HOW FINANCIAL RESOURCES INFLUENCE FIRMS' PERFORMANCE

A Comparative Study of the UK Manufacturing and Real Estate Industries

Lappeenranta–Lahti University of Technology LUT

Master's Programme in Strategic Finance and Analytics, Master's thesis

2025

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ABSTRACT

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Keywords: Manufacturing and Real Estate Industry, Resource-Based View (RBV), Panel Data Analysis, Fixed Effects Model, Driscoll–Kraay Standard Errors, Profitability (ROA).

This study focuses on the impact of financial resources on the performance of firms in the manufacturing and real estate sectors in the United Kingdom from 2015-2024. The paper uses the Resource-Based View (RBV) in its attempt to conceptualize the financial resources, including liquidity, leverage, free cash flow to assets, firm size, equity turnover, and growth, as the strategic inputs that could lead to competitive advantage. The fixed-effects models with firm and year controls are used to analyze a balanced panel dataset of 20 firms. Diagnostic testing determines that heteroskedasticity exists in both industries and cross-sectional dependence exists in the real estate industry; hence, Driscoll-Kraay standard errors are used to estimate the real estate model, whereas cluster-robust standard errors are applied to estimate the manufacturing model.

Results demonstrate that the financial variables are weakly explained when strong corrections are implemented. Growth has a marginal positive influence on profitability in the real estate industry, as compared to the equity ratio, where the ratio has a marginal negative influence. The free cash flow has a less positive effect in the manufacturing industry; however, the other financial indicators do not have a strong impact on performance. The overall impact of financial variables on profitability in both sectors is not significant, but the year effect is and remains significant; thus, macroeconomic conditions and industry-wide shocks appear to be the main predictors of firm performance.

Overall, the findings indicate that unobservable firm-specific features and external time effects have a more significant influence on profitability than the financial resource variables that are evaluated in this study.

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With the arrival of a new year, one chapter closes and another begins. I find myself completing this chapter of my journey at LUT. Though this chapter now comes to an end, the experiences, growth, and knowledge I have gained will continue to guide me into the future.

ABBREVIATIONS

ROA	Return on Asset
LIQ	Liquidity
LEV	Leverage
SIZE	Firm Size
FCFTA	Free Cash Flow to Asset
EQT	Equity Turnover
GROWTH	Sales Growth
RBV	Resource-Based View
SD	Standard Deviation
FE	Fixed Effect
CD	Cross Dependence
CSD	Cross-Sectional Dependence
SE	Standard Error
IV	Independent Variable
VIF	Variance Inflation Factor
DK	Driscoll Kraay
MFG	Manufacturing
RE	Random Effect
RES	Real Estate

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1 Introduction

The correlation between financial resources and firm performance has been a major issue in corporate finance and strategic management. Financial resources, including liquidity, leverage, and free cash flow, are essential for a firm's ability to invest, maintain, and attain a competitive advantage. Profitability, stability, and long-term growth depend on the proper management of these resources. The importance of exploring how financial resources determine firm performance has become even greater in the present dynamic business setting, where there is a wide range of variation in the intensive capital requirements and the financial structure of the firm, not to mention the differences in the industries of operation (Gupta et al., 2019). This thesis aims to discuss the effects of financial resources on the performance of firms in the manufacturing and real estate industries in the United Kingdom, and the effect of financial resources on the performance of firms: liquidity, leverage, equity, firm size, free cash flow and growth. This relationship is especially significant in the modern, unstable economic environment, where companies must face constrained financial resources, transformed capital requirements, and industry-related financing stresses. Finance is a key element in ensuring that firms can invest, operate efficiently, manage risks, and survive over a long period of time. The UK case would be particularly applicable as its manufacturing industry, which is largely based on tangible and internal forms of funding, is the exact opposite of the real estate industry, which is highly dependent on external funding and long-term project development. The differences render the study timely and significant to researchers and practitioners.

Previous research has given inconclusive findings on whether financial resources have an impact on the performance of the firm. Sari and Ainun (2024) and Asaleye et al. (2018) note that liquidity and internal cash flow have a positive impact on profitability, whereas a study conducted by Jolly and Singla (2020) and Huang et al. (2025) indicates that high leverage may deteriorate financial stability, especially in the real estate sector. In production, researchers normally focus on moderate leverage and internal funds significance, but in real estate, it is the risk of capital structure and funding limits. Although the available literature confirms that they are important in financial resources, it also reveals that their implications in different industries differ significantly.

