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Physical goods vs knowledge firms: a ratio analysis approach focused on company valuation

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ABSTRACT

This thesis examines the increasing difference between physical goods firms and knowledge-based companies through a comparative financial ratio and valuation analysis. Intangible assets are becoming primary value drivers in modern companies, making traditional valuation multiples that were designed for capital-intensive industries failing to accurately reflect the reality of knowledge firms. The study uses descriptive statistics and regression analysis to assess the accuracy of different multiples, using data from 2021 to 2025 of six leading companies listed on the American stock exchange (Alphabet, Apple, Microsoft vs. Coca-Cola, P&G, Nike). The objective is to identify which financial metric and valuation multiples most accurately reflects the reality for each business model.

Key words: Knowledge-Based Economy, Intangible Assets, Corporate Valuation, Research & Development.

RESUMEN

Esta tesis examina la creciente diferencia entre las empresas de bienes físicos y las empresas basadas en el conocimiento mediante un análisis comparativo de ratios financieros y valoración. Los activos intangibles se están convirtiendo en los principales impulsores de valor en las empresas modernas, lo que provoca que los múltiplos de valoración tradicionales, diseñados para industrias intensivas en capital, no reflejen con precisión la realidad de las empresas basadas en el conocimiento. El estudio utiliza estadística descriptiva y análisis de regresión para evaluar la precisión de diferentes múltiplos, utilizando datos de 2021 a 2025 de seis empresas líderes que cotizan en la bolsa de valores estadounidense (Alphabet, Apple, Microsoft frente a Coca-Cola, P&G, Nike). El objetivo es identificar qué métrica financiera y múltiplos de valoración reflejan con mayor precisión la realidad de cada modelo de negocio.

Palabras clave: Economía del Conocimiento, Activos Intangibles, Valoración de Empresas, Investigación y Desarrollo.

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1. Introduction

The objective of the Final Thesis is to identify and analyse the trend of key financial ratios from knowledge-based and physical goods firms, to assess whether traditional valuation multiples are effective in measuring the valuation of knowledge companies and to propose which multiples reflect better their realities. The thesis is relevant because it questions the validity of traditional valuation frameworks in an economy where intellectual capital has displaced physical capital, proposing more accurate metrics for the analysis of leading companies.

The Final Thesis addresses a comprehensive analysis of the valuation gap and financial mismatches between physical goods and knowledge-based firms. The valuation of modern companies has become increasingly difficult as the economy transitions from a manufacturing-based and capital-intensive model to one driven by intellectual property and capital. Traditional financial metrics now struggle to accurately capture the market value of knowledge-based enterprises. Through this study, we aim to examine how the different business models have distinct valuation approaches and metrics to reflect their market realities. The different business models will be represented by industry leaders like Alphabet, Apple and Microsoft in the case of knowledge-driven enterprises versus Coca-Cola, Procter & Gamble and Nike for physical goods corporations.

This approach seeks to not only understand current financial discrepancies but also to propose which multiples more accurately reflect the value of companies in the knowledge economy. In an environment where technological disruption is being dominant, which increases the importance of R&D and intangible assets, understanding the dynamics that drive the value of firms is essential for fundamental analysis to make better informed decisions. The study relies on qualitative and quantitative data from databases, financial reports, books and webpages to help in the analysis to provide a complete vision of modern valuation.

The thesis is structured into three blocks. First, a theoretical framework is developed, focused on defining the characteristics of both types of business models, the importance in distinguishing between them and examining the financial ratios that could be used in each type of business model. Second, a comparative financial analysis is conducted, utilizing key ratios in the financial statements to identify trends and structural differences

between the two business models from 2021 to 2025. Finally, a multiple regression analysis is applied to assess the power of each multiple in reflecting the market capitalization and enterprise value.

2. Theoretical Framework

2.1 Defining Physical Goods vs. Knowledge-Based Firms

Physical goods are tangible items that can be seen, touched, and held, produced for consumption, exchange or use. Physical goods firms are ones that sell goods and handle assets to generate economic value. The key operations of these firms involve controlling inventory, handling material, processing orders and transport the products to the customers. So, they manage physical inventory, supply chains and are capital-intensive in terms of property, plant and equipment. Physical goods companies require reinvestment in infrastructure to scale production¹.

Knowledge-based firms are organizations that consider knowledge, expertise and intellectual capital to be an essential resource in a firm. These organizations offer knowledge and knowledge-based products to the market where research and development play an important role as part of the business model. These firms often operate in high-tech and specialized sectors such as software, biotech or engineering, fostering rapid innovation through a highly skilled workforce².

2.2 Historical Context and the Drivers of the Intangible Economy

It is important to understand each different business model because, over the past decades, the composition of corporate value has undergone a fundamental transformation. The market value of companies in the S&P 500, in 1975, tangible assets accounted for 83% while intangible assets accounted just for 17% of the total market value. By the end of 2025, this relationship has shifted dramatically, with intangible assets now representing 92% of S&P market capitalization while tangible assets have reduced to constitute just 8%. The transformation is since value creation has changed from what is physical to intangible³.

¹ Diversification, *Physical Goods*, <https://diversification.com/term/physical-goods>

² Bontis, Nick, *The Knowledge-based view of the firm and its theoretical precursor*, https://www.researchgate.net/publication/228919839_The_knowledge-based_view_of_the_firm_and_its_theoretical_precursor

³ Ocean Tomo, *Intangible Asset Market Value Study*, <https://oceantomo.com/intangible-asset-market-value-study/>

The transition of the economy to having more value in intangible assets are due to different drivers. First the digital revolution, that has allowed software companies to scale globally with a marginal cost close to zero, something that is impossible for traditional manufacturers. Moreover, the globalization of supply chains has turned physical production into a commodity, shifting the competitive advantage and value to intellectual property and R&D. Finally, modern platforms have enabled the rise of network effects causing it to grow in value exponentially with its user base, a characteristic that physical assets like factories and inventories does not possess. Therefore, the reliance on valuation models of asset-based economy has created a valuation gap that this thesis seeks to address⁴.

⁴ McKinsey&Company, *Digital Globalization*,

<https://www.mckinsey.com/~/media/mckinsey/business%20functions/mckinsey%20digital/our%20insights/digital%20globalization%20the%20new%20era%20of%20global%20flows/mgi-digital-globalization-full-report.pdf>

3. Accounting Differentiations and the Intangible Gap

3.1 Definition of an Asset

An asset is a resource with economic value that is owned or controlled by a corporation with the expectation that it will provide a future benefit. However, the accounting standards, such as the US GAAP, treat these resources differently on whether they are classified as physical or as intangible, creating structural financial characteristics and differences in physical goods and knowledge-based firms⁵.

A physical asset is an item of economic value that has a material existence. These are typically PP&E, land and inventory. These assets are classified in current assets, which are short-term economic resources expected to be converted into cash or consumed within one year (cash, accounts receivable, inventory), and fixed assets, which are resources with an expected life of greater than a year (PP&E, land). These assets are typically recorded at historical cost at the balance sheet and depreciated over their useful lives⁶.

An intangible asset is a long-term economic resource without physical presence, including patents, trademarks, copyrights and goodwill. These non-physical resources grant a competitive advantage to the firm and are primary drivers of value. We can separate intangible assets into identifiable assets, those that can be separated from other assets and can be quantified or sold by the company (intellectual property, patents, copyrights, trademarks), and unidentifiable assets, those that cannot be separated from the company. The most common unidentifiable asset is goodwill, that arise when a company acquires another company and pays above its fair value, however it can also be argued that another unidentifiable asset is branding and reputation as it is difficult to separate good branding and reputation of a strong company⁷.

⁵ Pilot, *What is an asset?*, <https://pilot.com/glossary/asset>

⁶ Corporate Finance Institute, *Type of Assets*, <https://corporatefinanceinstitute.com/resources/accounting/types-of-assets/>

⁷ Corporate Finance Institute, *Intangible Assets*, <https://corporatefinanceinstitute.com/resources/accounting/intangible-assets/>

3.2 Accounting Treatment of R&D: Expense vs. Capitalization

The mismatch in accounting arises from how the investment is recorded in the financial statements. Capital expenditures (Capex) are costs of purchasing, upgrading or maintaining physical assets like PP&E. Capex are recognized on the balance sheet as an asset and the cost is depreciated over the asset's useful life, recording a decrease in the value of the asset and a depreciation expense in the income statement. For example, when Nike invests in a new machine to make shoes, the value of the machine will be recorded on Nike's balance sheet and will be gradually depreciated over time. Capex is seen as a long-term investment creating value for multiple periods and maintaining book value of a company high.

On the other hand, Research & Development (R&D) costs are costs incurred to develop new products, services or processes. R&D expenses under US GAAP are expensed immediately in the income statement. The reason for treating it directly as an expense for the period is due to the uncertain future benefits that it will provide to the organization. For example, when Microsoft spends money in developing new software to implement, they will record that money spent in the income statement for that period as a R&D expense⁸.

3.3 Financial Characteristics of Physical Goods Firms

This accounting differences have huge implications on the characteristics of physical goods and knowledge firm's financial statements. Physical goods companies that tend to capitalize investments have a greater book value. As they are recording the investments as assets, the value of the asset value in the balance sheet is going to be high, also making the Equity Book Value high and much higher relative to their market value compared to knowledge-based firms.

Additionally, capital intensive firms have operating leverage meaning that it faces significant marginal costs for every unit sold. To increase production, they must increase significantly their physical footprint such as more raw material, more factories, more logistics. This may be slow and of high cost making it difficult for this business models

⁸ IAS 38, *Intangible Assets*, <https://www.ifrs.org/content/dam/ifrs/publications/pdf-standards/english/2021/issued/part-a/ias-38-intangible-assets.pdf>

to scale quickly and efficiently. Eventually, it creates diseconomies of scale as building more factories or logistics may become more complex.

Physical goods firms also have a large amount of Depreciation and Amortization (D&A) expense in the income statement. So, these firms have high non-cash charges on the income statement. Also, this makes EV/EBITDA a better metric than the P/E, as it is not considering the high depreciation expense of assets that are still useful and creating value. These corporations also tend to have greater debt capacity as the physical assets they own serve as great collateral for creditors. So, they can safely carry more debt at low rates due to assets backing the loan and use this leverage to boost returns for shareholders.

3.4 Financial Characteristics of Knowledge-based Firms

In contrast, knowledge-based firms have understated assets and earnings. This is because they have assets, such as knowledge, that does not appear in the balance sheet but does provide an economic benefit for the company. These assets are said to be outside the balance sheet. Furthermore, current earnings look lower than they would because the R&D expense, or long-term investments, are being subtracted from revenue as if they were everyday bills. Therefore, as there are assets like reputation and knowledge that are not recorded in the balance sheet, the book value of knowledge-based firms serves only as a floor to the intrinsic value of the firm. This is because the company has a value beyond the value in the balance sheet as these assets that are not recorded also give and has value, so this book value must be the minimum value for the company. This is why the Price-to-Book value for this companies tend to be extremely high compared to physical firms.

Moreover, these types of firms have R&D burden. The high R&D expenses in the income statement decreases heavily earnings and more importantly the net income. This is why knowledge-based firms may appear to have lower earnings and a high Price-to-Earnings ratio, which makes the company look expensive for its actual earnings when they are just investing a great amount of money in the future for growth.

As with physical goods firms can use their assets as collateral and have high debt capacity, knowledge-based firms do not have such capacity as knowledge cannot be used as collateral and be repossessed by the bank in case of default. This reason causes intangible-

heavy companies to maintain a net cash position, cash minus debt to be positive. It is a strategic necessity, and companies must rely on cash flow they internally generate to remain flexible and fund their R&D, operations and acquisitions.

