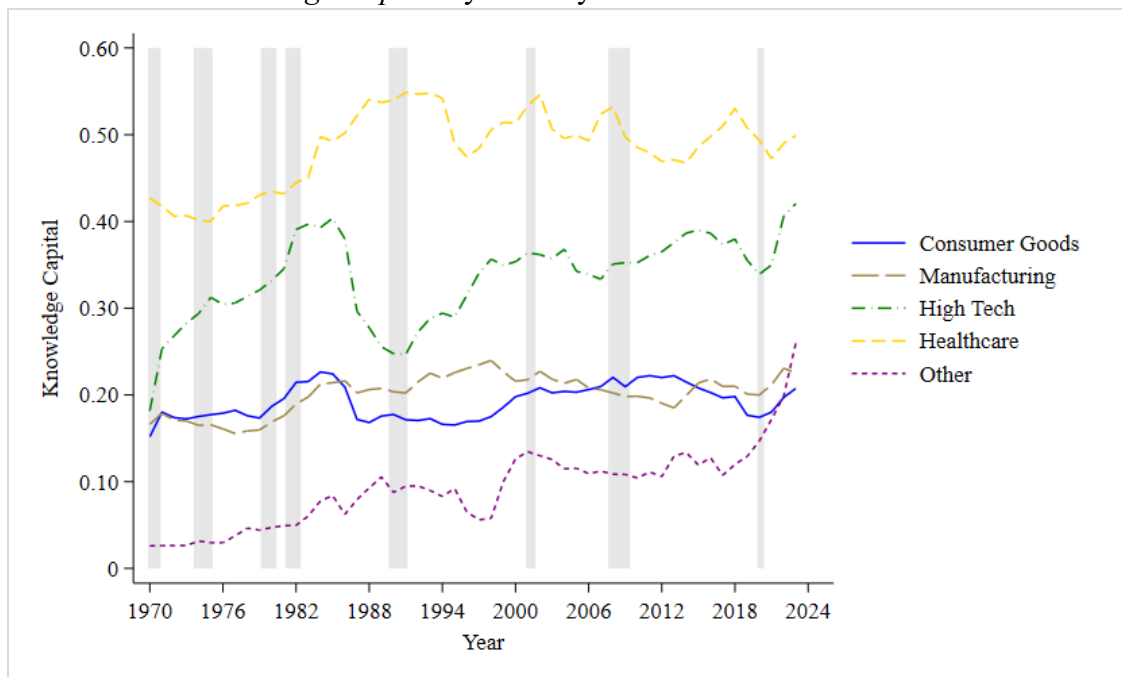
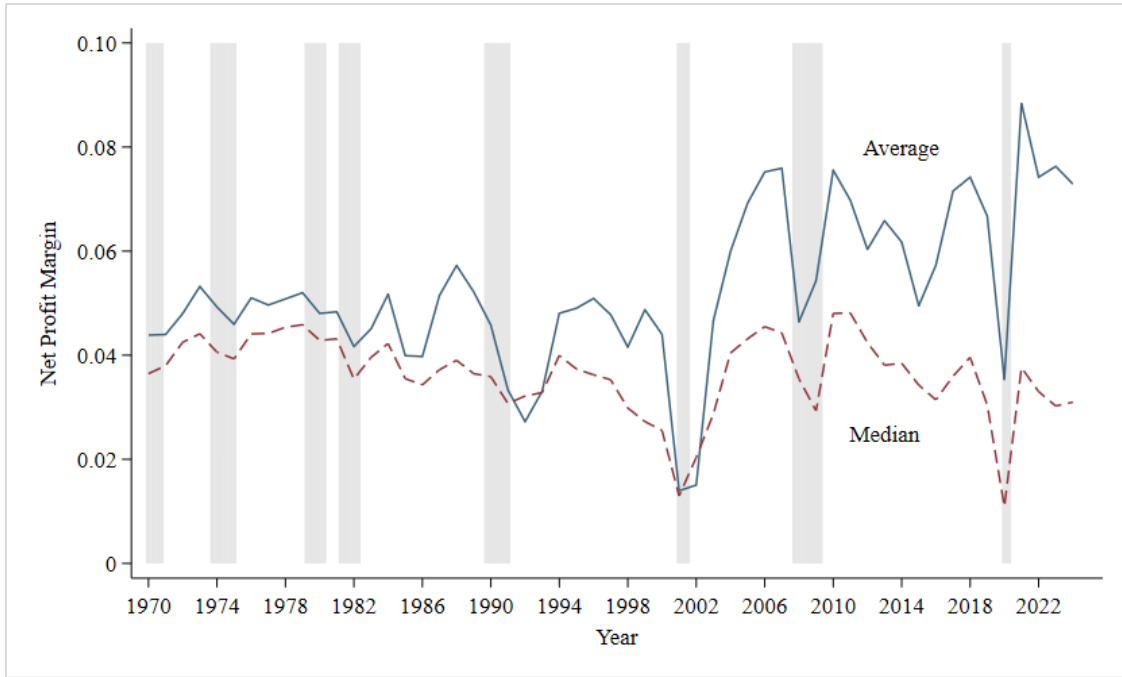


Figure 1 shows annual *R&D Intensity* and *Knowledge Capital* for firms in the Compustat annual file from 1970 to 2024. Panels A and B show the denominator-weighted average and median values for all firms in each fiscal year. Panels C and D show denominator-weighted average values for each Fama-French 5 industry category in each fiscal year. Shaded areas indicate recession periods. Variable definitions are provided in Appendix.