However, it has been noted that little prior research has compared the impact of financial resources in various industries operating in a common institutional environment. The fact that most of the studies are country-specific, industry-specific or short-term data applications has resulted in little knowledge on the way financial determinants work across industries with varying financing structures. Specifically, the UK does not provide any long-term, cross-industry evidence in which manufacturing and real estate companies are subjected to different but interrelated financial conditions. This discrepancy renders the unease in discerning whether financial resource drivers operate in a similar way in production-based and asset-based industries, which creates a necessity to compare them.

To fill this gap, this study will explore the impact of financial resources on the performance of UK manufacturing and real estate firms between 2015 and 2024. The research is concerned with the issue of whether the internal and external financial indicators influence the profitability in the two sectors differently. In addition, it is based on publicly traded financial data, and the sample size is restricted to 20 listed companies. It responds to three primary questions, and to analyse this, the study will use strong econometric methods, such as fixed-effects models and cross-sectional dependence corrections, to ensure the validity. The results will not only fill the current gaps in the academic literature but also provide practical implications to the managers, investors, and policymakers who need to maximize the financial strategies of various industrial settings.

In a nutshell, this study is a comparative, factual examination of the effects of financial resources on the performance of two key sectors in the UK. It will also contribute to the further development of the knowledge on financial resource management through the RBV perspective and contribute to the evidence-based knowledge on ways firms can enhance the strategic performance orientation of their financial structures.

1.1 Research Questions and Hypotheses

One of the most crucial factors that would define the success and sustainability of a firm is its financial health. Operational efficiency, strategic expansion, and innovation are based on the financial resources, including liquidity, leverage, and free cash flow. The RBV states that internal resources of a company, such as financial capital, can influence sustained competitive advantage when the resources are valuable, rare, and well-managed (Sari and Ainun, 2024). Nevertheless, the degree to which the financial resources influence the performance of firms differs greatly among industries because of the difference in asset structure, financing patterns and cash flow cycles. The manufacturing and real estate industries are two industries in the UK, and they are radically different in the extent to which they rely on financial resources. Manufacturing is a highly capital-intensive sector that often requires frequent reinvestments, dependent on its own funding, and efficient in operations (Sinha and Das, 2021). On the other hand, long-term financing and high leverage rates lead the real estate sector because property development is capital-intensive (Jolly and Singla, 2020). Considering such structural variations, the same financial variable, e.g., liquidity or leverage, may not equally affect the performance of firms in the two sectors.

The aim of this research is thus to conduct an empirical study and a comparison of the influence of the financial resources on the performance of the firms in the UK manufacturing and real estate sectors from 2015 to 2024. It seeks to offer a better insight into which financial indicators play the most significant role in the process by which the profitability of firms in any given sector is decided upon, in order to add to the academic field as well as the practical field of financial management in any given industry.

1.1.1 Research Questions

The following three major research questions guide this study:

1. Are financial resources of firms statistically associated with changes in firm performance?

   This question examines the relationship between financial indicators (liquidity, leverage, and free cash flow) and firm performance (measured by ROA) within the full sample period.
2. What is the most influential financial resource in each industry?

   The question aims to establish the predominant financial drivers of firm performance in any industry, which are liquidity, leverage, or free cash flow, and the differences between the effects of these drivers in the manufacturing and real estate industries in the UK.
3. What is the difference in the performance of firms in the manufacturing and real estate sectors in the UK in relation to the financial resources?

   The third research question is to compare the performance of each industry in relation to the financial variables (liquidity, leverage, and free cash flow) and profitability. Additionally, determine the structural or financial features that underlie such differences.

1.2 Hypothesis Development

This study forms some testable hypotheses based on the existing theory and previous empirical literature and is classified into the financial resource and industry context. There is a theoretical foundation of the hypotheses in RBV, which argues that companies perform better when they use valuable, rare, and well-managed resources. Financial resources (liquidity, leverage and free cash flow) are considered strategic assets that can create an enduring competitive advantage when used effectively. Nevertheless, the effect of these resources on the performance of firms might not be the same in all industries based on their capital structure and the nature of their operations.

1.2.1 Overall Financial Resource Effect

It is a general opinion that financial resources are the key to the competitiveness and development of firms. A study conducted by Sari and Ainun (2024) established the positive link between liquidity and cash flow efficiency and profitability, and Nassar (2018) identified the strength of internal resources as something allowing firms to survive the financial crisis. Opeyemi (2019), however, claimed that this relationship might be undermined by the size of the firm and market circumstances. Therefore, the overall hypothesis is:

- H1: Firms' financial resources have a statistically significant effect on firm performance.