Knowledge-based organisations operate under a zero marginal cost model and they experience massive scalability. Once the R&D cost is developed and in function, the cost of serving more users and scaling quickly is zero. This also leads to extremely high operating margins compared to physical goods firms, as they cannot match that the knowledge scales much quicker and more efficiently than when of need of physical assets. Eventually, it creates economies of scale due to the network effect as due to the investment the system will grow, and each new user adds value to the existing customers⁹.

⁹ RedMonk, *Understanding the Nature of R&D Investments vs. Capital Investments*, <https://redmonk.com/rstephens/2016/07/05/research-and-development-vs-capital-investments/>

4. Data Sourcing and Methodology

4.1 Companies Selection and Rationale

The selection of the companies follows a selective sampling strategy focusing on large capitalization companies listed in the U.S. exchanges. The firms were selected for their market leadership, high transparency and the clear contrast they provide between tangible and intangible-intensive business models.

Knowledge-based companies are categorized by their reliance in intellectual property and intangible assets. For the analysis the companies used will be Microsoft, Alphabet and Apple.

Microsoft is an American multinational technology conglomerate headquartered in Redmond, Washington and founded in 1975 by Bill Gates and Paul Allen. The company became influential in the rise of computers through software like Windows and has expanded to Internet services, cloud computing, artificial intelligence and other fields. Its business model is based on high-margin licensing and subscription services¹⁰.

Alphabet Inc. is an American multinational technology conglomerate holding company headquartered in Mountain View, California. It was created through a restructuring of Google in October 2015 and became the parent holding company of Google and several subsidiaries. It's primarily an information and data company operating main business units like Google Services and Google Cloud and hold portfolio companies like Waymo, Verily and more¹¹.

Apple Inc. is an American multinational technology company headquartered in Silicon Valley, California and is best known for its consumer electronics, software and online services. Was founded in 1976 by Steve Jobs. Its core business is the development of consumer hardware like iPhone, Mac, iPad and software like iOS. Have also services like Apple Music, Apple Pay and more¹².

¹⁰ Arimetrix, *What is Microsoft*, <https://www.arimetrix.com/en/digital-glossary/microsoft>

¹¹ Awati, R. & Wright, G., *What is Alphabet?*, <https://www.techtarget.com/whatis/definition/Alphabet-Inc>

¹² Arimetrix, *What is Apple*, <https://www.arimetrix.com/en/digital-glossary/apple>

The reason for the selection of these three companies as knowledge-based firms are due to their significant representation of the intangible economy. They all capitalize their position in their market through data and intellectual property rather than physical assets. These companies also invest heavily in R&D which makes it a good reason to analyse the limitations of traditional Book Value.

On the other hand, physical goods firms are categorized by their physical production and supply chains. For the analysis, the companies used will be Coca-Cola, Nike and Procter & Gamble (P&G).

The Coca-Cola Company is an American multinational corporation founded in 1887 headquartered in Atlanta, Georgia. It manufactures, sells and markets soft drinks including Coca-Cola, other non-alcoholic beverage concentrates and syrups, and alcoholic beverages. The company owns, licenses and markets over 500 brands, including Sprite, Fanta, Minute Maid and more. The business model relies on a vast physical network of bottling plants, inventory and global distribution so its value is tied to tangible output and physical presence¹³.

Nike Inc. is an American athletic footwear and apparel corporation founded in 1964 headquartered in Oregon. Is the largest supplier of athletic shoes and apparel and a major manufacturer of sports equipment. Primarily markets products under its own brand but also through subsidiaries like Converse. Its business model requires significant investment in inventory and physical logistics¹⁴.

Procter & Gamble is an American multinational consumer goods corporation headquartered in Ohio. The company operates in five key divisions: beauty, grooming, health care, fabric & home care and baby & family care. It owns brands that are in many cases the global leader in their category like Gillette, Oral-B, Ariel, Pantene and more¹⁵.

The reason for the selection of these three companies as physical goods firms are due to their significant proportion of PP&E and physical assets in their balance sheet. They provide a stable baseline for traditional multiples like EV/EBITDA and P/E.

¹³ Britannica, *The Coca-Cola Company*, <https://www.britannica.com/money/The-Coca-Cola-Company>

¹⁴ Carlson, D., *Nike, Inc.*, <https://www.britannica.com/money/Nike-Inc>

¹⁵ Britannica, *Procter & Gamble Company*, <https://www.britannica.com/money/Procter-and-Gamble-Company>

The selection of these six companies is ideal for this thesis for several reasons. First, the homogeneity in geography and regulation of all of them. The six companies are listed in the United States and report under the same accounting standards, under the US GAAP. This will eliminate fluctuations and differences in currency and accounting standards, ensuring that the ratio analysis is mathematically consistent. Secondly, all selected firms are the same in terms of size and maturity, being large-cap industry leaders. This will ensure that the differences found in the ratios are due to their business models rather than their stage of growth or risk profile. Finally, given their size and that they are publicly listed, the data access and availability is easy to find and use for the analysis. By selecting leaders, we can analyse how the knowledge sector and physical sector has recovered and re-valued themselves in the post-Covid-19 environment, providing a modern perspective in valuation.

4.2 Selection of Valuation Multiples

For the analysis we will be looking at the following ratios: P/S, P/E, EV/EBITDA, P/B, and P/R&D.

The Price-to-Sales (P/S) ratio that measures the market capitalization of the company relative to its total revenue. Expressed as:

$$P/S = \frac{\text{Market Capitalization}}{\text{Total Revenue}}$$

The P/S ratio focuses on the top line of the profit and loss account and provides a view of how much is the market willing to pay for every dollar of sales the company has generated. The ratio is very relevant because it is the most stable metric. Total revenue is not distorted by any type of cost or investment and reflects how the company is scaling and adopting in the market. For knowledge-based firms, revenue is an indicator of scalability and allows for better direct comparison between firms as earnings are distorted by R&D costs. While for physical goods firms, this metric is less significant because it is important to know how much of the revenue turns into cash for investors after covering the physical production costs.

The price-to-earnings ratio is the most widely recognised metric in equity valuation. It shows the relationship between the relationship between a company's market price per share and its earnings per share. Expressed as:

$$P/E = \frac{\text{Market Price per Share}}{\text{Earnings per Share}}$$

Or in absolute terms would be the relationship between the total market capitalization and the total net income.

$$P/E = \frac{\text{Market Capitalization}}{\text{Net Income}}$$

The ratio essentially indicates the dollar amount an investor can expect to invest in a company to receive one dollar of that company's earnings. For traditional companies such as Coca-Cola, Nike or P&G, the P/E ratio remains highly reliable as they operate in mature industries and have predictable cost structures. As they have well-defined margins, their Net Income is a good reflection of the ability of the companies to generate wealth for investors. The initial thesis of this research is that the P/E ratio becomes a problem when applied to knowledge-based firms like Apple, Microsoft or Alphabet. As the R&D costs are treated as operating expenses under US GAAP, this proportion reduces the Net Income, the E in the multiple, resulting in higher P/E ratios as the market capitalization is being reduced by a lower denominator. By looking just at the multiple an analyst could conclude that the company is expensive to invest in, while the high multiple is a result of investment in assets that will drive value in the future.

The third multiple will be the EV/EBITDA, a valuation metric that measures a company's total enterprise value relative to its ability to generate Earnings Before Interest, Taxes, Depreciation and Amortization. Expressed as:

$$EV/EBITDA = \frac{\text{Enterprise value}}{\text{EBITDA}}$$

Where:

$$\text{Enterprise Value (EV)} = \text{Market Capitalization} + \text{Total Debt} - \text{Total Cash}$$

This multiple is generally preferred over the P/E ratio for physical goods firms because it uses the Enterprise Value, so the ratio is unaffected by the capital structure, if it is funded with debt or equity, which is important for these types of firms that carry significant

leverage. It is important also to highlight the importance of using EBITDA, which comes before the high depreciation charges that these firms face due to investments in PP&E, and provides a clearer picture of the company's actual operational performance.

On the other hand, EV/EBITDA can also be misleading to value knowledge-based companies for a similar reason that with the P/E ratio. The EBITDA is considering the high R&D expenses that the firms have incurred, lowering the EBITDA and making the multiple high and appearing to be expensive. Moreover, these firms have little physical equipment to depreciate so there is little difference between EBIT and EBITDA, making the multiple less informative and important than for physical goods companies.

The fourth multiple is the Price-to-Book ratio that compares the current company's equity market value to its book value. The Book Value is calculated as total assets minus total liabilities, is the equity value that appears in the company's balance sheet, and in theory it represents what shareholders would receive if the company were liquidated today. Expressed as:

$$P/B = \frac{\text{Market Price per Share}}{\text{Book Value per Share}}$$

The P/B multiple is of relevance for physical goods companies as their assets are recorded in the balance sheet, so their equity book value stays relatively high resulting in low P/B multiples. While the P/B in knowledge-based companies reach high levels due to their most valuable assets not recorded in the balance sheet because they were developed internally. These assets have value for the market and investors but are not reflected in the balance sheet, making the equity book value much lower than its market value creating an inflated ratio that doesn't capture the reality of the firm.

The final multiple is the Price-to-R&D (P/R&D) which is a specialized valuation multiple that measures the market capitalization of a company relative to its investment in Research and Development. Expressed as:

$$P/R\&D = \frac{\text{Market Capitalization}}{\text{Research \& Development Expenditure}}$$

Traditional multiples focus on the outputs of the business, such as sales or earnings, while this ratio focuses on the inputs of innovation. It indicates how many dollars of market value the equity market assigns to every dollar invested in future intellectual property.

Since R&D is immediately expensed under US GAAP reducing the earnings of the company, the P/R&D treats such expense as a value-generating asset rather than a sunk cost. Physical goods companies will have no R&D expense that will prove the point that the value drivers for knowledge-based and physical goods firms are different¹⁶.

4.3 Data Sourcing

The empirical data for the research was extracted from the FactSet Financial Terminal, a premium global platform known for its institutional data and standardized financial reporting. The choice of FactSet as the source ensures reliability and consistency of the study, as it provides historical data that account for corporate actions and accounting mismatches that often remain in public databases.

The sample consists of a purposive sampling of six US-market-leading companies, separated into two groups. The first group, representing knowledge-based firms, is constituted by Apple, Microsoft and Alphabet and were selected due to its reliance on R&D and intangible capital as drivers for their competitive advantage. The second group, representing physical goods firms, is constituted by Coca-Cola, Nike and Procter & Gamble and were selected due to their traditional business models where valuation is driven by tangible assets.

The time horizon selected for the analysis covers 20 fiscal quarters, covering the period from March 2021 to December 2025. The time horizon is relevant as it encompasses a complete macroeconomic cycle of post-pandemic recovery, where central banks have been rising interest rates and valuations have grown heavily too by the surge of artificial intelligence. Furthermore, for all income statement variables that are going to be included in the analysis (Revenue, EBITDA, NI and R&D), we will use their LTM (Last Twelve Months) figures. If we would use isolated quarterly data, it would introduce seasonality bias like fourth-quarter spikes in consumer electronics (Apple) or retail (Nike) due to holiday shopping and promotional events and would distort the multiples if not smoothed. By using the rolling LTM basis, it ensures that ratios reflect a sustainable and standardized

¹⁶ Corporate Finance Institute, *Types of Valuation Multiples*, <https://corporatefinanceinstitute.com/resources/valuation/types-of-valuation-multiples/>

annual performance, providing a more accurate reflection of the fundamental value that investors use to price a company in the market.