Figure 2: Trends in Net Profit Margins

Panel A: Trends in Net Profit Margins



Panel B: Trends in Net Profit Margins by Industry

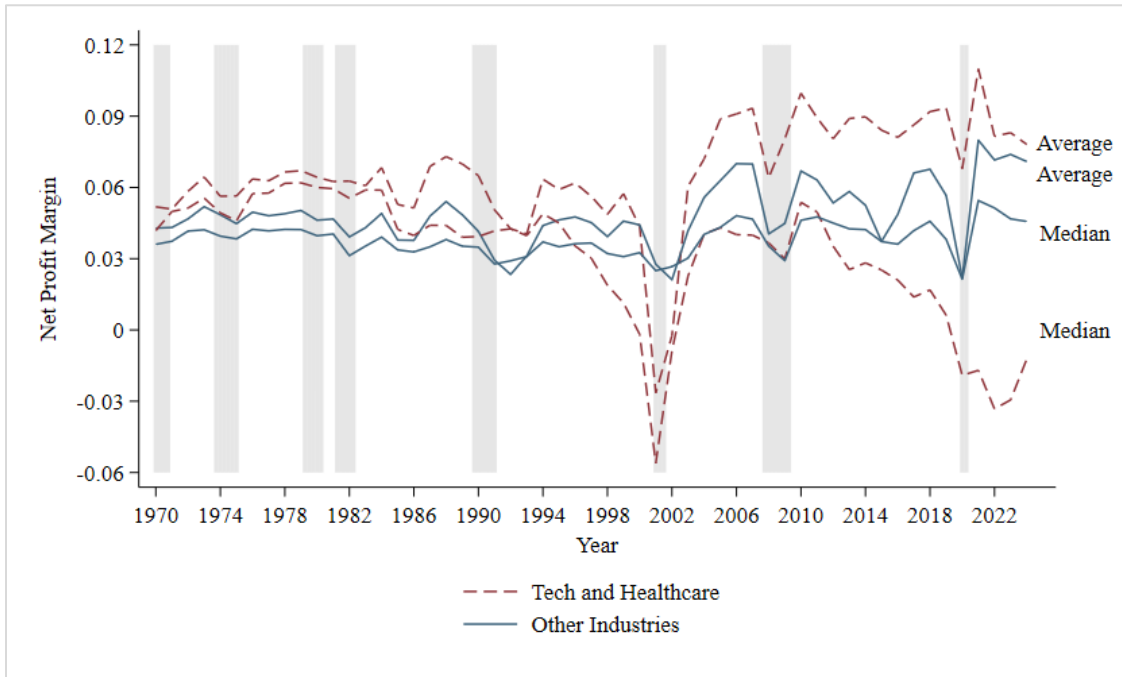


Figure 2 shows annual bottom-line earnings divided by sales for non-financial firms in the Compustat annual file from 1970 to 2024. The sales-weighted average and median values are calculated for each fiscal year across all firms (Panel A) and are separated by High Tech and Healthcare, and by all other Fama-French 5 industry categories (Panel B). Shaded areas indicate recession periods. Variable definitions are provided in Appendix.

Figure 3: Trends in *Net Profit Margin* Across Quartiles

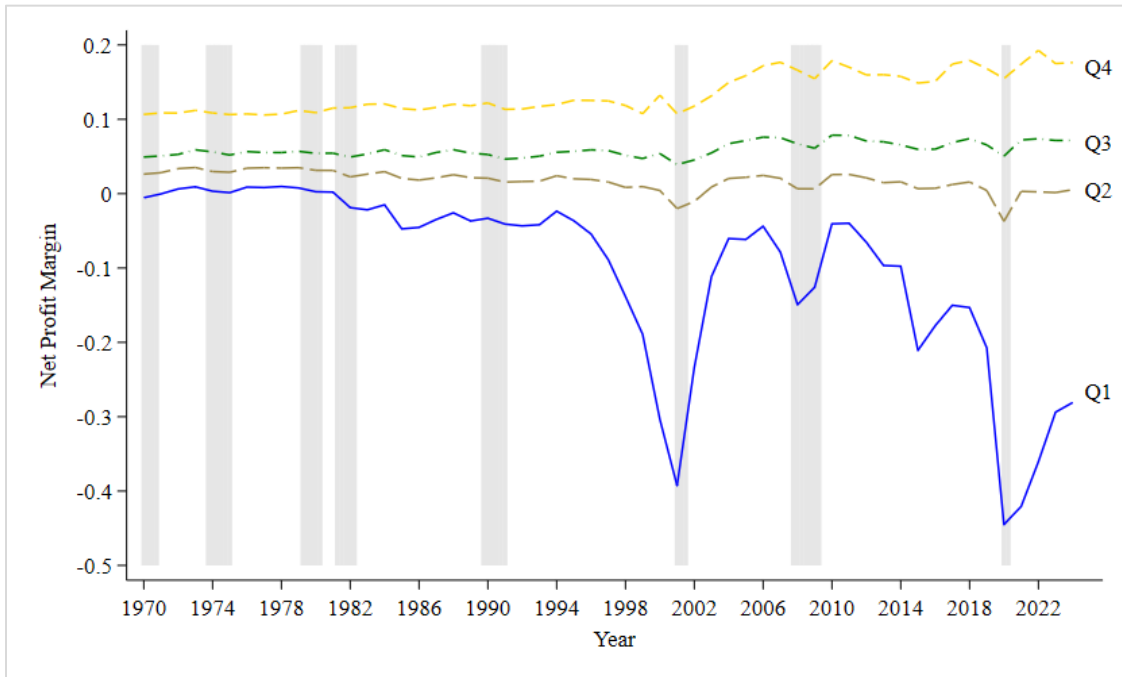
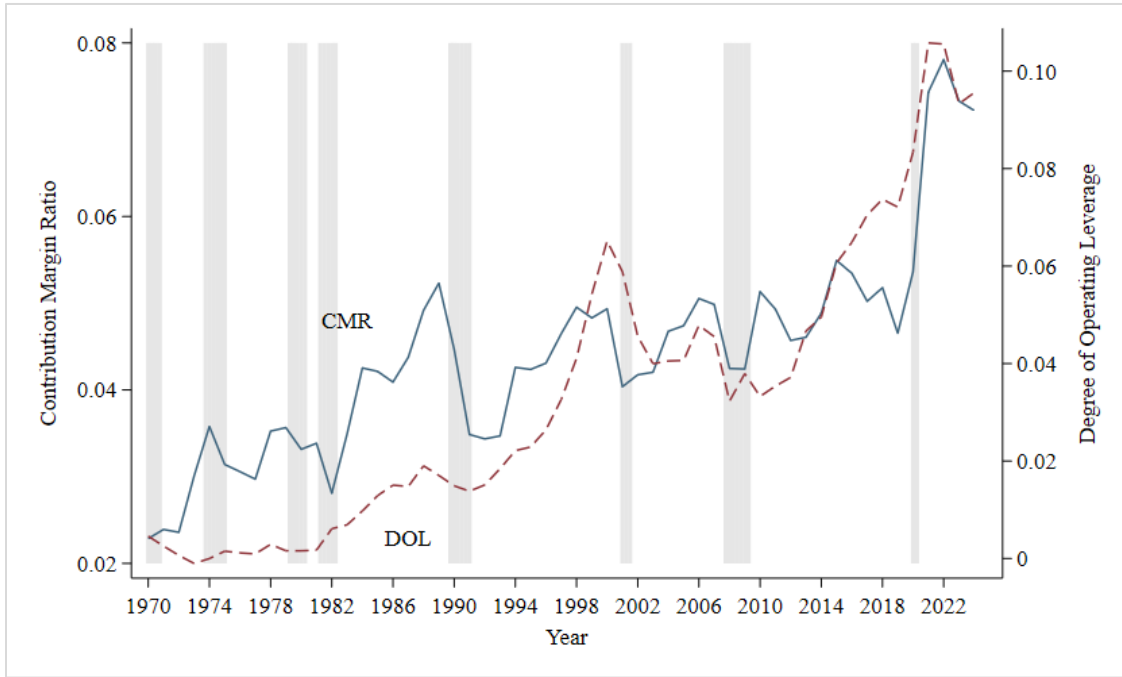


Figure 3 shows yearly net profit margins by quartile from 1970 to 2024. Each year, firms are sorted into quartiles of *Net Profit Margin*, and Q1, Q2, Q3, and Q4 represent the sales-weighted average net profit margins for quartiles 1 to 4, respectively. Shaded areas indicate recession periods. Variable definitions are provided in Appendix.