This hypothesis measures the relationship, in general, between the financial resource measures (liquidity, leverage, and free cash flow) and the performance of the firms in both industries.

1.2.2 Financial Resources and Firm Performance in the Manufacturing Industry

Production and internal financial management are essential in manufacturing companies to achieve efficiency in production and renewal of capital. Sinha and Das (2021) state that moderate leverage and availability of internal funds enhance the performance of operations, whereas high debt levels decrease the profitability. The fact that the sector is dependent on physical assets also implies that liquidity is not so dominant. Accordingly, the hypotheses are as follows:

- H2a: Free cash flow to total assets has a positive and significant effect on firm performance in the manufacturing industry.
- H2b: Leverage has a moderate positive effect on firm performance in the manufacturing industry.
- H2c: Liquidity has an insignificant or weaker effect on firm performance in the manufacturing industry compared to other financial resources.

These hypotheses align with the notion that internal financing supports sustainable performance, while external debt must be managed carefully to avoid financial distress.

1.2.3 Financial Resources and Firm Performance in the Real Estate Industry

The projects of real estate companies are long-term and capital-intensive, which makes the companies more dependent on debt. Leverage, in its turn, affects the profitability to a great degree, as Jolly and Singla (2020) and Huang, Yu, and Huang (2025) pointed out, yet also poses a financial risk when mismanaged. The liquidity is also essential, and this provides cash flow in case of a long project cycle. Thus, the hypotheses are presented below:

- H3a: The leverage is a highly and positively related factor in firm performance in the real estate industry.
- H3b: Liquidity positively influences the performance of firms in the real estate sector.
- H3c: The impact of free cash flow to total assets on the firm's performance is relatively weak as compared to leverage and liquidity in the real estate industry.

These hypotheses indicate how the industry has been dependent on external financing and liquidity buffer to sustain profitability in high borrowing requirements.

1.2.4 Comparative Industry Differences

Although these two industries rely on financial resources, there are differences in operational and financing structures that indicate different outputs. The manufacturing industry is known to focus on financial efficiency internally, whereas the real estate business depends on external funds. This comparative system enables testing the comparative strength of financial variables across the sectors:

- H4a: There is a significant discrepancy in the effects of financial resources on the performance of firms in the manufacturing and real property industries.
- H4b: The free cash flow is the most important financial resource in the manufacturing sector to influence the performance of firms.
- H4c: Financial resources are the most dominant to the firm's performance in the real estate industry, which includes liquidity and leverage.

These comparative hypotheses will also seek to answer the question of which financial indicators are most decisive in which sector and provide theoretical and managerial implications.

1.3 Outline of the thesis

The thesis starts with the introduction that emphasizes the motivation of the study of the relationship between the use of financial resources and the performance of the firms in the UK manufacturing and real estate sectors. This part includes the relevance of the subject, the review of the main findings of the previous studies, the research gap, research questions, objectives, and the structure of this study.

During the second part, a comprehensive literature review will be presented. The literature review follows, where the theoretical underpinnings of the research, including the Resource-Based View, Agency Theory, and capital structure theories are discussed. The available empirical evidence on the relationship between financial resources and firm performance in the two industries is presented, also highlighting the differences and gaps between them.

The third part of this thesis will introduce descriptive statistics and the model diagnostic chapter. This chapter will focus on the overview of the dataset, summarize the important financial variables, estimate multicollinearity and essential econometric tests such as Hausman, heteroskedasticity, autocorrelation and cross-sectional dependence tests of the two industries.

The methodology chapter four describes the research design and approach, theoretical framework, the measurement of the variables, model specification and justification, the choice of transformation, and the reasons to apply the fixed-effects estimators with strong correction like the Driscoll-Kraay and cluster robust standard errors.

The fifth part will show and analyse the results and findings of the empirical tests of each industry, compare the significance of the coefficient, and explain the impact of internal and external financial resources on profitability. Chapter six includes the economic significance part that measures the usefulness of the statistical findings, associating the sizes of coefficients with the industry features and the applicability of the decision. The thesis ends

with a conclusion and future research recommendations in chapter seven of this study. This final part suggests that further expansion of this study is possible by incorporating macroeconomic control variables or in a cross-country comparison.

2 Literature Review

The literature review examines how financial resources such as liquidity, leverage, free cash flow, and equity influence firm performance within the manufacturing and real estate industries. It summarises theoretical perspectives, including the Resource-Based View, Agency Theory, and capital structure theories, which explain how financing decisions and internal capabilities shape outcomes. Empirical studies show mixed effects, with manufacturing relying more on internal funding and moderate leverage, while real estate depends heavily on external borrowing and liquidity. The review highlights that financial resource impacts are industry-specific and context-dependent. It identifies gaps in cross-industry, UK-based, and long-term research, establishing the need for this study.