The data collection process involved a systematic extraction of financial statements for each of the 20 quarters. For every company in the sample, the Quarterly Financial Statements and the Ratio Analysis reports were downloaded from FactSet and consolidated into a complete excel spreadsheet. The selection of variables follows a strategy to support both the descriptive statistical and the econometric regression analysis. On one hand, valuation multiples (P/S, P/E, P/BV and EV/EBITDA) were downloaded directly for each fiscal quarter. Having these multiples as a time-series data allows for a better statistical analysis enabling the calculation of averages, medians and volatility of each group and a chart to show the trend of each company. On the other hand, fundamental figures from the Income Statement (Revenue, EBITDA, NI and R&D Expense) and from the Balance Sheet (Book Value) were extracted to serve as the regressors of the Ordinary Least Squares models. The variables will be essential for quantifying the drivers of corporate value (Market Capitalization and Enterprise Value) which were also downloaded from the FactSet terminal. All raw data points, calculations and standardized ratios were integrated into a comprehensive Excel workbook that will serve as a tool for the statistical tests and econometric estimations performed in Gretl. The complete data tables can be found in the Appendices of this thesis.

5. Descriptive Statistical and Visual Analysis

The analysis commences with a comprehensive descriptive statistical study to characterize the distribution and behaviour of valuation multiples across the two defined groups. Two analytical tools are used. The first will be a time-series comparative chart of the multiple to track the historical trend over the 20-quarter horizon. This will allow to identify patterns and the impact of each variable in valuation. The second tool will be measures of central tendency and dispersion. For each group, the mean, median, standard deviation and range are calculated and will provide a measure of the volatility associated with each business model. By contrasting knowledge-based group against the physical goods group, the descriptive analysis seeks to provide a preliminary validation of the hypothesis that markets assign different fundamentals to different profiles of corporations.

5.1 Analysis of the Price-to-Sales (P/S) Ratio

The descriptive analysis starts with the examination of the Price-to-Sales ratio, which serves as a vital benchmark for evaluating how the market prices a dollar of a company's revenue. With the historical fiscal quarter multiples, we have been able to extract the following statistics of the groups:

Table 1: Summary Statistics for the P/S Ratio

	Avg.	Median	St. Dev.	Max.	Min.	Range
Knowledge	8,49x	7,69x	2,68x	13,74x	4,07x	9,67x
Physical	4,80x	4,81x	1,33x	6,82x	1,93x	4,89x

Source: Own elaboration using data from FactSet

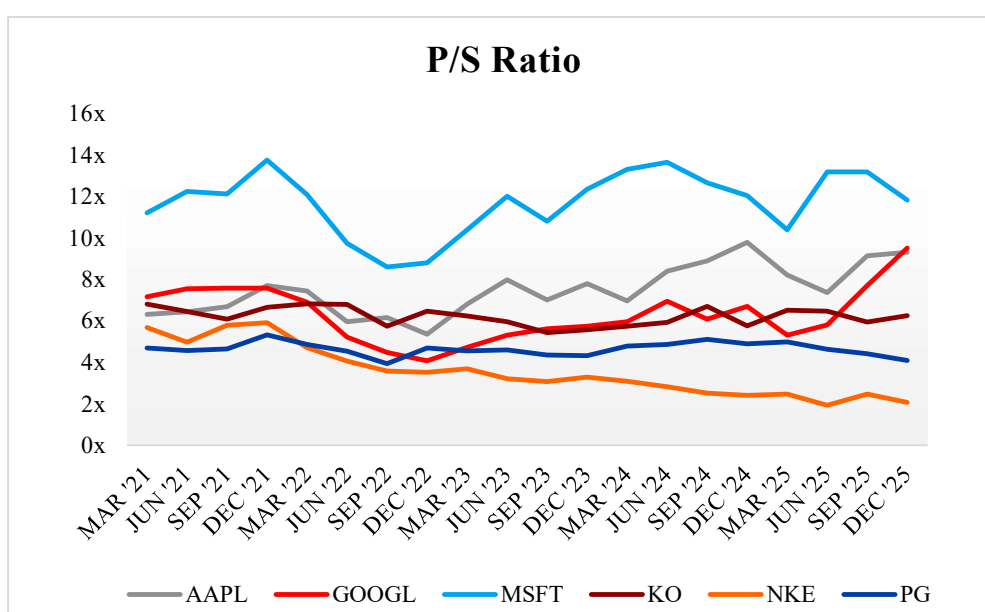
The summary statistics show how the knowledge-based group have a massive premium with an average P/S ratio of 8.49x, in contrast with the physical goods group with an average ratio of 4.80x. This shows that investors are willing to pay a 77% premium for every dollar of revenue generated by intangible intensive firms compared to tangible intensive firms. The gap is further highlighted by the extremes where the maximum P/S obtained in the knowledge group is 13.74x while the physical group never exceeded 6.82x. Even the minimum valuation of the knowledge group of 4.07 can be compared to the average valuation of the physical group of 4.80x, demonstrating that the lowest valued

intangible heavy company still trades at a premium relative to the average of physical goods firms. The analysis of the median further explains the nature of the premium. The knowledge median of 7.69x is lower than its mean of 8.49x suggesting a right-skewed distribution influenced by high peak valuations from times during the AI boom. The physical mean (4.80x) and median (4.81x) are almost identical, indicating perfectly stable and symmetric valuation profile.

The standard deviation metric provides an important insight into the market's perception of risk and growth stability. The knowledge group shows a much wider dispersion in valuations with a standard deviation of 2.68x and a huge range of 9.67x. The high level of volatility suggests that the tech sector's valuations are more sensible to changes such as shifts in the AI landscape, inflation and interest rates expectations. In direct contrast, the physical group shows much more stability with a low standard deviation of 1.33x and a range of 4.89x. This low volatility reflects on the stability of these firms, being more predictable but more slower growing, resulting in more consistent valuation multiples over time.

Moreover, a longitudinal examination of the P/S ratio time-series can help us reveal the divergence in valuation cycles between the two groups.

Figure 1: Evolution of the P/S Ratio by Company



Source: Own elaboration using data from FactSet

Throughout the 20-quarter period, the knowledge-based group shows a more volatile behaviour. We can see a contraction in the 2022 fiscal year aligning with the global rising interest rates that affected the growth of companies. However, the subsequent year shows a recovery with a powerful rebound particularly for Microsoft (MSFT) and Apple (AAPL). We can also see how Microsoft has been constantly above all in the multiple, and how in the past fiscal year, all knowledge companies appear to have a higher multiple than the physical goods firms, further demonstrating the premium paid for intangible intensive companies. The three physical goods firms tend to have a horizontal trend with small fluctuations, and we can see Nike (NKE) and Procter & Gamble (PG) be consistently the lowest valued through the past five fiscal years. The visual evidence supports that tech firms are valued for their exponential scalability and R&D driven growth while physical goods firms are valued for their stable cash flows and revenue.

5.2 Analysis of the Price-to-Earnings (P/E) Ratio

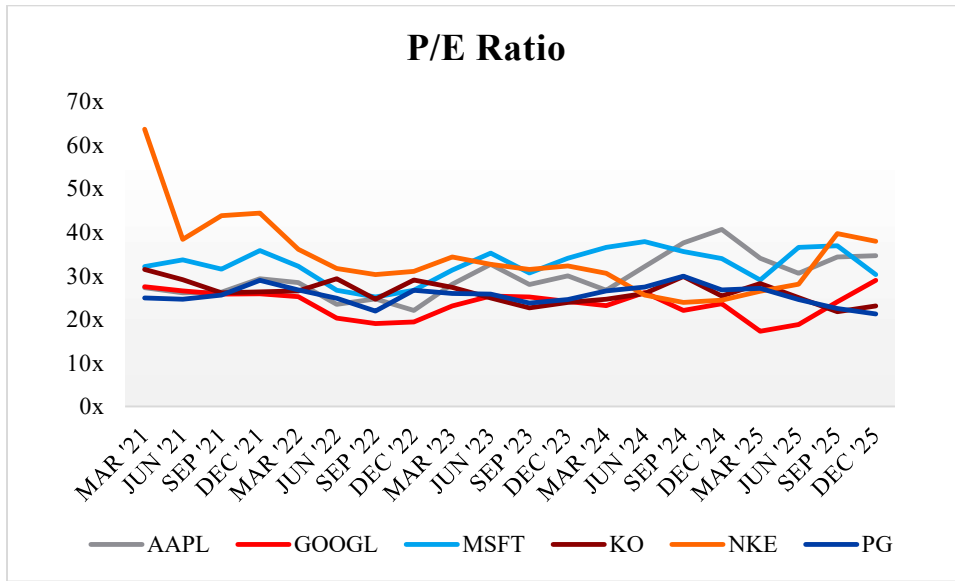
Table 2: Summary Statistics for the P/E Ratio

	Avg.	Median	St. Dev.	Max.	Min.	Range
Knowledge	28,63x	27,97x	5,38x	40,63x	17,24x	23,39x
Physical	28,66x	26,57x	6,75x	63,62x	21,23x	42,39x

Source: Own elaboration using data from FactSet

In contrast to the P/S analysis, the descriptive statistics for the Price-to-Earnings (P/E) ratio reveals a convergence in central tendency. The knowledge-based group presents an average of 28.63x, while the physical goods group stands at virtually the same level with 28.66x. At a first look this may suggest that investors value earnings identically across sectors, but the P/E ratio uses the Net Income, a number calculated after the deduction of R&D expense. Knowledge-based corporations that have aggressive R&D spending, have their earnings suppressed, which makes the denominator of the multiple very low and therefore inflates their P/E ratios. If the R&D would be capitalized and not expensed, the net income would be higher, making the P/E ratio lower and more attractive for an investor. Therefore, the convergence here of the mean suggests that the market is willing to pay a premium for non-capitalized growth in technology equivalent to what it pays for standardized earnings in traditional industries.

Figure 2: Evolution of the P/E Ratio by Company



Source: Own Elaboration using data from FactSet

Diving into dispersion metrics we can conclude that physical goods have a little more volatility as shown by its standard deviation of 6.75x compared to the standard deviation of knowledge-based group of 5.38x. The physical group presents a massive range driven by the maximum P/E of 63.62x. From the time-series chart figure 4, it is evident that this extreme outlier corresponds to Nike (NKE) in the earliest quarters of 2021. This may be primarily due to a sharp post-pandemic recovery of the apparel sector in 2021 that stabilized in the subsequent quarters. The chart also shows how all historical P/E ratios of the companies tend to be quite similar and have a horizontal trend.

5.3 Analysis of the EV/EBITDA Ratio

Table 3: Summary Statistics for the EV/EBITDA Ratio

	Avg.	Median	St. Dev.	Max.	Min.	Range
Knowledge	20,58x	20,82x	3,81x	27,74x	11,82x	15,91x
Physical	21,83x	20,47x	4,99x	45,35x	15,18x	30,17x

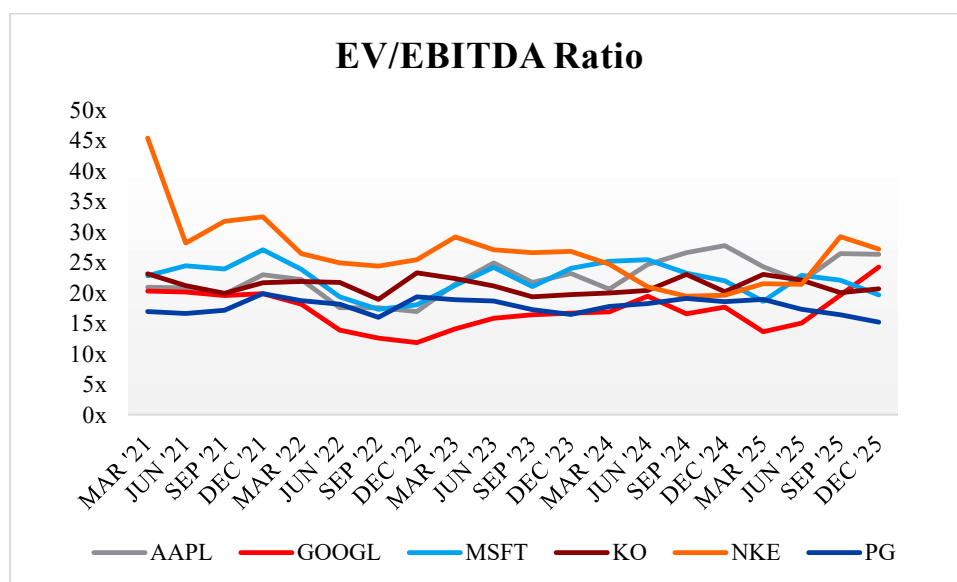
Source: Own elaboration using data from FactSet

The descriptive results for the EV/EBITDA ratio mirror the convergence observed in the P/E analysis. The knowledge group shows an average of 20.58x while the physical group

a slightly higher average of 21.83x. the reason for this is like the one of Net Income explained before, EBITDA is an indicator of operational profitability. R&D expenses are deducted from operating income reducing the EBITDA figure. For the knowledge group, the R&D compresses their reported EBITDA. If R&D expenses were to be capitalized rather than expensed, the denominator (EBITDA) will be higher leading to a much lower and more attractive multiple. The fact that the market prices a similar multiple indicates that investors are willing to pay the same price for a compressed EBITDA from knowledge-based companies as they are for a full realized EBITDA from physical goods companies, signalling a strong implicit valuation of intangibles.