Figure 4: Trends in Contribution Margin Ratio and Operating Leverage

Panel A: Trends in overall *CMR* and *DOL*



Panel B: Trends in *CMR* by *R&D Intensity* and *Net Profit Margin*

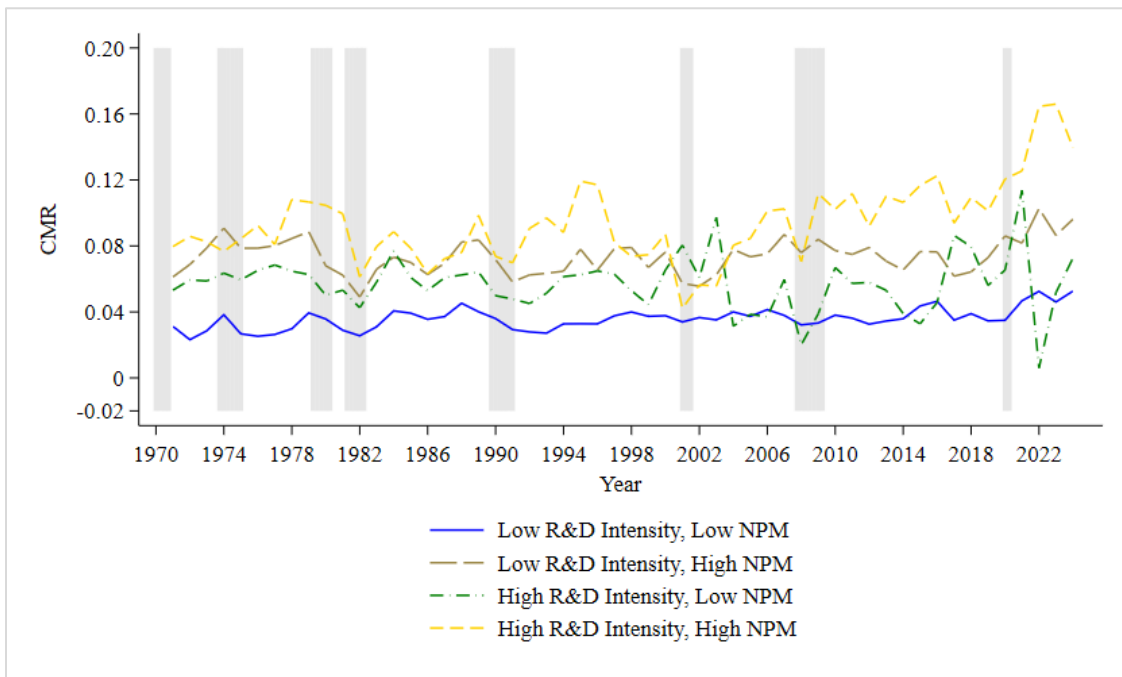
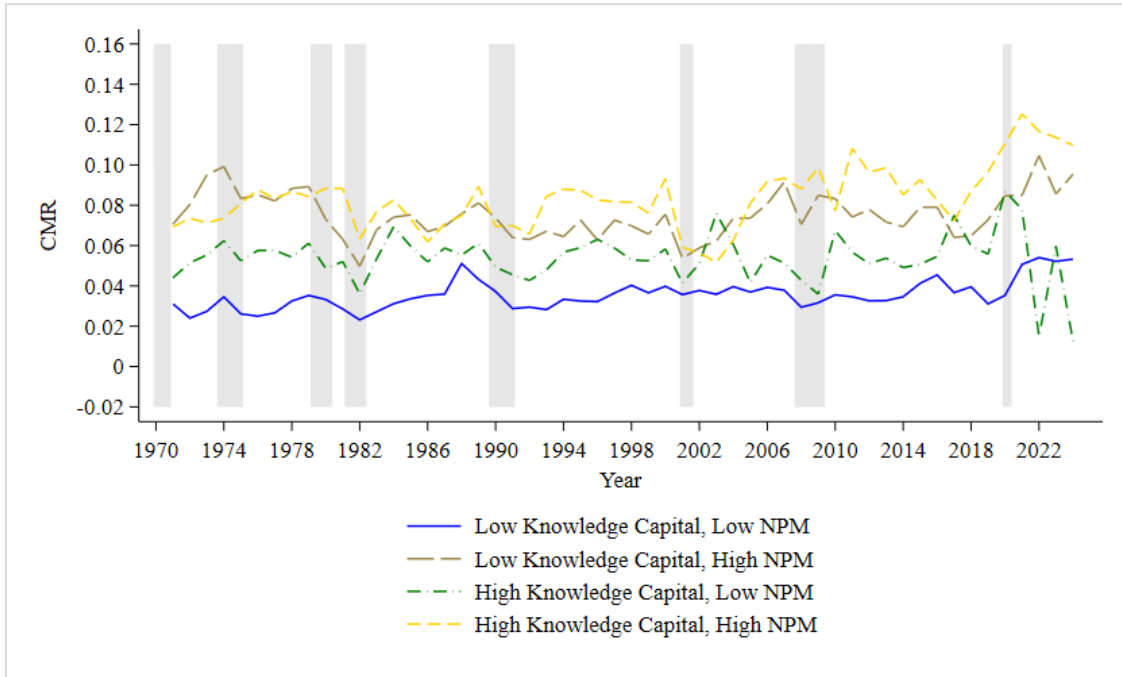


Figure 4 (continued)

Panel C: Trends in *CMR* by *Knowledge Capital* and *Net Profit Margin*



Panel D: Trends in *DOL* by *R&D Intensity* and *Net Profit Margin*

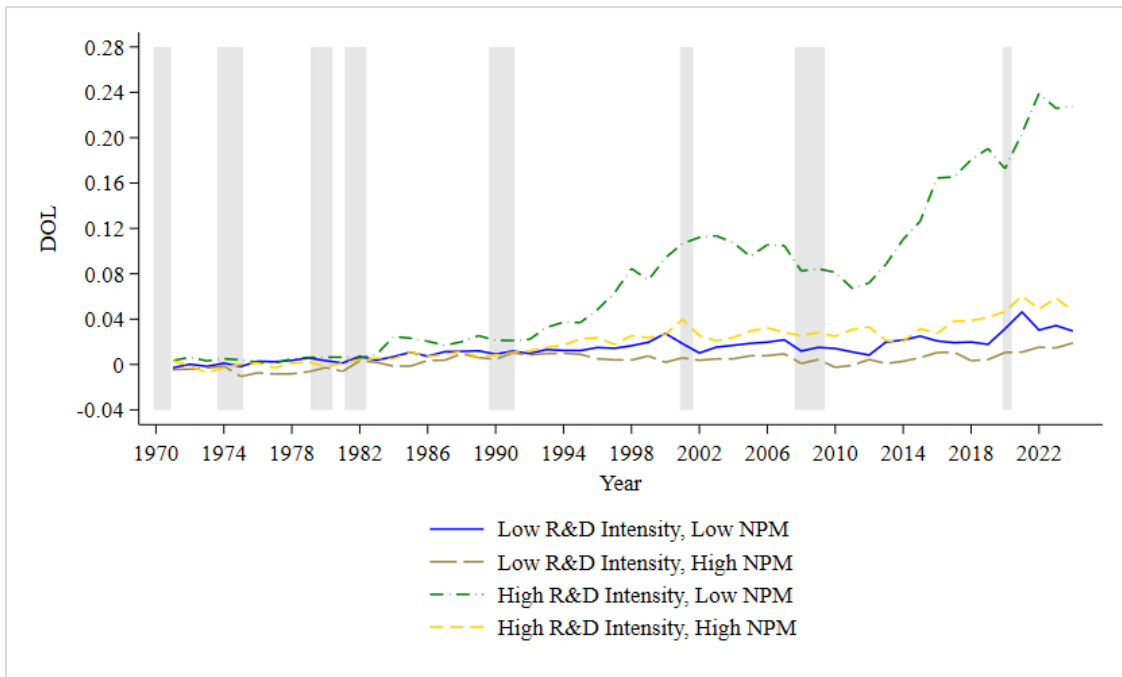


Figure 4 (continued)