2.1 Overview

The connection between firm performance and financial resources has been one of the key subjects in the study of corporate finance and strategic management. Researchers such as Sari and Ainun (2024) highlighted that such financial resources as liquidity, leverage, and free cash flow are essential to maintaining profitability and competitiveness. Nassar (2018) argued, however, that their power is different in industries and economic conditions. Whereas manufacturing companies are operated on efficiency in capital investment, real estate companies are operated on leverage and liquidity to grow. This review examines theoretical insights and empirical evidence to determine the influence of financial resources on the firm performance in terms of the manufacturing and real estate industries. The current literature out there shows various conclusions regarding the effects of financial capital on the success of an organisation. Asaleye, Adama, and Ogunjobi (2018) mentioned the macroeconomics of the financial systems in enhancing firm performance, especially in industries. On the other hand, Huang, Yu, and Huang (2025) cautioned that too much financial leverage will increase the risk and decrease the sustainability. These opposite perspectives indicate that financial resources may promote and diminish firm performance based on how they are managed and the structure of the industry. It is therefore important to

analyse the previous surveys to determine such patterns, contradictions and gaps that are pertinent to this comparative analysis.

2.2 Theoretical Foundations

Various schools of thought explain the impact of financial resources on the performance of firms. The main basis of the current research is the RBV approach. The argument provided by Barney and Wright (2021) was that sustainable competitive advantage helps firms to achieve a competitive advantage through an effective exploitation of valuable, scarce, and imitable resources, including financial capital. This view was reinforced by Sari and Ainun (2024), who indicated that such factors as liquidity and cash flow efficiency help firms to take advantage of opportunities and maintain competitiveness. But Nassar (2018) has warned that financial resources are not enough to guarantee high performance, unless they are combined with managerial capacity and strategic orientation. Therefore, RBV focuses on the internal prowess of the financial resource utilisation. In addition to RBV, the Agency Theory and Capital Structure Theories describe how financing decisions affect the outcome of a firm. The Agency Theory, developed by Jensen (1967), reveals the tensions between the managers and the shareholders with regard to the utilisation of resources, especially leverage and free cash flow. Equally, Tahat, Ahmed, and Alhadab (2018) noted that governance and transparency have some effects on financial efficiency in the UK. At the same time, the Pecking Order Theory hypothesises that firms would opt to finance their activities internally and, only after that, they would explore the option of external debt, whereas the Trade-Off Theory hypothesises that companies would balance the merits of using debt and the risk associated with it. All these theories show that financing decisions have an intermediating effect on the relationship between resources and performance. Lastly, industry-specific differences are also recognised in the theoretical discourse. Sinha and Das (2021) have observed that manufacturing companies are capital-intensive; this reduces their reliance on external sources of funding, internal sources of capital, and moderate leverage helps them to operate. On the other hand, Jolly and Singla (2020) established that the real estate companies use debt financing majorly, which is in line with the risk-reward balance in the trade-off theory. Huang, Yu, and Huang (2025) put on top of this that a high leverage in the real estate increases financial vulnerability and agrees with the agency theory warning about agency problems. Hence, integrating RBV with financial and agency-based theories gives a

comprehensive approach to the analysis of the influence of financial resources on performance in various industries.

2.3 Financial Resources and Firm Performance

The financial resources are generally recognised as having a crucial influence on the performance of firms. Nassar (2018) discovered that companies that have high internal financial and intellectual resources perform better, particularly in capital-intensive industries. But Asaleye, Adama, and Ogunjobi (2018) claimed that the success of the firms is also defined by the general advancement of the financial system since external access to finances improves productivity in the manufacturing sector. Nassar concentrated on the efficiency of the firm, whereas Asaleye et al. concentrated on the macroeconomic environment, where it was noted that a firm's performance depends on both inner capabilities and external financial infrastructure. Firm competitiveness also requires liquidity and financial flexibility. According to Sari and Ainun (2024), liquidity and cash flow positively affect firm performance greatly and enhance their responsiveness and efficiency. On the other hand, Opeyemi (2019) suggested that it is the size of the firm rather than liquidity, because larger firms benefit in terms of the scale and less difficult access to credit. These conflicting perspectives confirm that, as much as liquidity improves performance in operations, its effects are influenced by firm structure and industry scale, indicating that financial flexibility is not necessarily a long-term competitive advantage. The other area is the contribution of intangible and financial assets. Tahat, Ahmed, and Alhadab (2018) found that intangible resources, such as intellectual property, have a great influence on financial performance, particularly in the UK. Similarly, Nassar (2018) observed the relevance of intellectual capital to guarantee sustainable performance. Sinha and Das (2021), however, suggested that the contribution of material financial capital is still dominant in the production industry, and firms make their operation on a fixed investment and production capacity. The rationale of these results suggests that knowledge-based industries will be enjoying the benefits of intangible assets, and capital-intensive industries will tend to be dependent extensively on the handling of financial resources. Financial innovation has also further transformed access to resources. Montgomery, Squires, and Syed (2018) argued that real estate crowdfunding makes financing more accessible, particularly in small businesses. However, Huang, Yu, and Huang (2025) cautioned that these kinds of innovations might