Physical group shows a higher dispersion with a standard deviation of 4.99x and a range of 30.17x compared to the knowledge group with a standard deviation of 3.81x and range of 15.91x. The dispersion shown is heavily influenced by Nike (NKE) as seen in the time-series chart (figure 6) shown below. Nike began 2021 with an artificial multiple of 45.35x, nearly double the group’s average, which was temporary again by the post-pandemic market effect.

Figure 3: Evolution of the EV/EBITDA Ratio by Company



Source: Own elaboration using data from FactSet

The EV/EBITDA time-series highlights the convergence of multiples and its horizontal trend. It is worth noting that Alphabet (GOOGL) is consistently in the bottom of the valuation multiple representing an anomaly where a high-growth tech giant is valued

cheaper than defensive staples. Overall, the six firms tend to be around the 20x mark and suggests that despite the fundamental differences in business models, the current macroeconomic environment has forced the growth potential of tech and stability of traditional firms to be priced at a similar risk-adjusted premium.

5.4 Analysis of the Price-to-Book Value (P/BV) Ratio

Table 4: Summary Statistics for the P/BV Ratio

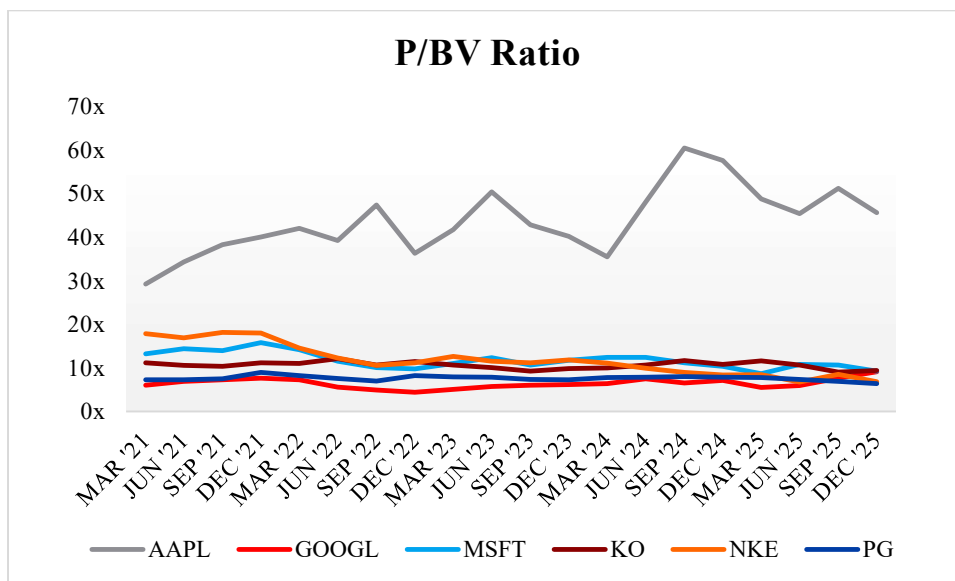
	Avg.	Median	St. Dev.	Max.	Min.	Range
Knowledge	20,60x	11,32x	17,09x	60,46x	4,43x	56,04x
Physical	9,97x	9,84x	2,75x	18,18x	6,37x	11,81x

Source: Own elaboration using data from FactSet

The analysis of the Price-to-Book Value (P/BV) ratio provides the most compelling evidence of the divergence between traditional accounting and moder market valuation. The knowledge-based group show an average of P/BV of 20.6x, more than double the 9.97x average of the physical goods group. The physical group tends to be more stable with a median of 9.84x very close to its mean, indicating that the market still sees the balance sheet as a connection with the company’s pricing.

The most striking feature in the dataset is the performance of Apple (AAPL). As illustrated in the time-series chart below (figure 8), Apple lies in a valuation of its own world, peaking at 60x P/BV.

Figure 4: Evolution of the P/BV Ratio by Company



Source: Own elaboration using data from FactSet

The high multiple of Apple is not a statistical error but a reflection of two factors. The first is the intangible dominance of Apple as most of its value comes from its brand equity and intellectual property, which are not captured in the Book Value. Second is the capital structure of the company, where Apple is known for large share buybacks that have historically reduced its shareholder's equity artificially inflating the P/BV ratio.

A methodological question arises regarding whether Apple should be excluded from the descriptive analysis to avoid skewing the results. However, this study argues that its inclusion is essential and that the extreme P/BV ratio is strong evidence of the intangible revolution. Excluding the company would mean having stabilized results that will ignore the most successful implementation of an intangible intensive business model.

Even when accounting for Apple's distortion, the knowledge group exhibits a higher standard deviation of 17.09x compared to the physical group with a standard deviation of 2.75x. Within the knowledge-based companies, a hierarchy emerges. Apple appears to trade at extremes and Microsoft at multiples higher than physical goods firms most of the time. However, Alphabet (GOOGL) consistently presents the most conservative P/BV levels consistently. The positioning of the company in the lower bound is a reflection that the company also has a high level of tangible assets in its operations. Alphabet comprise global data centres, fibre-optic networks and physical Google Cloud hardware that makes

the Book Value be high and therefore reduce the multiple. From Appendix 6, we can see that the equity Book Value of Alphabet was \$415.26 billion in December 2025, nearly five times higher than the equity Book Value of Apple.

5.5 Analysis of the Price-to-R&D Expense (P/R&D) Ratio

The Price-to-R&D (P/R&D) ratio represents the most specialized valuation metric within this study, designed to capture the market capitalization of innovation. We seek to isolate the relationship between a firm’s market value and its internal investment in future intellectual property.

The analysis of the P/R&D ratio from the Table 9 reveals the most radical divergence in the study. While the knowledge-based group shows an average multiple of 81.39x, the physical goods group present a null value (0,00x).

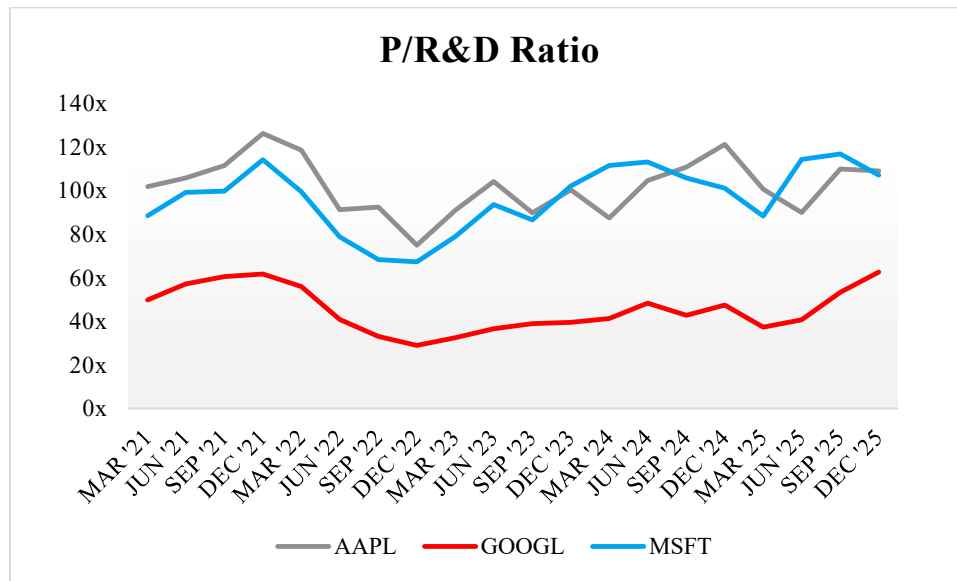
Table 5: Summary Statistics for the P/R&D Ratio

	Avg.	Median	St. Dev.	Max.	Min.	Range
Knowledge	81,39x	89,78x	28,45x	126,30x	28,92x	97,38x
Physical	0,00x	0,00x	0,00x	0,00x	0,00x	0,00x

Source: Own elaboration using data from FactSet

The incredible disparity is not a result of missing data or an error, but a reflection of the structural difference in reporting from the different groups. Traditional firms with high level of tangible assets have an absence of R&D expenditure reporting. In these industries, the competitive advantage is maintained through marketing, branding and CAPEX. The average of 81.39x and median of 89.78x indicate that investors are willing to pay a massive multiple for every dollar of research conducted.

Figure 5: Evolution of the P/R&D by Company



Source: Own elaboration using data from FactSet

As seen in the time series chart Figure 10, Microsoft (MSFT) and Apple (AAPL) consistently trade at the top of this range, often even exceeding the 100x P/R&D. This suggests that for these firms, R&D is viewed as a high-yield value driver. In contrast, Alphabet (GOOGL) trades at a significant discount consistently compared to its peers. This could be since Alphabet invests much more in R&D than its peers. For example, Alphabet has invested in R&D \$61.09 billion as of December 2025, while Apple has invested \$37.17 billion and Microsoft \$33.67 billion (Appendix 6). As Alphabet has a higher denominator, it reduces its P/R&D ratio compared to the one if its peers.

On the other hand, the lower multiple could be because of the immediacy of results that the R&D is going to give to the company. Alphabet may invest in projects that are more of a long-term investment than investments done by its peers that will have more impact in the short term. Microsoft invests heavily on its software-as-a-service (SaaS) and generative AI that have immediate integration to its ecosystem. Same applies with Apple where its R&D investment is aligned to hardware cycles where the research is quickly converted into sales. In contrast, Alphabet allocates a lot of the investment in other projects with higher risk and lower predictability in profitability. Such projects could include Waymo, the autonomous driving, and X Development, of radical technological breakthroughs. Therefore, because the R&D investment in Apple and Microsoft have a

higher convertibility into sales, the market could price the companies higher due to this perception of recovering their investment quicker.

The inclusion of the P/R&D ratio is essential to highlight the opportunity cost of tangible asset intensive models. By not reporting their investment in R&D, the physical goods group are missing out the exponential scalability associated with intangible assets. From an investor perspective, the R&D expense is seen as an asset and not as a cost. This explains why the knowledge-based group of companies has outpaced the physical goods group in market capitalization growth over the last decade.

6. Econometric Framework: Multivariate Regression Analysis

The next stage of this research moves from descriptive statistics to econometric modelling. While the previous section established a clear valuation gap between the business models, they do not quantify the relative weight of specific financial drivers. To address this, an Ordinary Least Squares (OLS) regression is employed. The objective is to see the impact of fundamental drivers on the market value of the companies.