Panel E: Trends in *DOL* by *Knowledge Capital* and *Net Profit Margin*

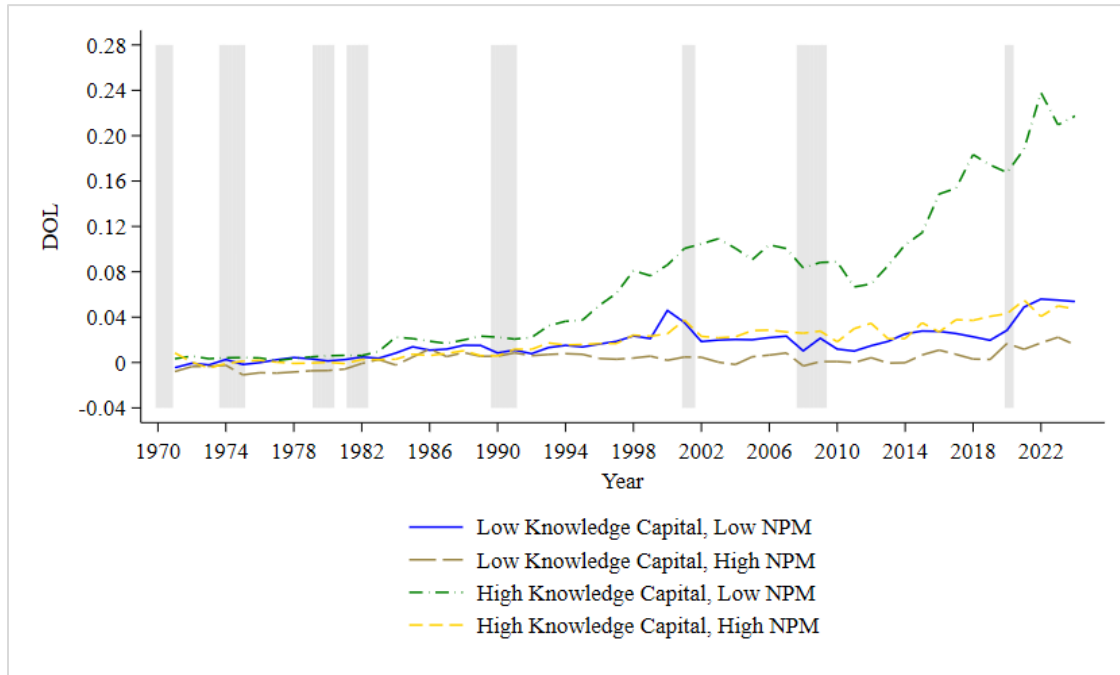


Figure 4 presents trends in contribution margin ratios (*CMR*) and the degree of operating leverage (*DOL*), estimated from annual cross-sectional regressions for non-financial firms in the Compustat annual file from 1970 to 2024. Panel A reports the overall trends. Panels B and C (D and E) report trends in *CMR* and *DOL*, respectively, estimated separately for firms sorted each year into groups above or below the median of *R&D Intensity (Knowledge Capital)* and, within each *R&D Intensity (Knowledge Capital)* group, above or below the median of *Net Profit Margin* for the previous year. Shaded regions denote recession periods. Variable definitions are provided in Appendix.

Figure 5: Trends in Contribution Margin Ratio and Profit Share of Economic Output

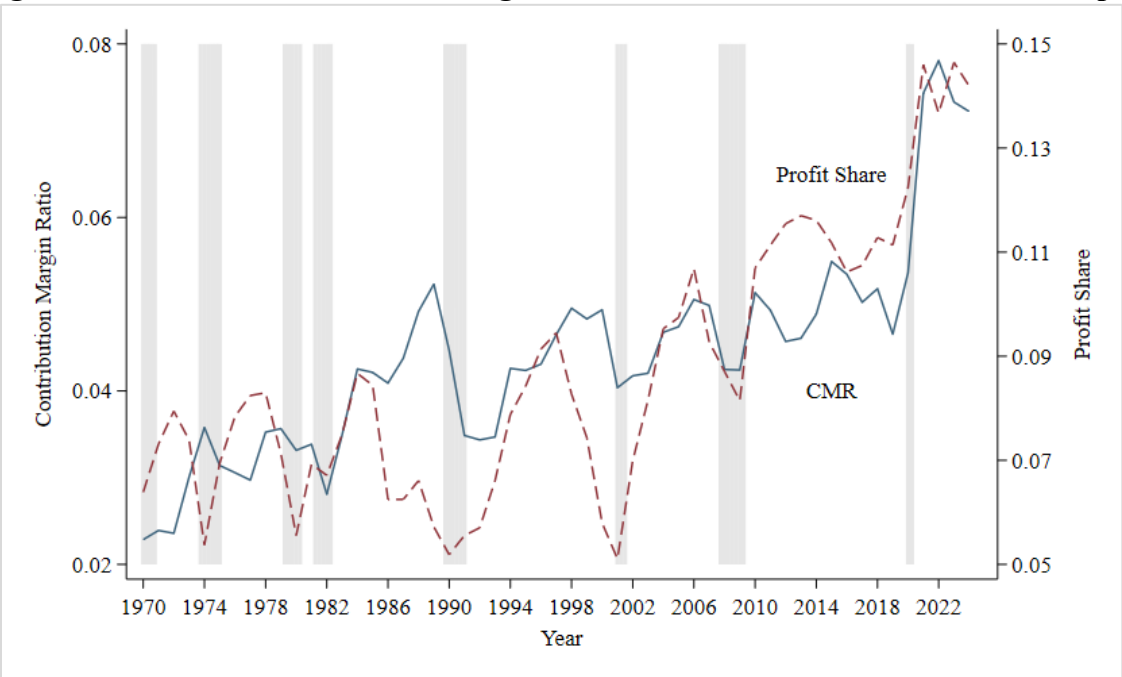


Figure 5 shows annual contribution margin ratio (*CMR*), estimated using yearly cross-sectional data for non-financial firms in the Compustat annual file, alongside non-financial corporate profit shares of economic output from NIPA, covering fiscal years 1970 to 2024. Shaded areas indicate recession periods. Variable definitions are provided in Appendix.