lead to the manipulation of leverage, thereby increasing financial risk. Whereas Montgomery et al. viewed financial innovation as growth-enhancing, Huang et al. focused on the destabilising facet of it. According to this comparison, innovative financing may be a better means of accessing capital, but it needs to be done carefully to prevent excessive financial exposure. Leverage and capital structure are the key aspects of performance. Jolly and Singla (2020) claim that leverage enhances the short-term profitability of real estate and infrastructure companies and financial risk in the long term. Similarly, Huang et al. (2025) cautioned that excessive debt will result in default, but Sinha and Das (2021) argued that an average amount of debt is positive in the manufacturing sector. The differences highlight that leverage will affect the situation depending on the industry's capital structure, which is beneficial when they are controlled proportionately, but detrimental when disproportionately large. This explains why there should be a balance between growth and financial viability. Overall, scholars agree that capital or financial resources play a key and complex role in defining the performance of firms. The positive impact was justified by Sari and Ainun (2024) and Asaleye et al. (2018), and concerned over-reliance on debt brought up by Huang et al. (2025) and Jolly and Singla (2020). At the same time, Tahat et al. (2018) and Nassar (2018) stressed that intellectual and intangible resources should be used to complement financial capital. Together, these studies indicate that financial resources are required to be successful; however, the effectiveness of the management, industry type, and financial discipline determine the level of the impact.

2.4 Financial Resources in the Manufacturing Industry

Finance is crucial in augmenting the output and competitiveness of the manufacturing firms. Sinha and Das (2021) discovered that finance is directly related to the growth in manufacturing, as companies have to heavily depend on capital investments to boost production and update technology. They noted that proper financial management encourages stability in operations and profitability in the long term. Nevertheless, Asaleye, Adama, and Ogunjobi (2018) believed that the external financial factors that define manufacturing success are the interest rates and the efficiency of banks. According to their opinion, even well-managed firms can have a hard time in the absence of a supportive financial system, which underscores the co-determinant effect of firm-level and macroeconomic determinants. Manufacturing performance is specifically important in matters of liquidity and leverage

decisions. Sari and Ainun (2024) noted that liquidity assists a company in meeting short-term debts and invests in innovation in order to emerge as a stronger force in the competition. Opeyemi (2019) conversely said that profitability is highly dependent on the size of firms as opposed to liquidity, since large manufacturers can access credit easily. It has been discussed that liquidity management is more beneficial to small firms, but the structural advantages support the large ones. Thus, financial flexibility is a growth factor that, in combination with the size of the firm and industry dynamics, affects overall performance. Capital structure decisions play a vital role in profitability determination in manufacturing. According to Sinha and Das (2021), moderate leverage best boosts the performance of a firm by administering financial discipline and growth financing. Nonetheless, excessive borrowing is likely to raise risk and lower returns. In line with this perspective, Asaleye et al. (2018) demonstrated that leverage could be counterproductive to growth in the case of credit market inefficiency. These results, when compared, suggest the non-linearity of the impact of debt on performance, which is positive at moderate levels but harmful at extreme levels. This finding emphasised the importance of financial management in manufacturing industries. The intangible resources also play a role in determining financial results in manufacturing. Tahat, Ahmed, and Alhadab (2018) noticed that the performance of firms employing financial and intellectual capital is enhanced, and manufacturing competitiveness becomes more and more related to innovation and knowledge resources.