A critical choice in this model is the application of Natural Logarithms (\ln) to both the dependent and independent variables. The Log-log model can be superior for several reasons. First, the resulting coefficients (β) represent elasticities. This means for example that a coefficient of 0.5 in R&D investment implies that a 1% increase in R&D expense correlates with a 0.5% increase in market capitalization. This provides a percentage-based comparison that is more insightful and useful than absolute values. Secondly, the log-log model mitigates the heteroscedasticity as large-cap firms have non-constant variance and the logarithmic transformation reduces the scale of the data to ensure the OLS estimators are unbiased. Finally, market valuation often follows complex relationships and with the log model we seek to convert them into linear equations that can be more accurately estimated.

To evaluate the accuracy of the models, the analysis will look at four primary indicators:

1. The Coefficient (β): measures the magnitude and direction of the relationship. A positive and high coefficient for the independent variable would confirm the hypothesis
2. The p-value: we will use a 95% confidence interval ($\alpha = 0.05$). A p-value below 0.05 indicates that the relationship is statistically significant and not a random result.
3. R-squared (R^2): measures the Goodness of Fit. Tells us what percentage of the dependent variable is explained by our independent variables.
4. The dummy variable (Type): will capture the sector premium and quantifies the intrinsic value added by simply being classified as a knowledge-based firm, independent of the firm's financial performance.

The coefficient associated with the 'Type' dummy variable provides a direct quantitative measure of the sector premium. In a log-log model, the coefficient represents the constant

proportional shift in the dependent variable that occurs when the binary condition changes from 0 (Physical) to 1 (knowledge). A positive and statistically significant coefficient for ‘Type’ confirms that the market applies a premium to technology firms. This premium reflects the intangible driven expectations that are included in the knowledge-based business model but absent in the traditional asset-heavy business model.

6.1 Model I: Revenue-based (P/S)

The first econometric regression focuses on the relationship between Total Revenue and Market Capitalization to understand the efficiency of the P/S ratio and see how much premium is added by being a knowledge-based company. A log-log multivariate regression was estimated using 120 quarterly observations. The model is specified as follows:

$$\ln(\text{MktCap}_{i,t}) = \beta_0 + \beta_1 \ln(\text{Revenue}_{i,t}) + \beta_2(\text{Type}_i) + \varepsilon_{i,t}$$

Where:

- Ln(MktCap): Natural logarithm of Market Capitalization
- Ln(Revenue): Natural logarithm of Total Revenue
- Type: Binary dummy variable (1 for Knowledge-based, 0 for Physical goods)
- β_1 : Represents the revenue elasticity of market value
- β_2 : Captures the intercept shift attributable to the sector premium

The OLS regression shows a good Adjusted R² of 0.932, indicating that over 93% of the variance in market capitalization is explained by revenue and sector classification. The high F-statistic of 818.06 and its associated p-value of <0.0001 confirm the robust joint significance of the regressors.

Table 6: OLS Regression Results for Model I (P/S)

Variable	Coefficient	St. Dev.	t-stat	p-value
constant	5.176	1.093	4.737	<0.0001 ***
l_revenue	0.665	0.100	6.652	<0.0001 ***
Type	1.127	0.176	6.388	<0.0001 ***

Source: Own elaboration using data from FactSet and Gretl

Table 6 shows the findings of the regression estimates for the P/S multiple. The coefficient of $\beta_1 = 0.665$ suggests that the market does not scale valuation linearly with sales. A 1% increase in revenue correlates with a 0.67% increase in market value. This indicates that while size is a major factor, the market places weight on other qualitative factors beyond total revenue. It is not enough to sell more, now the market also looks at how efficiently those sales are being made. Furthermore, the coefficient for the Type dummy (1.127) is both positive and significant. By applying the exponential transformation ($e^{1.127} - 1$) we find a 208.6% valuation premium for knowledge-based firms. This proves that for any given level of revenue, the market prices knowledge-based companies at more than triple the value of traditional physical goods companies. In other words, the market believes that a dollar of revenue in a knowledge-based firm is worth more than a dollar of revenue in a physical goods firm. The high Adjusted R² confirms that the P/S ratio is a highly accurate metric in the current economy because revenue is less susceptible to accounting discretion than earnings.

6.2 Model II: Earnings-based (P/E)

The second model evaluates the robustness of the P/E ratio. Net Income measures the final efficiency of the business model but are subject to accounting treatments, with the immediate expense of R&D, and may not be as accurate as the top-line revenue. The model is specified as follows:

$$\ln(\text{MktCap}_{i,t}) = \beta_0 + \beta_1 \ln(\text{NetIncome}_{i,t}) + \beta_2(\text{Type}_i) + \varepsilon_{i,t}$$

Where:

- Ln(MktCap): Natural logarithm of Market Capitalization
- Ln(NetIncome): Natural logarithm of Net Income
- Type: Binary dummy variable (1 for Knowledge-based, 0 for Physical goods)
- β_1 : Represents the earnings elasticity of market value
- β_2 : Captures the intercept shift attributable to the sector premium

Model II shows an even higher explanatory power than the previous model, with an Adjusted R² of 0.976, suggesting that 97.6% of the firm's market capitalization is driven

by their net profitability and sector classification. The extremely high F-statistic of 2421.95 and its very low p-value of <0.0001 indicate a near perfect structural fit.

Table 7: OLS Regression Results for Model II (P/E)

Variable	Coefficient	St. Dev.	t-stat	p-value
constant	5.141	0.397	12.95	<0.0001 ***
l_NetIncome	0.801	0.043	18.42	<0.0001 ***
Type	0.444	0.103	4.314	<0.0001 ***

Source: Own elaboration using data from FactSet and Gretl

The earnings elasticity ($\beta_1 = 0.801$) is notably higher than the revenue elasticity ($\beta_1 = 0.665$). This means the market is more sensitive to changes in profit than to changes in sales. For every 1% increase in Net Income, the market value rises by 0.80%. In addition, the coefficient for the Type dummy has dropped to 0.444, converting this ($e^{0.444} - 1$), the sector premium is now 55.9%. Compared to the 208% premium in the revenue model, this tells us that much of the intangible advantage is already reflected in the higher profit margins. So, despite accounting mismatches through R&D expensing, the P/E ratio remains an incredibly accurate metric for these large-cap firms. The market is pricing the companies with precision based on their earnings and knowing that earnings already consider the R&D investment of the company for the period.

6.3 Model III: Cash Flow-Based (EV/EBITDA)

This model shifts the dependent variable to Enterprise Value (EV) to match the logic of the EBITDA multiple as it is neutral to capital structure. The model is specified as follows:

$$\ln(EV_{i,t}) = \beta_0 + \beta_1 \ln(EBITDA_{i,t}) + \beta_2(\text{Type}_i) + \varepsilon_{i,t}$$

Where:

- $\ln(\text{MktCap})$: Natural logarithm of Enterprise Value
- $\ln(\text{EBITDA})$: Natural logarithm of EBITDA
- Type: Binary dummy variable (1 for Knowledge-based, 0 for Physical goods)
- β_1 : Represents the EBITDA elasticity of market value
- β_2 : Captures the intercept shift attributable to the sector premium

Model III presents an extraordinary Adjusted R² of 0.975, confirming that 97.5% of the Enterprise Value is explained by the operational profitability and the sector type. The F-statistic (2353.1) and its p-value (<0.0001) reinforces the model's high reliability.

Table 8: OLS Regression Results for Model III (EV/EBITDA)

Variable	Coefficient	St. Dev.	t-stat	p-value
constant	5.026	0.376	13.36	<0.0001 ***
l_EBITDA	0.791	0.04	19.85	<0.0001 ***
Type	0.41	0.095	4.316	<0.0001 ***

Source: Own elaboration using data from FactSet and Gretl

Results in Table 8 show a high operational elasticity in the coefficient $\beta_1 = 0.791$ indicating that for every 1% increase in EBITDA, the Enterprise Value increases by approximately 0.79%. This value is very close to earnings elasticity from before (0.80), suggesting that the market uses operational cash flow for pricing both intangible and tangible large-cap companies. The Type coefficient of 0.41 translates into a premium of 50.6% ($e^{0.41} - 1$). This is the lowest premium found so far and at the same time is very close to the premium in the earnings model before. The extreme precision of this model with Adjusted R² 0.97 validates the reason why EV/EBITDA is the preferred metric for institutional investors. However, investors must consider that large R&D investment has been deducted already in knowledge-based companies and that physical goods firms will have large depreciation and amortization expense after EBITDA.

6.4 Model IV: Asset-Based (P/BV)

The fourth model tests the P/BV framework. This regression is crucial for your thesis because it measures how much the market cares about accounting equity. The model is specified as follows:

$$\ln(\text{MktCap}_{i,t}) = \beta_0 + \beta_1 \ln(\text{BookValue}_{i,t}) + \beta_2(\text{Type}_i) + \varepsilon_{i,t}$$

Where:

- Ln(MktCap): Natural logarithm of Market Capitalization
- Ln(BookValue): Natural logarithm of the Equity Book Value
- Type: Binary dummy variable (1 for Knowledge-based, 0 for Physical goods)

- β_1 : Represents the asset elasticity of market value
- β_2 : Captures the intercept shift attributable to the sector premium

Model IV shows the lowest explanatory power so far with an adjusted R^2 of 0.914. While still high, it is lower than the other models, suggesting that the balance sheet is less reliable predictor of value than profitability for the modern era capitalizations.

Table 9: OLS Regression Results for Model IV (P/BV)

Variable	Coefficient	St. Dev.	t-stat	p-value
constant	10.718	0.536	19.99	<0.0001 ***
l_BookValue	0.17	0.053	3.225	0.0016 ***
Type	1.929	0.115	16.77	<0.0001 ***

Source: Own elaboration using data from FactSet and Gretl

First thing to point out is the asset irrelevance in valuing a company. The coefficient $\beta_1 = 0.17$ is the lowest of all models, meaning that for every increase of 1% in accounting equity, the market value only grows 0.17%. The market nearly ignores the Book Value when pricing firms, confirming that traditional accounting is losing its relevance. The Type coefficient is incredibly high (1.929), close to five times the coefficient from the EV/EBITDA model. With the exponential transformation ($e^{1.929} - 1$) the sector premium reaches 588%. This means that for the same amount of equity on the balance sheet, a knowledge-based firm is valued nearly 7 times higher than a physical goods firm. This premium represents the massive intangible wealth that does not appear in the balance sheet. The low R^2 and the very high constant (10.71) suggest that the P/BV ratio is not very accurate to value companies, it requires a large adjustment just so that the data makes sense.

6.5 Model V: Innovation Premium (P/R&D)

The final model isolates R&D expenditure as the primary driver. It will test if the market prices innovation as a fundamental asset. The model is specified as follows:

$$\ln(\text{MktCap}_{i,t}) = \beta_0 + \beta_1 \ln(\text{R\&D}_{i,t}) + \varepsilon_{i,t}$$

Where:

- $\ln(\text{MktCap})$: Natural logarithm of Market Capitalization
- $\ln(\text{R\&D})$: Natural logarithm of Research and Development Expenditure
- β_1 : Represents the innovation elasticity of market value

For Model V, a small constant of 0.00001 was added to observations with zero R&D expenditure. This allows the inclusion of the physical goods group in the logarithmic specification without losing data. This adjustment was necessary to maintain a consistent sample size of $n = 120$ across all models.

Model V reflects an Adjusted R^2 of 0.907. While slightly lower than all models, it still demonstrates that over 90% of a firm's market capitalization can be explained by its level of innovation. The F-statistic (1158.1) and the p-value of F (<0.0001) confirms the high structural significance of R&D as a valuation driver.