Table 1: Sample Selection and Descriptive Statistics

Panel A: Sample selection

Criteria	Number of firm-years
Fiscal years in the Compustat annual file between 1970 and 2024	<u>479,322</u>
Available sales, operating expenses, operating income, net income, stock price, and shares outstanding	(158,147)
Sales of at least \$10M	(64,872)
Stock price of at least \$1	(12,772)
Non-financial firms	(39,741)
Final sample	203,790

Panel B: Descriptive statistics

Variable	N	Mean	SD	Min	P25	Median	P75	Max
<i>R&D Intensity</i>	111,681	7.9%	12.8%	0.0%	0.5%	2.7%	10.2%	81.3%
<i>Knowledge Capital</i>	118,699	37.3%	32.6%	0.0%	4.2%	31.7%	66.0%	99.8%
<i>Operating Income Margin</i>	203,790	2.9%	38.9%	-731.9%	2.3%	7.4%	13.7%	57.5%
<i>Net Profit Margin</i>	203,790	-2.9%	42.2%	-693.9%	-0.1%	3.7%	8.0%	69.1%

Panel C: Correlation matrix

Variable	<i>R&D Intensity</i>	<i>Knowledge Capital</i>	<i>Operating Income Margin</i>	<i>Net Profit Margin</i>
<i>R&D Intensity</i>		0.900	-0.082	-0.048
<i>Knowledge Capital</i>	0.667		-0.135	-0.080
<i>Operating Income Margin</i>	-0.507	-0.259		0.829
<i>Net Profit Margin</i>	-0.488	-0.244	0.910	

Table 1 summarizes the sample selection process and provides descriptive statistics for key variables. Panel A shows how each selection criterion impacts the sample size. Panel B presents descriptive statistics for intangible intensity and income measures for non-financial firms in Compustat from 1970 to 2024. Panel C provides Pearson (Spearman) correlations below (above) the diagonal. Variable definitions are provided in Appendix. Variables from Compustat are winsorized at the 1st and 99th percentiles in each fiscal year.

Table 2: Trends in Intangible Intensity

Panel A: Overall trends

Decade	<i>R&D Intensity</i>		<i>Knowledge Capital</i>	
	(1) Average	(2) Median	(3) Average	(4) Median
1970s	2.0%	1.1%	18.5%	15.3%
1980s	3.1%	2.0%	23.3%	22.9%
1990s	4.1%	2.9%	25.7%	32.1%
2000s	4.2%	4.4%	27.8%	43.2%
2010s	4.3%	4.2%	28.0%	44.0%
2020s	5.5%	6.3%	30.1%	50.9%
Annual Trend	0.06%***	0.09%***	0.23%***	0.75%***

Panel B: Annual trends by industry

Industry	Trends in <i>R&D Intensity</i>		Trends in <i>Knowledge Capital</i>		% of Sample		
	(1) Average	(2) Median	(3) Average	(4) Median	(5) 1970	(6) 2024	(7) Difference
All	0.06%***	0.09%***	0.23%***	0.75%***			
Consumer Goods	0.02%***	0.00%***	0.05%***	-0.06%***	35.2	17.8	-17.4
Manufacturing	0.01%	0.01%***	0.08%***	0.19%***	40.7	20.9	-19.7
High Tech	0.11%***	0.22%***	0.19%***	0.78%***	9.0	23.5	14.4
Healthcare	0.24%***	0.27%***	0.15%***	1.05%***	2.8	14.5	11.6
Other	0.06%***	0.02%***	0.26%***	0.13%***	12.3	23.3	11.1

Table 2 presents trends in intangible intensity of non-financial firms in the Compustat annual file for fiscal years 1970 to 2024. Panel A reports denominator-weighted averages and median values of *R&D Intensity* and *Knowledge Capital* for all years in each decade of our sample. Panel B shows annual trends for our sample period across Fama-French 5 industry categories. Columns 1 to 4 present annual trends, and columns 5 to 7 report the share of total non-financial firms in each industry for 1970 and 2024, and the change between the two years, respectively. Variable definitions are provided in Appendix.

Table 3: Trends in Profit Margins

Year	<i>Operating Income Margin</i>		<i>Net Profit Margin</i>	
	(1) Average	(2) Median	(3) Average	(4) Median
1970s	9.9%	8.6%	4.9%	4.2%
1980s	9.6%	7.5%	4.8%	3.9%
1990s	9.6%	7.1%	4.4%	3.4%
2000s	10.5%	6.7%	5.3%	3.3%
2010s	11.3%	7.7%	6.5%	3.9%
2020s	11.9%	6.5%	7.1%	2.9%
Annual Trend	0.05%***	-0.02%***	0.05%***	-0.02%***

Table 3 reports sales-weighted averages and medians of *Operating Income Margin* and *Net Profit Margin* for non-financial firms in the Compustat annual file for all years in each decade of our sample period, from 1970 to 2024. Variable definitions are provided in Appendix.

Table 4: Dispersion in Net Profit Margins

Panel A: Trends in dispersion

Decade	Deciles of <i>Net Profit Margin</i>									
	(1) 1 st	(2) 2 nd	(3) 3 rd	(4) 4 th	(5) 5 th	(6) 6 th	(7) 7 th	(8) 8 th	(9) 9 th	(10) 10 th
	<i>Average Net Profit Margin</i>									
1970s	-1.3%	1.1%	2.1%	3.0%	3.9%	4.9%	5.7%	7.2%	9.6%	14.7%
1980s	-10.9%	-1.4%	1.0%	2.1%	3.3%	4.5%	5.7%	7.3%	10.3%	16.8%
1990s	-30.0%	-4.7%	-0.6%	1.3%	2.6%	4.1%	5.7%	7.4%	10.5%	19.0%
2000s	-67.2%	-11.8%	-2.7%	0.6%	2.4%	4.3%	6.6%	8.3%	12.8%	24.2%
2010s	-60.0%	-10.8%	-2.1%	1.0%	2.9%	4.8%	7.2%	9.4%	14.1%	26.3%
2020s	-141.2%	-31.3%	-10.4%	-2.1%	1.7%	4.3%	7.1%	10.0%	15.5%	29.1%
Annual Trend	-2.24%***	-0.50%***	-0.18%***	-0.08%***	-0.03%***	0.00%	0.03%***	0.06%***	0.12%***	0.30%***

Panel B: Average *Net Profit Margin* by *R&D Intensity* and *Net Profit Margin* dependent sorts

		<i>R&D Intensity</i> Deciles									
		1	2	3	4	5	6	7	8	9	10
<i>Net Profit Margin</i> Deciles	1	-10.2%	-8.3%	-7.0%	-10.1%	-11.7%	-16.4%	-35.2%	-56.3%	-89.9%	-586.7%
	2	-0.9%	-0.8%	-0.9%	-0.7%	-1.2%	-1.6%	-4.6%	-11.6%	-26.3%	-137.9%
	3	0.6%	0.9%	1.3%	1.7%	1.5%	1.7%	0.1%	-2.8%	-9.9%	-73.2%
	4	1.5%	1.7%	2.5%	2.8%	2.9%	3.2%	2.7%	1.6%	-2.8%	-37.5%
	5	2.2%	2.6%	3.5%	3.8%	3.9%	4.5%	4.2%	4.3%	2.0%	-19.1%
	6	3.1%	3.4%	4.5%	4.7%	5.0%	5.6%	5.7%	6.4%	5.6%	-5.3%
	7	4.1%	4.6%	5.3%	5.6%	6.0%	6.8%	7.2%	8.4%	8.9%	3.6%
	8	5.3%	6.0%	6.7%	7.0%	7.5%	8.2%	8.9%	11.0%	12.1%	11.0%
	9	7.3%	8.8%	8.7%	9.1%	9.5%	10.4%	11.9%	14.4%	16.6%	17.3%
	10	12.8%	16.5%	16.0%	15.7%	16.8%	17.0%	18.9%	25.1%	26.8%	30.1%
All	3.7%	4.4%	6.2%	6.3%	6.5%	6.1%	5.2%	7.4%	10.6%	10.2%	
10 - 1	23.0%	24.8%	23.1%	25.8%	28.6%	33.4%	54.0%	81.3%	116.7%	616.8%	