Nassar (2018) noted, however, that in the traditional production industries, the performance drivers are still dominated by tangible financial capital. These conflicting opinions show that where manufacturing companies gain by the addition of knowledge-based assets, financial capital is the source of operational effectiveness and development. The most appropriate mix of the two increases resilience and profitability. Economic capital is instrumental in sustaining growth in the manufacturing firms. Such factors can be found in the research articles, such as Sinha and Das (2021), Sari and Ainun (2024), as the positive sides of effective liquidity and leverage. Nevertheless, Opeyemi (2019) and Asaleye et al. (2018) caution that this correlation is predetermined by the size of the firm, level of debt, and external financial circumstances. The literature combined is indicative of the fact that the manufacturing performance does not only depend on financial availability, but also on the strategic financial planning and general economic conditions within which firms operate.

2.5 Financial Resources in the Real Estate Industry

Financial resources are quite significant in the profitability and stability of the real estate industry. Nassar (2018) found that financial management can render real estate firms immune to crisis and competitive over the long term. Similarly, Jolly and Singla (2020) observed that there is a direct relationship between the profitability of real estate companies and the capital structure, and leverage is among the performance measurements. However, Huang, Yu, and Huang (2025) cautioned that the manipulation of leverage can increase financial risk, which implies that debt must be managed prudently. Such observations refer to the fact that, as much as financing stimulates growth, a high debt can bankrupt the financial position of a company. Real estate performance is highly influenced by the patterns of liquidity and financing. Sari and Ainun (2024) further state that liquidity can help in the continuity of the project since it enables the project development cycles that tend to be long in real estate projects. However, Montgomery, Squires, and Syed (2018) presented another opinion, and they claim that new financing schemes, that is, crowdfunding, can reduce the dependence on the traditional liquidity reserves. Nonetheless, Huang et al. (2025) warned that these innovations may lead to increased leverage risk when they are not managed in a reasonable way. It implies that, even though liquidity is still required, the shifting nature of financing poses new complexity in the process of financial stability management. In real estate finance, the leverage is usually considered as a strength and a threat. Jolly and Singla's (2020) rationale was that the high profit is maximised by investing in high-scale property through leverage. Huang et al., on the contrary, confirmed that excessive leverage is being manipulated to the point where the probability of default can rise when businesses go too far during market booms. Nassar (2018) maintained this issue and noted that during downturns, over-geared companies may face liquidity crises. These are mutually exclusive results that indicate that debt can maximise returns in the short run but can decrease sustainability in the long run without a proper balance. Intangible and intellectual resources also play a part in the financial performance of real estate. Tahat, Ahmed, and Alhadab (2018) observed that intangible assets, including the brand reputation and credibility of the markets, increase investor confidence and financial performance. Equally, Nassar (2018) noted that the intellectual capital supplemented by the financial resources enhances decision-making and innovativeness. Nonetheless, Jolly and Singla (2020) argued that the real estate industry is still driven by tangible capital and capital leverage as the most dominant sources of

profitability. All these arguments combine to reveal that intangible resources contribute to the value, but the amount of financial capital is still the key to maintaining the growth of real estate. The literature puts across, overall, that there is a complicated association between the financial assets and the performance of the firms in the real estate industry. The positive impact of leverage and liquidity, and the threat that leverage and liquidity can create, respectively, is supported by the research conducted by Jolly and Singla (2020), Sari and Ainun (2024), Huang et al. (2025), and Nassar (2018). In Montgomery et al. (2018), another point that is being made is that financial innovation is an opportunity and uncertainty creator. These results proved that financial resources are absolutely critical to the success of real estate, yet must be managed with care to achieve profitability and stability in the long term.

2.6 Comparative Insights: Manufacturing vs. Real Estate

When the trading in manufacturing and real estate industries is compared, it can be observed that there are vast differences in the effects of financial resources on performance. Sinha and Das (2021) found that manufacturing companies have shifted towards using internal capital and moderate leverage to garner consistent growth. On the other hand, Jolly and Singla (2020) have found that real estate firms are heavily dependent on external borrowings to finance long-term initiatives. Although leverage elevated the growth in real estate, it also enhanced financial risk, as pointed out by Huang, Yu, and Huang (2025). All these opposing dynamics indicate that industry structure can either make or break financial resources in terms of being a growth factor or a weakness. Liquidity and flexibility of financing do not work across sectors in a similar way. Sari and Ainun (2024) noted that though both industries have been supported by liquidity, it is more significant in real estate as cash conversion is longer. On the other hand, Opeyemi (2019) claimed the performance of manufacturing companies depends not on liquidity but on the size of the firm since larger manufacturers can find financing more easily. Montgomery, Squires, and Syed (2018) also included that crowdfunding innovations transform the access to financing in the real estate industry, and manufacturing still relies on traditional credit. Therefore, financing and liquidity flexibility have industry-specific applications influenced by operational cycles. The two sectors are also characterised by intangible and intellectual resources. Tahat, Ahmed, and Alhadab (2018) discovered that intangibles have a strong impact on the performance of service-oriented real estate companies through investor trust and market reputation. In contrast,