Table 10: OLS Regression Results for Model V (P/R&D)

Variable	Coefficient	St. Dev.	t-stat	p-value
constant	13.62	0.033	413.5	<0.0001 ***
l_RDExpense	0.102	0.003	34.03	<0.0001 ***

Source: Own elaboration using data from FactSet and Gretl

From Table 10 we can reflect several things. First, there is a positive innovation elasticity with a coefficient of $\beta_1 = 0.102$. For every 1% increase in R&D spending the market capitalization increases by 0.10%. This demonstrates that investors see the R&D investment as an asset that creates value rather than as a cost. The high R^2 of 0.90 proves that for firms in this study, R&D is not an expense but a necessity to keep growing. The market uses R&D spending as a proxy for the firm's ability to maintain its competitive advantage in the future. However, the constant term $\beta_0 = 13.61$ is very high. This suggests that the capacity to innovate and expectations of the future is a factor in valuation too, even before the specific quarterly R&D expense is factored in.

6.6 Discussion and Models Comparison

To conclude the regression analysis, Table 11 summarizes the performance of the 5 models tested. This comparison allows us to identify which financial fundamental is the most reliable driver for corporate value.

Table 11: Comparative Summary of Models

Model	Multiple	Independent Variable	Adj. R ²	β_1
I	P/S	Revenue	0.932	0.665
II	P/E	Net Income	0.976	0.801
III	EV/EBITDA	EBITDA	0.975	0.791
IV	P/BV	Book Value	0.914	0.169
V	P/R&D	R&D Expense	0.906	0.102

Source: Own elaboration using data from FactSet and Gretl

We can conclude three critical insights from the regression analysis. First, is that profitability is still the most important factor to investigate. Models II (Net Income) and III (EBITDA) show the highest explanatory power with an Adjusted R² > 0.97, proving that while the intangible vs. tangible story is important, the market is ultimately looking for profits. Second thing to highlight is the failure of physical assets. Model IV (Book Value) is the weakest predictor of value. The extremely low elasticity (0.169) and massive sector premium (1.929) confirm that traditional accounting with high book values is almost irrelevant for knowledge-based firms. Investors are not buying physical assets and large balance sheet; they are buying intangible intellectual property. Another insight comes from model I, which shows how the market uses Revenue as a proxy for success before a company is profitable, but applies a huge bonus in knowledge-based companies of +208%. This suggests that the market is pricing the potential for future scale. Finally, the fact that model V with R&D alone explains 90% of a firm's value confirms that innovation is no longer an optional expense. In the modern economy, the market capitalization is tied to its commitment to evolution to maintain its competitive advantage.

7. Conclusions

The journey of the research began with a Descriptive Statistical Analysis that highlighted a clear divergence in corporate behaviour. The initial data showed that physical goods firms maintain stable, linear growth, while knowledge-based firms exhibit exponential valuation patterns.

The analysis confirms that there is an intangible era, where knowledge-based companies trade at higher multiples. Model I (P/S) and Model IV (P/BV) proved that it is not an anomaly and that the market assigns a 208% premium to intangible intensive revenue and a 588% premium over book value. This confirms that traditional accounting is failing to record the real value-drivers of the modern economy.

One of the most important conclusions of the research is the market's recognition of operating leverage. The descriptive analysis showed that knowledge-based firms scale their valuation much faster than their costs. Econometric Models I and III confirm that the market is pricing the zero marginal cost. Physical goods firms face increasing costs for every unit produced while knowledge-based firms can replicate their value infinitely at a cost near zero.

Traditionally, companies with massive physical assets were considered safe. However, Model IV (P/BV) proved that physical assets are now a poor predictor of market value with a $\beta_1 = 0.169$. The high R^2 of Model V with a 0.906 suggests a paradigm shift that R&D is the new Capex. In the modern economy, a firm's assets are its research labs and its patents. This research concludes that innovation is not an optional expense, but a value driver for market capitalization.

Finally, profitability appears to continue to be a key metric when pricing a company. The descriptive analysis of Net Income was confirmed by Model II with an $R^2 = 0.976$. This proves that the market is highly rational and it rewards the scalability of knowledge-based corporations only when it translates into superior profitability. Knowledge-based firms invest in R&D that reduces this Net Income, and theoretically it should reduce their valuations. However, the high statistical fit proves that the market looks through these accounting distortions and recognizes that the expenditure is a driver for future cash flows and profit.

One limitation of the study is the sample concentration as the study focused on 6 global mega-caps. While these firms represent a large portion of the global economy, the results might differ for Small and Medium Enterprises (SMEs) where access to capital for R&D is more constrained. Also, there is a survivorship bias as the selected firms are the ones that have gone well in their respective industries. A broader study that includes companies that have failed could provide a more accurate view of the risks associated with R&D investment. Finally, the 20-quarter period covers a specific time-series of the market expansion. Future research should include periods of extreme interest rate volatility to test if the knowledge premium remains stable when the cost of money increases or when there is a recession in the economy.

Ultimately, this research proves that the new economy is not a myth, but a statistically verifiable shift in the drivers of valuation. Profits remain the goal of any firm, but the path to achieving them has changed, from the accumulation of physical machines to the continuous investment in human knowledge and innovation.

8. Declaration of Use of Generative Artificial Intelligence Tools

Declaración de Uso de Herramientas de Inteligencia Artificial Generativa en Trabajos Fin de Grado

ADVERTENCIA: Desde la Universidad consideramos que ChatGPT u otras herramientas similares son herramientas muy útiles en la vida académica, aunque su uso queda siempre bajo la responsabilidad del alumno, puesto que las respuestas que proporciona pueden no ser veraces. En este sentido, NO está permitido su uso en la elaboración del Trabajo fin de Grado para generar código porque estas herramientas no son fiables en esa tarea. Aunque el código funcione, no hay garantías de que metodológicamente sea correcto, y es altamente probable que no lo sea.

Por la presente, yo, [Nombre completo del estudiante], estudiante de [nombre del título] de la Universidad Pontificia Comillas al presentar mi Trabajo Fin de Grado titulado "[Título del trabajo]", declaro que he utilizado la herramienta de Inteligencia Artificial Generativa ChatGPT u otras similares de IAG de código sólo en el contexto de las actividades descritas a continuación [el alumno debe mantener solo aquellas en las que se ha usado ChatGPT o similares y borrar el resto. Si no se ha usado ninguna, borrar todas y escribir "no he usado ninguna"]:

1. **Brainstorming de ideas de investigación:** Utilizado para idear y esbozar posibles áreas de investigación.
2. **Crítico:** Para encontrar contra-argumentos a una tesis específica que pretendo defender.
3. **Referencias:** Usado conjuntamente con otras herramientas, como Science, para identificar referencias preliminares que luego he contrastado y validado.
4. **Metodólogo:** Para descubrir métodos aplicables a problemas específicos de investigación.
5. **Interpretador de código:** Para realizar análisis de datos preliminares.
6. **Estudios multidisciplinares:** Para comprender perspectivas de otras comunidades sobre temas de naturaleza multidisciplinar.
7. **Constructor de plantillas:** Para diseñar formatos específicos para secciones del trabajo.
8. **Corrector de estilo literario y de lenguaje:** Para mejorar la calidad lingüística y estilística del texto.
9. **Generador previo de diagramas de flujo y contenido:** Para esbozar diagramas iniciales.
10. **Sintetizador y divulgador de libros complicados:** Para resumir y comprender literatura compleja.
11. **Generador de datos sintéticos de prueba:** Para la creación de conjuntos de datos ficticios.
12. **Generador de problemas de ejemplo:** Para ilustrar conceptos y técnicas.
13. **Revisor:** Para recibir sugerencias sobre cómo mejorar y perfeccionar el trabajo con diferentes niveles de exigencia.
14. **Generador de encuestas:** Para diseñar cuestionarios preliminares.
15. **Traductor:** Para traducir textos de un lenguaje a otro.

Afirmo que toda la información y contenido presentados en este trabajo son producto de mi investigación y esfuerzo individual, excepto donde se ha indicado lo contrario y se han dado los créditos correspondientes (he incluido las referencias adecuadas en el TFG y he explicitado para que se ha usado ChatGPT u otras herramientas similares). Soy consciente de las implicaciones

académicas y éticas de presentar un trabajo no original y acepto las consecuencias de cualquier violación a esta declaración.

Fecha: 26/03/2026

Firma: Alejandro Santodomingo Werner

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10. Appendix

1. P/S Table

Date	AAPL	GOOGL	MSFT	KO	NKE	PG
DEC '25	9,30x	9,50x	11,81x	6,23x	2,06x	4,07x
SEP '25	9,12x	7,70x	13,16x	5,93x	2,46x	4,41x
JUN '25	7,36x	5,79x	13,17x	6,45x	1,93x	4,62x
MAR '25	8,19x	5,29x	10,37x	6,50x	2,45x	4,97x
DEC '24	9,78x	6,68x	12,02x	5,75x	2,39x	4,89x
SEP '24	8,88x	6,07x	12,65x	6,69x	2,50x	5,09x
JUN '24	8,38x	6,94x	13,62x	5,92x	2,81x	4,85x
MAR '24	6,95x	5,95x	13,29x	5,73x	3,08x	4,77x
DEC '23	7,78x	5,73x	12,34x	5,56x	3,28x	4,31x
SEP '23	7,00x	5,61x	10,79x	5,43x	3,05x	4,34x
JUN '23	7,97x	5,30x	12,00x	5,95x	3,20x	4,58x
MAR '23	6,79x	4,70x	10,37x	6,22x	3,67x	4,54x
DEC '22	5,35x	4,07x	8,78x	6,46x	3,51x	4,68x
SEP '22	6,15x	4,46x	8,58x	5,73x	3,58x	3,93x
JUN '22	5,94x	5,20x	9,72x	6,77x	4,05x	4,52x
MAR '22	7,42x	6,88x	12,06x	6,82x	4,69x	4,86x
DEC '21	7,69x	7,57x	13,74x	6,65x	5,91x	5,31x
SEP '21	6,67x	7,56x	12,10x	6,07x	5,78x	4,64x
JUN '21	6,43x	7,53x	12,22x	6,43x	4,95x	4,56x
MAR '21	6,30x	7,15x	11,20x	6,79x	5,67x	4,69x

2. P/E Table

Date	AAPL	GOOGL	MSFT	KO	NKE	PG
DEC '25	34,59x	28,97x	30,26x	23,01x	37,90x	21,23x
SEP '25	34,25x	23,98x	36,85x	21,74x	39,65x	22,43x
JUN '25	30,57x	18,77x	36,46x	24,92x	28,06x	24,49x
MAR '25	34,00x	17,24x	29,01x	28,18x	26,43x	27,07x
DEC '24	40,63x	23,53x	33,95x	25,30x	24,33x	26,71x
SEP '24	37,53x	22,00x	35,52x	29,82x	23,90x	29,87x
JUN '24	32,07x	26,13x	37,87x	25,87x	25,51x	27,40x
MAR '24	26,67x	23,15x	36,45x	24,58x	30,57x	26,53x
DEC '23	29,96x	24,06x	34,01x	23,87x	32,20x	24,54x
SEP '23	27,93x	25,09x	30,58x	22,57x	31,38x	23,71x
JUN '23	32,60x	25,32x	35,16x	24,89x	32,62x	25,73x
MAR '23	28,02x	23,07x	31,25x	27,33x	34,27x	25,90x
DEC '22	22,08x	19,37x	26,66x	29,00x	30,98x	26,62x
SEP '22	24,65x	18,99x	25,10x	24,56x	30,23x	21,89x
JUN '22	23,41x	20,28x	26,63x	29,26x	31,67x	24,78x
MAR '22	28,40x	25,16x	32,17x	26,51x	36,08x	26,70x

DEC '21	29,27x	25,81x	35,78x	26,30x	44,37x	28,91x
SEP '21	26,20x	25,75x	31,51x	26,09x	43,76x	25,55x
JUN '21	26,07x	26,47x	33,63x	29,04x	38,33x	24,56x
MAR '21	27,20x	27,46x	32,08x	31,46x	63,62x	24,91x