Table 4 (continued)

Panel C: Average *Net Profit Margin* by *Knowledge Capital* and *Net Profit Margin* dependent sorts

		<i>Knowledge Capital</i> Deciles									
		1	2	3	4	5	6	7	8	9	10
<i>Net Profit Margin</i> Deciles	1	-10.1%	-13.1%	-8.4%	-10.1%	-12.2%	-21.4%	-29.1%	-52.9%	-133.8%	-375.1%
	2	-0.8%	-1.0%	-1.0%	-0.7%	-0.5%	-1.6%	-2.6%	-9.3%	-30.2%	-97.1%
	3	0.7%	1.4%	1.3%	1.7%	1.9%	1.6%	1.0%	-1.7%	-11.6%	-43.7%
	4	1.5%	2.7%	2.5%	2.9%	3.2%	3.0%	2.9%	1.6%	-3.9%	-23.7%
	5	2.3%	4.0%	3.6%	4.0%	4.2%	4.2%	4.3%	3.5%	0.4%	-11.0%
	6	3.1%	5.3%	4.9%	4.9%	5.2%	5.4%	5.6%	5.3%	3.6%	-3.7%
	7	4.1%	7.1%	5.9%	6.0%	6.3%	6.7%	7.2%	7.4%	6.2%	1.5%
	8	5.4%	9.2%	7.7%	7.3%	7.8%	8.4%	9.1%	9.8%	9.9%	6.5%
	9	7.5%	13.3%	9.7%	9.5%	9.8%	10.8%	12.4%	13.8%	14.6%	13.2%
	10	13.5%	21.7%	18.1%	19.4%	18.0%	19.0%	21.0%	24.2%	24.9%	26.1%
	All	3.7%	7.7%	6.1%	6.1%	6.0%	5.8%	6.7%	7.2%	9.7%	4.6%
10 - 1	23.6%	34.8%	26.5%	29.5%	30.2%	40.4%	50.2%	77.1%	158.7%	401.2%	

Table 4 (continued)

Panel D: Trends in intangible intensity across *Net Profit Margin* deciles

Decade	Deciles of <i>Net Profit Margin</i>									
	(1) 1 st	(2) 2 nd	(3) 3 rd	(4) 4 th	(5) 5 th	(6) 6 th	(7) 7 th	(8) 8 th	(9) 9 th	(10) 10 th
	Average <i>R&D Intensity</i>									
1970s	1.3%	1.0%	1.2%	1.5%	1.8%	2.0%	2.2%	2.7%	3.6%	4.7%
1980s	3.6%	2.4%	1.8%	2.0%	2.6%	2.4%	3.2%	4.0%	5.3%	8.3%
1990s	11.2%	4.3%	3.6%	2.4%	2.5%	3.2%	3.7%	4.5%	7.0%	11.1%
2000s	20.5%	8.8%	4.2%	2.8%	2.5%	2.7%	3.0%	3.3%	7.9%	11.7%
2010s	24.1%	7.2%	3.5%	2.2%	2.3%	2.8%	3.1%	3.9%	8.2%	14.4%
2020s	37.9%	16.2%	7.9%	4.2%	2.3%	2.9%	3.7%	4.5%	8.4%	17.0%
Annual Trend	0.70%***	0.25%***	0.11%***	0.03%***	0.01%	0.02%***	0.02%***	0.02%***	0.10%***	0.23%***
	Average <i>Knowledge Capital</i>									
1970s	16.6%	18.7%	19.4%	21.8%	24.0%	16.3%	15.0%	20.2%	23.5%	20.0%
1980s	24.5%	22.2%	22.8%	21.5%	24.4%	21.2%	21.0%	23.7%	29.5%	34.8%
1990s	46.4%	26.3%	26.1%	22.2%	23.4%	23.1%	22.0%	26.6%	30.6%	36.5%
2000s	63.6%	42.0%	31.5%	27.4%	25.8%	24.3%	20.7%	20.5%	34.9%	37.3%
2010s	70.1%	34.8%	24.7%	23.4%	22.0%	22.7%	21.7%	25.1%	33.6%	46.3%
2020s	77.8%	53.4%	36.3%	27.2%	25.2%	22.4%	26.3%	22.8%	31.9%	51.6%
Annual Trend	1.42%***	0.65%***	0.26%***	0.11%**	0.00%	0.07%*	0.17%***	0.07%	0.19%***	0.58%***

Table 4 presents the dispersion in net profit margins for non-financial firms in the Compustat annual file between 1970 and 2024. In Panel A (D), we group firms into deciles each year by *Net Profit Margin* and, for each decade, present the denominator-weighted average *Net Profit Margin* (*R&D Intensity* and *Knowledge Capital*) for all firms-years in each decile. In Panel B (C), we group all firm-years in our sample into 100 groups based on dependent sorts on *R&D Intensity* (*Knowledge Capital*) and *Net Profit Margin* deciles in the previous year, respectively, and present the sales-weighted average *Net Profit Margin* for each group. Variable definitions are provided in Appendix.

Table 5: Intangible Intensity and Net Profit Margin Double Sorts

Panel A: *CMR by R&D Intensity and Net Profit Margin dependent sorts*

		<i>R&D Intensity Deciles</i>									
		1	2	3	4	5	6	7	8	9	10
<i>Net Profit Margin Deciles</i>	1	0.04	0.04	0.05	0.02	0.06	0.01	0.05	0.08	-0.02	-0.06
	2	0.02	0.03	0.04	0.04	0.05	0.04	0.05	0.03	-0.04	-0.07
	3	0.02	0.04	0.04	0.04	0.05	0.05	0.04	0.03	0.05	0.17
	4	0.03	0.03	0.05	0.06	0.06	0.06	0.06	0.05	0.07	-0.02
	5	0.05	0.05	0.06	0.07	0.07	0.07	0.07	0.08	0.10	0.02
	6	0.05	0.05	0.07	0.08	0.07	0.07	0.07	0.11	0.10	0.07
	7	0.07	0.05	0.08	0.09	0.08	0.08	0.10	0.10	0.10	0.20
	8	0.07	0.05	0.08	0.10	0.10	0.09	0.11	0.14	0.17	0.23
	9	0.09	0.07	0.07	0.11	0.12	0.10	0.12	0.17	0.18	0.28
	10	0.09	0.13	0.12	0.15	0.15	0.14	0.19	0.22	0.23	0.35
All		0.04	0.04	0.06	0.06	0.07	0.07	0.08	0.09	0.13	0.25

Panel B: *DOL by R&D Intensity and Net Profit Margin dependent sorts*

		<i>R&D Intensity Deciles</i>									
		1	2	3	4	5	6	7	8	9	10
<i>Net Profit Margin Deciles</i>	1	0.02	0.03	0.02	0.03	0.03	0.03	0.05	0.06	0.09	0.39
	2	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.03	0.03	0.21
	3	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.02	0.03	0.12
	4	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.02	0.03	0.08
	5	0.00	0.00	0.00	0.01	0.01	0.00	0.01	0.01	0.03	0.05
	6	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.05
	7	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.02	0.06
	8	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.02	0.03	0.05
	9	0.00	0.00	0.00	0.01	0.00	0.01	0.01	0.01	0.03	0.05
	10	0.00	0.01	0.01	0.01	0.01	0.00	0.02	0.03	0.04	0.09
All		0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.04	0.06	0.18