Nassar (2018) and Sinha and Das (2021) claimed that manufacturing performance has not been detached from the physical and financial assets anymore. This opposition indicates competitive priorities that are different because innovation and reputation are the driving factors of real estate, whereas capital efficiency and production capability are the two main forces of manufacturing. Collectively, these views depict the resource composition as determining the financial performance of every industry and its resilience in strategies. Altogether, the comparative evidence demonstrates that financial resources have different implications for manufacturing and real estate performance. Their respective significance is validated by such studies as Sari and Ainun (2024) and Jolly and Singla (2020), yet the latter claim that there are different strengths and risk levels. The manufacturing companies maintain a balanced liquidity and moderate leverage, while the real estate companies rely on high leverage and long-term financing. Huang et al. (2025) warn that too much debt could be responsible for destabilising the performance of real estate. Thus, financial resource management should be in line with the industry structure to become profitable and sustainable.

2.7 Research Gaps and Summary

Although the financial resources and the firm's performance are widely researched, there are still some gaps in the research. The strong connection between liquidity, leverage, and profitability was confirmed by Sari and Ainun (2024); however, the majority of the results are confined to one industry environment. Jolly and Singla (2020) concentrated on real estate, whereas Sinha and Das (2021) concentrated on manufacturing, which does not provide much comparative evidence across sectors. Further, Asaleye, Adama and Ogunjobi (2018) also emphasised the economic variables in emerging economies, yet their findings might vary in the developed economies such as the UK. This shows the necessity to employ a cross-industry and country-specific study with a financial, structural, and contextual aspect.

The other gap is due to the absence of longitudinal studies that will explore the long-term effects of financial resources. The majority of the research, such as that of Nassar (2018) and Tahat, Ahmed, and Alhadab (2018), employed short-term data, constraining the information on the impact of financial decisions on performance over the long run. Also, not many

studies have taken into account the post-Brexit financial dynamics and their impact on the UK industries. Closing this gap will give a better idea of the way financial resource management can respond to a change in the role of the market and the regulatory environment of the developed economies. Overall, the previous literature concludes that financial resources play a core role in firm performance, but it is still context-specific. The research, like Sari and Ainun (2024) and Nassar (2018), focused on financial efficiency, whereas Huang, Yu, and Huang (2025) and Jolly and Singla (2020) cautioned about the threats of over-leverage. There is little comparative evidence of the manufacturing and real estate industries, particularly in the UK. Hence, the research makes a contribution in that it compares the two industries over the course of ten years, providing concrete clues of how financial resources affect the performance of firms in a developed market setting.

3 Descriptive Statistics and Tests of Model Fitness

This chapter contains the descriptive statistics and model diagnostic tests that will be used to evaluate the structure of the data, its quality, and suitability to perform empirical analysis. It starts with the general summary of the panel dataset, and next describes the Real Estate and the Manufacturing industries separately so as to bring out the central tendencies, variability, and the patterns of distributions of financial variables of significance. The following chapter is a review of key diagnostic tests, such as multicollinearity assessment, Hausman model-selection tests, as well as the fixed-effects model-check with heteroskedasticity and cross-sectional dependence correction. All these sections make the dataset and selected econometric models statistically sound and suitable for answering the research questions.

3.1 Data overview

The study uses balanced panel data for two UK industries—Real Estate and Manufacturing—each with 10 firms × 10 years = 100 observations. Firm performance is measured by ROA and explained by LIQ, LEV, SIZE, FCFTA, EQT, GROWTH, estimated in a fixed-effects framework with firm and year effects as specified in the proposal model.

3.2 Overview of the Diagnostic Test Results

3.2.1 Real Estate Industry

The Real Estate analysis commences with descriptive statistics and then proceeds to multicollinearity tests based on the pairwise correlation test and the VIF test, which indicate that there are no problematic correlations. Even though the Hausman test indicates the presence of Random Effects (RE), the Modified Wald test indicates the presence of heteroskedasticity, and the Pesaran CD test indicates the presence of cross-sectional dependence (CSD), results in the use of Fixed Effects (FE). The cluster-robust standard errors are used to correct heteroskedasticity, and the findings indicate that year effects are

significant and the financial variables are not jointly significant. Hence, the last model that will be used is FE with firm and year controls, estimated with Driscoll-Kraay standard errors to solve all the issues that are identified.