3. P/BV Table

Date	AAPL	GOOGL	MSFT	KO	NKE	PG
DEC '25	45,58x	9,11x	9,19x	9,35x	6,79x	6,37x
SEP '25	51,18x	7,59x	10,61x	9,04x	8,48x	6,84x
JUN '25	45,38x	5,88x	10,77x	10,59x	6,77x	7,28x
MAR '25	48,73x	5,44x	8,67x	11,56x	8,38x	7,76x
DEC '24	57,59x	7,11x	10,35x	10,78x	8,32x	7,80x
SEP '24	60,46x	6,48x	11,12x	11,67x	8,91x	7,99x
JUN '24	48,06x	7,46x	12,38x	10,61x	9,90x	7,85x
MAR '24	35,45x	6,38x	12,35x	9,97x	11,04x	7,77x
DEC '23	40,17x	6,14x	11,73x	9,79x	11,83x	7,22x
SEP '23	42,84x	6,01x	10,63x	9,19x	11,09x	7,33x
JUN '23	50,36x	5,66x	12,27x	10,01x	11,52x	7,80x
MAR '23	41,71x	5,06x	11,01x	10,64x	12,59x	7,91x
DEC '22	36,29x	4,43x	9,75x	11,42x	11,13x	8,20x
SEP '22	47,33x	4,89x	10,01x	10,62x	10,52x	6,92x
JUN '22	39,24x	5,58x	11,51x	12,11x	12,22x	7,52x
MAR '22	42,02x	7,21x	14,16x	10,96x	14,53x	8,21x
DEC '21	40,05x	7,62x	15,76x	11,13x	17,95x	8,96x
SEP '21	38,25x	7,27x	13,93x	10,32x	18,18x	7,48x
JUN '21	34,29x	6,86x	14,35x	10,51x	16,87x	7,20x
MAR '21	29,24x	6,02x	13,21x	11,12x	17,84x	7,25x

4. EV/EBITDA Table

Date	AAPL	GOOGL	MSFT	KO	NKE	PG
DEC '25	26,30x	24,20x	19,63x	20,60x	27,13x	15,18x
SEP '25	26,39x	19,59x	22,01x	20,01x	29,19x	16,35x
JUN '25	21,84x	14,98x	22,84x	22,05x	21,36x	17,24x
MAR '25	24,25x	13,58x	18,59x	23,00x	21,46x	18,90x
DEC '24	27,74x	17,60x	21,93x	20,16x	19,59x	18,54x
SEP '24	26,56x	16,53x	23,18x	22,98x	19,46x	19,07x
JUN '24	24,63x	19,41x	25,39x	20,35x	20,94x	18,18x
MAR '24	20,58x	16,85x	25,12x	19,91x	24,68x	17,73x
DEC '23	23,15x	16,62x	23,97x	19,65x	26,79x	16,41x
SEP '23	21,66x	16,38x	20,96x	19,30x	26,57x	17,22x
JUN '23	24,86x	15,81x	24,13x	21,07x	27,05x	18,64x

MAR '23	21,38x	14,07x	21,20x	22,31x	29,13x	18,85x
DEC '22	16,91x	11,82x	17,97x	23,26x	25,41x	19,33x
SEP '22	17,52x	12,51x	17,29x	18,91x	24,34x	15,96x
JUN '22	17,54x	13,85x	19,32x	21,69x	24,86x	18,09x
MAR '22	22,16x	18,12x	23,81x	21,82x	26,41x	18,67x
DEC '21	22,93x	19,86x	27,04x	21,62x	32,45x	19,86x
SEP '21	19,74x	19,51x	23,86x	19,87x	31,67x	17,12x
JUN '21	20,77x	20,11x	24,37x	21,15x	28,13x	16,55x
MAR '21	20,87x	20,27x	22,77x	23,11x	45,35x	16,89x

5. P/R&D Table

Date	AAPL	GOOGL	MSFT	KO	NKE	PG
DEC '25	108,94x	62,65x	107,13x	0,00x	0,00x	0,00x
SEP '25	109,90x	53,33x	116,86x	0,00x	0,00x	0,00x
JUN '25	89,86x	40,62x	114,23x	0,00x	0,00x	0,00x
MAR '25	100,67x	37,28x	88,31x	0,00x	0,00x	0,00x
DEC '24	121,23x	47,39x	100,99x	0,00x	0,00x	0,00x
SEP '24	110,68x	42,62x	105,75x	0,00x	0,00x	0,00x
JUN '24	104,58x	48,30x	113,17x	0,00x	0,00x	0,00x
MAR '24	87,38x	41,24x	111,50x	0,00x	0,00x	0,00x
DEC '23	100,29x	39,49x	102,03x	0,00x	0,00x	0,00x
SEP '23	89,70x	38,88x	86,54x	0,00x	0,00x	0,00x
JUN '23	104,19x	36,58x	93,50x	0,00x	0,00x	0,00x
MAR '23	90,98x	32,43x	78,81x	0,00x	0,00x	0,00x
DEC '22	74,97x	28,92x	67,31x	0,00x	0,00x	0,00x
SEP '22	92,37x	33,02x	68,25x	0,00x	0,00x	0,00x
JUN '22	91,19x	40,79x	78,65x	0,00x	0,00x	0,00x
MAR '22	118,52x	55,93x	99,48x	0,00x	0,00x	0,00x
DEC '21	126,30x	61,73x	114,21x	0,00x	0,00x	0,00x
SEP '21	111,53x	60,54x	99,74x	0,00x	0,00x	0,00x
JUN '21	105,77x	57,15x	99,14x	0,00x	0,00x	0,00x
MAR '21	101,78x	49,82x	88,48x	0,00x	0,00x	0,00x

6. Vertical Fundamentals Table for Regression Analysis

ID	Ticker	Name	Type	Date	Mkt. Cap	EV	Revenue	EBITDA	Net Income	Book Value	R&D Expense
1	AAPL	Apple	1	DEC '25	4049151	4020679	435617	152902	117777	88190	37169
1	AAPL	Apple	1	SEP '25	3797058	3819395	416161	144748	112010	73733	34550
1	AAPL	Apple	1	JUN '25	3005780	3094480	408625	141696	99280	65830	33449
1	AAPL	Apple	1	MAR '25	3280732	3368158	400366	138866	97294	66796	32589
1	AAPL	Apple	1	DEC '24	3872409	3809524	395760	137352	96150	66758	31942
1	AAPL	Apple	1	SEP '24	3472169	3576099	391035	134661	93736	56950	31370
1	AAPL	Apple	1	JUN '24	3232633	3245615	385603	131781	101956	66708	30912
1	AAPL	Apple	1	MAR '24	2651888	2667546	381623	129629	100389	74194	30348
1	AAPL	Apple	1	DEC '23	2998971	3011497	385706	130109	100913	74100	29902
1	AAPL	Apple	1	SEP '23	2683272	2724701	383285	125820	96995	62146	29915
1	AAPL	Apple	1	JUN '23	3059881	3082015	383933	123957	94760	60274	29369
1	AAPL	Apple	1	MAR '23	2613178	2646532	385095	123788	94321	62158	28724
1	AAPL	Apple	1	DEC '22	2073126	2118159	387537	125288	95171	56727	27654
1	AAPL	Apple	1	SEP '22	2424701	2287557	394328	130541	99803	50672	26251
1	AAPL	Apple	1	JUN '22	2303704	2272020	387542	129557	99633	58107	25262
1	AAPL	Apple	1	MAR '22	2865987	2898473	386077	130795	101935	67399	24182
1	AAPL	Apple	1	DEC '21	2912020	2960530	378697	129099	100555	71932	23057
1	AAPL	Apple	1	SEP '21	2444028	2398273	366295	121463	94680	63090	21914
1	AAPL	Apple	1	JUN '21	2233817	2327734	347601	112070	86802	64280	21120
1	AAPL	Apple	1	MAR '21	2051983	2090043	325522	100162	76311	69178	20161
2	GOOGL	Google	1	DEC '25	3827364	3723697	403063	153902	132170	415265	61087
2	GOOGL	Google	1	SEP '25	2966549	2878618	385516	146917	124251	386867	55631
2	GOOGL	Google	1	JUN '25	2149654	2079608	371214	138860	115573	362916	52927
2	GOOGL	Google	1	MAR '25	1900680	1812819	359314	133510	110996	345267	50979
2	GOOGL	Google	1	DEC '24	2337476	2244022	349807	127490	100118	325084	49326
2	GOOGL	Google	1	SEP '24	2059691	1970044	339518	119203	94269	314119	48322
2	GOOGL	Google	1	JUN '24	2275964	2172446	327961	111944	87657	300753	47118
2	GOOGL	Google	1	MAR '24	1890700	1788950	317921	106145	82406	292844	45849
2	GOOGL	Google	1	DEC '23	1760373	1659488	307157	99843	73795	283379	44579
2	GOOGL	Google	1	SEP '23	1661398	1550626	296376	94665	66732	273202	42734
2	GOOGL	Google	1	JUN '23	1527851	1422791	288136	89978	60953	267141	41764
2	GOOGL	Google	1	MAR '23	1330130	1234044	282845	87722	58587	260894	41014
2	GOOGL	Google	1	DEC '22	1142314	1049882	280875	88809	59972	256144	39500
2	GOOGL	Google	1	SEP '22	1252728	1153753	280618	92238	66990	253626	37941
2	GOOGL	Google	1	JUN '22	1442561	1328831	277220	95968	72016	255419	35362
2	GOOGL	Google	1	MAR '22	1856693	1726882	269798	95305	74539	254004	33196
2	GOOGL	Google	1	DEC '21	1948239	1807050	257488	91006	76033	251635	31562
2	GOOGL	Google	1	SEP '21	1808687	1663147	239265	85262	70618	244567	29876
2	GOOGL	Google	1	JUN '21	1659470	1522467	220404	75702	62929	237565	29038
2	GOOGL	Google	1	MAR '21	1406785	1277288	196663	63007	51363	230013	28238
3	MSFT	Microsoft	1	DEC '25	3607805	3626629	305453	184761	119262	390875	33677
3	MSFT	Microsoft	1	SEP '25	3867015	3868803	293812	175768	104912	363076	33090
3	MSFT	Microsoft	1	JUN '25	3711176	3715365	281724	162681	101832	343479	32488