Table 5 (continued)

Panel C: *CMR by Knowledge Capital and Net Profit Margin dependent sorts*

		<i>Knowledge Capital Deciles</i>									
		1	2	3	4	5	6	7	8	9	10
<i>Net Profit Margin Deciles</i>	1	0.04	0.05	0.03	0.04	0.04	0.05	0.04	0.09	0.00	-0.01
	2	0.02	0.03	0.03	0.03	0.04	0.04	0.04	0.03	0.01	-0.16
	3	0.02	0.03	0.03	0.04	0.05	0.05	0.04	0.04	0.03	-0.04
	4	0.03	0.05	0.05	0.06	0.06	0.06	0.06	0.04	0.04	-0.02
	5	0.05	0.08	0.05	0.06	0.07	0.07	0.07	0.07	0.05	0.00
	6	0.06	0.07	0.08	0.07	0.08	0.07	0.07	0.08	0.06	0.05
	7	0.06	0.09	0.08	0.09	0.09	0.08	0.10	0.10	0.10	0.01
	8	0.08	0.08	0.07	0.11	0.09	0.10	0.10	0.12	0.13	0.09
	9	0.08	0.16	0.09	0.12	0.11	0.13	0.14	0.12	0.21	0.18
	10	0.09	0.22	0.14	0.14	0.16	0.18	0.14	0.17	0.30	0.23
All		0.04	0.05	0.05	0.06	0.06	0.06	0.07	0.07	0.11	0.08

Panel D: *DOL by Knowledge Capital and Net Profit Margin dependent sorts*

		<i>Knowledge Capital Deciles</i>									
		1	2	3	4	5	6	7	8	9	10
<i>Net Profit Margin Deciles</i>	1	0.02	0.04	0.04	0.04	0.03	0.04	0.06	0.11	0.17	0.38
	2	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.03	0.04	0.16
	3	0.00	0.01	0.00	0.00	0.01	0.01	0.01	0.02	0.02	0.07
	4	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.01	0.02	0.05
	5	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.01	0.02	0.04
	6	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.03
	7	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.02	0.03
	8	0.00	0.01	0.00	0.00	0.00	0.01	0.01	0.02	0.02	0.03
	9	0.00	0.00	0.01	0.01	0.00	0.01	0.01	0.02	0.03	0.04
	10	0.00	0.02	0.01	0.01	0.01	0.01	0.01	0.02	0.03	0.09
All		0.00	0.02	0.01	0.01	0.01	0.02	0.02	0.04	0.07	0.14

Table 5 presents the distributions of contribution margin ratios (*CMR*) and degree of operating leverage (*DOL*) for non-financial firms in the Compustat annual file between 1970 and 2024, across intangible intensity and profitability levels. In Panels A and B (C and D), we group all firm-years in our sample into 100 groups based on dependent sorts on *R&D Intensity (Knowledge Capital)* and *Net Profit Margin* deciles in the previous year and present the *CMR* and *DOL* estimates for each group, respectively. Variable definitions are provided in Appendix.

Table 6: Intangible Intensity and Contribution Margin Ratios

Panel A: *CMR and R&D Intensity*

DV =	<i>Op Inc</i>	<i>Op Inc</i>	<i>Op Inc</i>	<i>Op Inc</i>	<i>Op Inc</i>
	Median <i>Net Profit Margin</i>		Median <i>Net Profit Margin</i>		
	Above	Below	Above	Below	
	(1)	(2)	(3)	(4)	(5)
<i>Sales</i> × <i>R&D Intensity</i> _{<i>t-1</i>}	0.585*** (4.83)	0.198 (1.58)	0.531*** (4.76)	0.200 (1.58)	0.539*** (5.14)
<i>R&D Intensity</i> _{<i>t-1</i>}	0.314*** (4.61)	0.101 (1.19)	0.257*** (4.05)	0.104 (1.22)	0.298*** (4.30)
<i>Sales</i>	1.373*** (21.12)	0.668*** (9.78)	1.288*** (21.48)	0.661*** (9.57)	1.018*** (17.99)
Observations	53,078	52,767	53,078	52,767	108,017
R ²	0.806	0.734	0.818	0.740	0.752
Firm FE	Yes	Yes	Yes	Yes	Yes
Year FE	No	No	Yes	Yes	Yes
Standard Errors	Cluster by Firm	Cluster by Firm	Cluster by Firm	Cluster by Firm	Cluster by Firm

Table 6 (continued)

Panel B: *CMR and Knowledge Capital*

DV =	<i>Op Inc</i>	<i>Op Inc</i>	<i>Op Inc</i>	<i>Op Inc</i>	<i>Op Inc</i>
	Median <i>Net Profit Margin</i>		Median <i>Net Profit Margin</i>		
	Above	Below	Above	Below	
	(1)	(2)	(3)	(4)	(5)
<i>Sales</i> × <i>Knowledge Capital</i>_{<i>t-1</i>}	0.100**	0.019	0.095**	0.018	0.095***
	(2.10)	(0.74)	(2.17)	(0.66)	(3.01)
<i>Knowledge Capital</i> _{<i>t-1</i>}	-0.004	-0.023	-0.058**	-0.012	-0.066***
	(-0.17)	(-1.51)	(-2.55)	(-0.81)	(-3.70)
<i>Sales</i>	1.175***	0.571***	1.107***	0.563***	0.806***
	(28.83)	(22.56)	(30.20)	(21.66)	(28.57)
Observations	57,466	57,196	57,466	57,196	116,973
R ²	0.793	0.727	0.807	0.733	0.738
Firm FE	Yes	Yes	Yes	Yes	Yes
Year FE	No	No	Yes	Yes	Yes
Standard Errors	Cluster by Firm	Cluster by Firm	Cluster by Firm	Cluster by Firm	Cluster by Firm

Table 6 presents the results of OLS panel regressions examining the association between contribution margin ratios and one-year lagged intangible intensity, measured by *R&D Intensity* and *Knowledge Capital* in Panels A and B, respectively. All variables are standardized to a mean of zero and a variance of one for interpretability. All columns include firm fixed effects and columns 3 to 5 also include year fixed effects. Standard errors are clustered at the firm level (t-statistics in parentheses). The sample consists of non-financial firms from the Compustat annual file, covering fiscal years 1970 to 2024. Variable definitions are provided in Appendix.