3	MSFT	Microsoft	1	MAR '25	2800785	2816050	270010	151460	96635	321891	31715
3	MSFT	Microsoft	1	DEC '24	3147762	3165207	261802	144328	92750	302695	31170
3	MSFT	Microsoft	1	SEP '24	3214341	3218121	254190	138839	90512	287723	30395
3	MSFT	Microsoft	1	JUN '24	3339611	3344935	245122	131720	88136	268477	29510
3	MSFT	Microsoft	1	MAR '24	3143620	3153420	236584	125543	86181	253152	28193
3	MSFT	Microsoft	1	DEC '23	2808267	2825070	227583	117836	82541	238268	27524
3	MSFT	Microsoft	1	SEP '23	2356126	2308068	218310	110092	77096	220714	27226
3	MSFT	Microsoft	1	JUN '23	2542812	2499072	211915	103584	72361	206223	27195
3	MSFT	Microsoft	1	MAR '23	2151871	2118972	207591	99969	69020	194683	27305
3	MSFT	Microsoft	1	DEC '22	1792175	1764417	204094	98205	67449	183136	26627
3	MSFT	Microsoft	1	SEP '22	1743257	1706609	203075	98701	69789	173566	25541
3	MSFT	Microsoft	1	JUN '22	1927766	1890622	198270	97843	72738	166542	24512
3	MSFT	Microsoft	1	MAR '22	2322808	2280372	192557	95769	72456	162924	23350
3	MSFT	Microsoft	1	DEC '21	2540898	2477384	184903	91616	71185	160010	22248
3	MSFT	Microsoft	1	SEP '21	2133289	2064970	176251	86531	67883	151978	21389
3	MSFT	Microsoft	1	JUN '21	2053693	1988841	168088	81602	61271	141988	20716
3	MSFT	Microsoft	1	MAR '21	1791145	1732144	159969	76074	56015	134505	20243
4	KO	Coca-Cola	0	DEC '25	301522	334267	48392	16230	13107	32169	0
4	KO	Coca-Cola	0	SEP '25	283235	318964	47752	15942	13031	31247	0
4	KO	Coca-Cola	0	JUN '25	303474	341254	47078	15473	12183	28585	0
4	KO	Coca-Cola	0	MAR '25	303506	345129	46669	15005	10784	26202	0
4	KO	Coca-Cola	0	DEC '24	268776	300522	46766	14907	10631	24856	0
4	KO	Coca-Cola	0	SEP '24	310348	339453	46392	14771	10409	26518	0
4	KO	Coca-Cola	0	JUN '24	274904	300650	46456	14771	10648	25853	0
4	KO	Coca-Cola	0	MAR '24	264420	290711	46139	14598	10784	26429	0
4	KO	Coca-Cola	0	DEC '23	255167	285172	45869	14515	10714	25941	0
4	KO	Coca-Cola	0	SEP '23	242897	268301	44765	13905	10772	26325	0
4	KO	Coca-Cola	0	JUN '23	261415	287861	43947	13662	10510	26013	0
4	KO	Coca-Cola	0	MAR '23	269520	298036	43313	13356	9868	25217	0
4	KO	Coca-Cola	0	DEC '22	276513	305997	42825	13156	9542	24105	0
4	KO	Coca-Cola	0	SEP '22	243463	270229	42454	14290	9925	22805	0
4	KO	Coca-Cola	0	JUN '22	280246	304229	41380	14025	9571	23005	0
4	KO	Coca-Cola	0	MAR '22	273925	301863	40180	13837	10307	24845	0
4	KO	Coca-Cola	0	DEC '21	257386	289551	38726	13390	9771	22999	0
4	KO	Coca-Cola	0	SEP '21	230319	255411	37928	12853	8813	22179	0
4	KO	Coca-Cola	0	JUN '21	235033	264457	36538	12503	8079	22249	0
4	KO	Coca-Cola	0	MAR '21	227368	261604	33492	11320	7217	20355	0
5	NKE	Nike	0	DEC '25	95717	98589	46565	3634	2524	14085	0
5	NKE	Nike	0	SEP '25	114430	116761	46519	4000	2895	13468	0
5	NKE	Nike	0	JUN '25	89534	91298	46402	4274	3219	13213	0
5	NKE	Nike	0	MAR '25	117604	118836	47905	5538	4508	14007	0
5	NKE	Nike	0	DEC '24	117367	119041	49050	6078	4886	14037	0
5	NKE	Nike	0	SEP '24	125147	126062	50058	6479	5301	13944	0
5	NKE	Nike	0	JUN '24	144162	143230	51386	6839	5700	14430	0
5	NKE	Nike	0	MAR '24	158649	158566	51571	6424	5231	14226	0
5	NKE	Nike	0	DEC '23	168945	169530	51508	6329	5299	14146	0

5	NKE	Nike	0	SEP '23	156969	158393	51433	5961	5052	13971	0
5	NKE	Nike	0	JUN '23	163816	162727	51191	6016	5070	14004	0
5	NKE	Nike	0	MAR '23	185883	184701	50636	6341	5478	14531	0
5	NKE	Nike	0	DEC '22	172477	171923	49153	6766	5634	15272	0
5	NKE	Nike	0	SEP '22	168808	167203	47219	6870	5640	15822	0
5	NKE	Nike	0	JUN '22	189566	186343	46792	7496	6046	15281	0
5	NKE	Nike	0	MAR '22	219941	214393	46894	8117	6116	14809	0
5	NKE	Nike	0	DEC '21	273729	265527	46342	8183	6169	14924	0
5	NKE	Nike	0	SEP '21	266813	259878	46182	8206	6083	14343	0
5	NKE	Nike	0	JUN '21	220369	214671	44493	7632	5727	12767	0
5	NKE	Nike	0	MAR '21	217926	213140	38456	4700	3428	11931	0
6	PG	Procter & Gamble	0	DEC '25	347383	359910	85259	23705	16454	53041	0
6	PG	Procter & Gamble	0	SEP '25	374414	384865	84933	23540	16765	53270	0
6	PG	Procter & Gamble	0	JUN '25	389346	400068	84284	23205	15974	52012	0
6	PG	Procter & Gamble	0	MAR '25	417495	425636	83927	22518	15496	52272	0
6	PG	Procter & Gamble	0	DEC '24	412100	418634	84346	22576	15480	51168	0
6	PG	Procter & Gamble	0	SEP '24	427111	432981	83905	22707	14318	51841	0
6	PG	Procter & Gamble	0	JUN '24	407715	413673	84039	22752	14880	50287	0
6	PG	Procter & Gamble	0	MAR '24	401082	409162	84060	23079	15127	50058	0
6	PG	Procter & Gamble	0	DEC '23	361719	371737	83933	22656	14770	48535	0
6	PG	Procter & Gamble	0	SEP '23	361033	371055	83265	21542	15235	47693	0
6	PG	Procter & Gamble	0	JUN '23	375936	386710	82006	20751	14653	46777	0
6	PG	Procter & Gamble	0	MAR '23	367740	380556	80968	20192	14321	45140	0
6	PG	Procter & Gamble	0	DEC '22	376051	386681	80281	20006	14279	44455	0
6	PG	Procter & Gamble	0	SEP '22	316080	326560	80461	20461	14569	44075	0
6	PG	Procter & Gamble	0	JUN '22	362825	370392	80187	20471	14742	46589	0
6	PG	Procter & Gamble	0	MAR '22	386615	392870	79618	21039	14596	45478	0
6	PG	Procter & Gamble	0	DEC '21	416180	417352	78346	21012	14510	44618	0
6	PG	Procter & Gamble	0	SEP '21	357734	361642	77138	21128	14141	46111	0
6	PG	Procter & Gamble	0	JUN '21	347188	351535	76118	21238	14306	46378	0
6	PG	Procter & Gamble	0	MAR '21	350804	352579	74870	20881	14200	46596	0

7. Model I: Revenue-based (P/S)

Modelo 1: MCO combinados, utilizando 120 observaciones

Se han incluido 6 unidades de sección cruzada

Largura de la serie temporal = 20

Variable dependiente: l_MktCap

	<i>Coefficiente</i>	<i>Desv. Típica</i>	<i>Estadístico t</i>	<i>valor p</i>	
const	5.17635	1.09286	4.737	<0.0001	***
l_Revenue	0.665288	0.100019	6.652	<0.0001	***
Type	1.12697	0.176414	6.388	<0.0001	***
Media de la vble. dep.	13.56053	D.T. de la vble. dep.	1.179982		

Suma de cuad. residuos	11.05778	D.T. de la regresión	0.307426
R-cuadrado	0.933262	R-cuadrado corregido	0.932122
F(2, 117)	818.0677	Valor p (de F)	1.68e-69
Log-verosimilitud	-27.21120	Criterio de Akaike	60.42240
Criterio de Schwarz	68.78487	Crit. de Hannan-Quinn	63.81844
rho	0.881741	Durbin-Watson	0.149658

8. Model II: Earnings-based (P/E)

Modelo 2: MCO combinados, utilizando 120 observaciones

Se han incluido 6 unidades de sección cruzada

Largura de la serie temporal = 20

Variable dependiente: l_MktCap

	<i>Coefficiente</i>	<i>Desv. Típica</i>	<i>Estadístico t</i>	<i>valor p</i>	
const	5.14106	0.397008	12.95	<0.0001	***
l_NetIncome	0.801229	0.0434991	18.42	<0.0001	***
Type	0.444350	0.103009	4.314	<0.0001	***
Media de la vble. dep.	13.56053		D.T. de la vble. dep.	1.179982	
Suma de cuad. residuos	3.907718		D.T. de la regresión	0.182755	
R-cuadrado	0.976416		R-cuadrado corregido	0.976012	
F(2, 117)	2421.950		Valor p (de F)	6.29e-96	
Log-verosimilitud	35.19967		Criterio de Akaike	-64.39935	
Criterio de Schwarz	-56.03687		Crit. de Hannan-Quinn	-61.00331	
rho	0.796665		Durbin-Watson	0.431288	

9. Model III: Cash flow-based (EV/EBITDA)

Modelo 3: MCO combinados, utilizando 120 observaciones

Se han incluido 6 unidades de sección cruzada

Largura de la serie temporal = 20

Variable dependiente: l_EV

	<i>Coefficiente</i>	<i>Desv. Típica</i>	<i>Estadístico t</i>	<i>valor p</i>	
const	5.02604	0.376280	13.36	<0.0001	***
l_EBITDA	0.791453	0.0398642	19.85	<0.0001	***
Type	0.409709	0.0949177	4.316	<0.0001	***
Media de la vble. dep.	13.56992		D.T. de la vble. dep.	1.155319	
Suma de cuad. residuos	3.852993		D.T. de la regresión	0.181471	
R-cuadrado	0.975742		R-cuadrado corregido	0.975328	
F(2, 117)	2353.118		Valor p (de F)	3.26e-95	

Log-verosimilitud	36.04587	Criterio de Akaike	-66.09174
Criterio de Schwarz	-57.72926	Crit. de Hannan-Quinn	-62.69570
rho	0.788107	Durbin-Watson	0.418921

10. Model IV: Asset-based (P/BV)

Modelo 4: MCO combinados, utilizando 120 observaciones

Se han incluido 6 unidades de sección cruzada

Largura de la serie temporal = 20

Variable dependiente: l_MktCap

	<i>Coefficiente</i>	<i>Desv. Típica</i>	<i>Estadístico t</i>	<i>valor p</i>	
const	10.7179	0.536130	19.99	<0.0001	***
l_BookValue	0.169596	0.0525920	3.225	0.0016	***
Type	1.92931	0.115045	16.77	<0.0001	***
Media de la vble. dep.	13.56053		D.T. de la vble. dep.	1.179982	
Suma de cuad. residuos	13.99538		D.T. de la regresión	0.345859	
R-cuadrado	0.915533		R-cuadrado corregido	0.914089	
F(2, 117)	634.0783		Valor p (de F)	1.63e-63	
Log-verosimilitud	-41.34675		Criterio de Akaike	88.69351	
Criterio de Schwarz	97.05598		Crit. de Hannan-Quinn	92.08955	
rho	0.902148		Durbin-Watson	0.122057	

11. Model V: Innovation-based (P/R&D)

Modelo 5: MCO combinados, utilizando 120 observaciones

Se han incluido 6 unidades de sección cruzada

Largura de la serie temporal = 20

Variable dependiente: l_MktCap

	<i>Coefficiente</i>	<i>Desv. Típica</i>	<i>Estadístico t</i>	<i>valor p</i>	
const	13.6197	0.0329393	413.5	<0.0001	***
l_RDEExpense	0.102353	0.00300759	34.03	<0.0001	***
Media de la vble. dep.	13.56053		D.T. de la vble. dep.	1.179982	
Suma de cuad. residuos	15.32077		D.T. de la regresión	0.360329	
R-cuadrado	0.907534		R-cuadrado corregido	0.906750	
F(1, 118)	1158.143		Valor p (de F)	7.56e-63	
Log-verosimilitud	-46.77567		Criterio de Akaike	97.55134	
Criterio de Schwarz	103.1263		Crit. de Hannan-Quinn	99.81536	
rho	0.898592		Durbin-Watson	0.115654	