Table 7: Intangible Intensity and Operating Leverage

Panel A: *DOL and R&D Intensity*

DV =	<i>Ln(Sales / Op Exp)</i>	<i>Ln(Sales / Op Exp)</i>	<i>Ln(Sales / Op Exp)</i>	<i>Ln(Sales / Op Exp)</i>	<i>Ln(Sales / Op Exp)</i>
	Median Net Profit Margin		Median Net Profit Margin		
	Above	Below	Above	Below	
	(1)	(2)	(3)	(4)	(5)
<i>Ln(Sales) × R&D Intensity_{t-1}</i>	0.021*** (8.67)	0.067*** (23.83)	0.019*** (7.71)	0.063*** (22.40)	0.052*** (21.98)
<i>R&D Intensity_{t-1}</i>	-0.151*** (-8.80)	-0.350*** (-26.54)	-0.134*** (-7.73)	-0.328*** (-24.72)	-0.317*** (-22.83)
<i>Ln(Sales)</i>	0.011*** (8.46)	0.060*** (24.87)	0.024*** (9.22)	0.092*** (26.86)	0.069*** (24.89)
Observations	53,078	52,767	53,078	52,767	108,017
R ²	0.561	0.781	0.570	0.791	0.750
Firm FE	Yes	Yes	Yes	Yes	Yes
Year FE	No	No	Yes	Yes	Yes
Standard Errors	Cluster by Firm	Cluster by Firm	Cluster by Firm	Cluster by Firm	Cluster by Firm

Table 7 (continued)

Panel B: *DOL and Knowledge Capital*

DV =	<i>Ln(Sales / Op Exp)</i>	<i>Ln(Sales / Op Exp)</i>	<i>Ln(Sales / Op Exp)</i>	<i>Ln(Sales / Op Exp)</i>	<i>Ln(Sales / Op Exp)</i>
	Median <i>Net Profit Margin</i>		Median <i>Net Profit Margin</i>		
	Above	Below	Above	Below	
	(1)	(2)	(3)	(4)	(5)
<i>Ln(Sales) × Knowledge Capital_{t-1}</i>	0.012*** (8.85)	0.047*** (16.32)	0.011*** (7.97)	0.042*** (15.39)	0.029*** (15.52)
<i>Knowledge Capital_{t-1}</i>	-0.096*** (-12.01)	-0.209*** (-14.50)	-0.081*** (-10.34)	-0.150*** (-11.08)	-0.151*** (-15.22)
<i>Ln(Sales)</i>	0.012*** (9.18)	0.076*** (24.05)	0.026*** (9.59)	0.120*** (27.04)	0.085*** (24.57)
Observations	57,466	57,196	57,466	57,196	116,973
R ²	0.545	0.740	0.555	0.755	0.706
Firm FE	Yes	Yes	Yes	Yes	Yes
Year FE	No	No	Yes	Yes	Yes
Standard Errors	Cluster by Firm	Cluster by Firm	Cluster by Firm	Cluster by Firm	Cluster by Firm

Table 7 presents the results of OLS panel regressions examining the association between the degree of operating leverage and one-year lagged intangible intensity, measured by *R&D Intensity* and *Knowledge Capital* in Panels A and B, respectively. Intangible intensity measures are standardized to a mean of zero and a variance of one for interpretability. All columns include firm fixed effects and columns 3 to 5 also include year fixed effects. Standard errors are clustered at the firm level (t-statistics in parentheses). The sample consists of non-financial firms from the Compustat annual file, covering fiscal years 1970 to 2024. Variable definitions are provided in Appendix.

Table 8: Contribution Margin Ratios and the Profit Share

DV =	Profit Share						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
<i>Time Trend</i>	0.122*** (9.04)	0.085*** (7.19)	0.089*** (6.83)	0.128*** (8.81)	0.124*** (8.37)	0.085*** (6.64)	0.090*** (7.11)
<i>CMR (High-Intangible Leaders)</i>		0.003 (0.57)	-0.001 (-0.24)			0.002 (0.48)	-0.005 (-0.91)
<i>CMR (High-Intangible Laggards)</i>				0.009 (1.00)	0.011 (1.53)	0.004 (0.63)	0.011** (2.13)
<i>CMR (High-Intangible Leaders) × Time Trend</i>		0.024** (2.15)	0.032** (2.49)			0.026** (2.40)	0.042*** (2.93)
<i>CMR (High-Intangible Laggards) × Time Trend</i>				-0.019 (-0.82)	-0.023 (-1.38)	-0.002 (-0.16)	-0.020* (-1.81)
Observations		54	54	54	54	54	54
R ²		0.769	0.752	0.618	0.627	0.784	0.776
Intangible Intensity measure		<i>R&D Intensity</i>	<i>Knowledge Capital</i>	<i>R&D Intensity</i>	<i>Knowledge Capital</i>	<i>R&D Intensity</i>	<i>Knowledge Capital</i>

Table 8 presents the results of time-series regressions examining the association between annual contribution margin ratios (*CMR*) and the corporate profit share between 1970 and 2024. The dependent variable, *Profit Share*, is after-tax corporate profits of the non-financial corporate sector divided by the sector's gross value added, obtained from the BEA's National Income and Product Accounts. *Time Trend* is a linear time trend equal to the calendar year minus 1970. *CMR (High-Intangible Leaders)* and *CMR (High-Intangible Laggards)* are annual cross-sectional estimates, computed separately for two groups of firms. High-intangible firms are those with intangible intensity above the median in the previous year. Within that group, leaders (laggards) are firms with above-median (below-median) net profit margin in the previous year. Columns 2, 4, and 6 use *R&D Intensity* to identify high-intangible firms; columns 3, 5, and 7 use *Knowledge Capital*. The coefficient on *CMR × Time Trend* captures whether the group's share of revenue in aggregate output has changed systematically over the sample period. Standard errors are heteroskedasticity-robust, with t-statistics reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. Detailed variable definitions are provided in Appendix.

Table 9: Increasing Procyclicality of Profits and Degree of Operating Leverage

DV =	Δ Net Profit Margin					
	High-Intangible Group					
		Leaders	Laggards	Leaders	Laggards	
	(1)	(2)	(3)	(4)	(5)	(6)
<i>GDP Growth</i> × <i>Time Trend</i>	0.028**	0.019	0.084**	0.022**	0.079**	-0.036
	(2.07)	(1.47)	(2.29)	(2.40)	(2.44)	(-0.95)
<i>Time Trend</i>	0.011	0.009	-0.005	0.011	-0.006	0.031
	(1.16)	(0.80)	(-0.06)	(0.91)	(-0.11)	(1.10)
<i>DOL</i> × <i>GDP Growth</i>						0.011*
						(1.84)
<i>DOL</i>						-0.004
						(-0.89)
<i>GDP Growth</i>	-0.000	0.001	-0.006	0.000	-0.006	0.017*
	(-0.03)	(0.86)	(-1.40)	(0.14)	(-1.62)	(1.87)
Observations	54	53	53	53	53	54
R ²	0.323	0.145	0.073	0.171	0.123	0.434
Intangible Intensity measure		<i>R&D Intensity</i>		<i>Knowledge Capital</i>		

Table 9 presents the results of OLS regressions examining trends in the procyclicality of profit margins for non-financial firms in the Compustat annual file between 1970 and 2024. Specifically, it reports estimates from regressions of yearly changes in (sales-weighted) average profit margins (Δ Net Profit Margin) on a time trend, *GDP Growth*, and the interaction between the time trend and *GDP Growth*. Columns 2 and 4 (3 and 5) show results when calculating Δ Net Profit Margin separately each year for *High-Intangible Leaders* (*High-Intangible Laggards*), which are defined as firms with above median intangible intensity and, within that group, above (below) median *Net Profit Margin*. All variables other than the time trend are standardized to a mean of zero and a variance of one for interpretability. Standard errors are heteroskedasticity-robust (t-statistics in parentheses). Variable definitions are provided in Appendix.