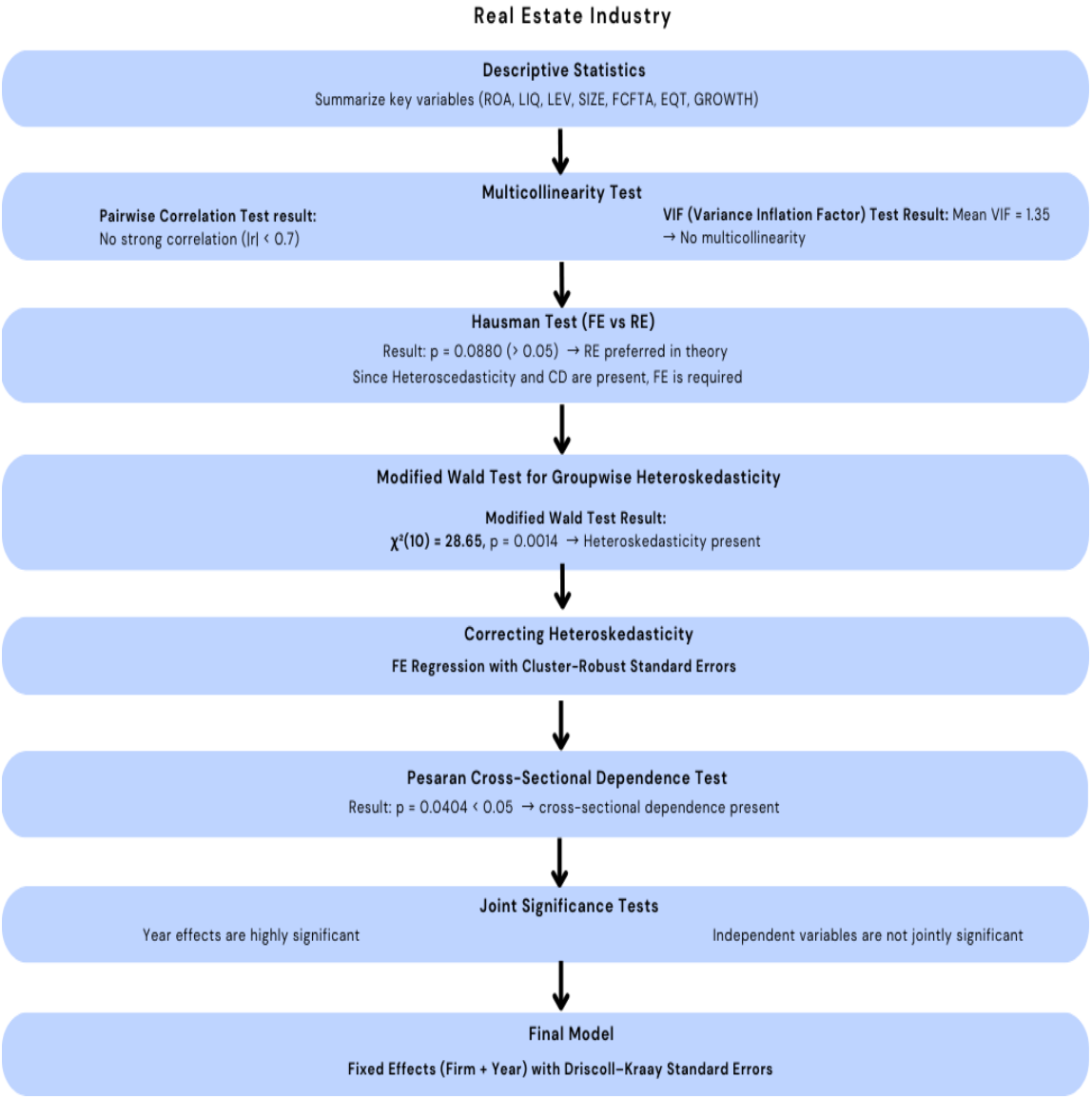

Figure 1: Real Estate Tests Overview

3.2.2 Manufacturing Industry

The flowchart in Figure 2 is a summary of the econometric modelling process of the Manufacturing Industry. In the case of the manufacturing industry, descriptive statistics are used to summarize the key variables (ROA, LIQ, LEV, SIZE, FCFTA, log_EQT and GROWTH), transforming EQT into log_EQT as there are outliers. The test of

multicollinearity is verified with the help of pairwise correlation and VIF values, which reveal that there is nothing wrong with the correlation between the predictors. The Hausman test clearly rejects the RE model (p = 0.0000), which shows that the FE model is consistent and preferred.

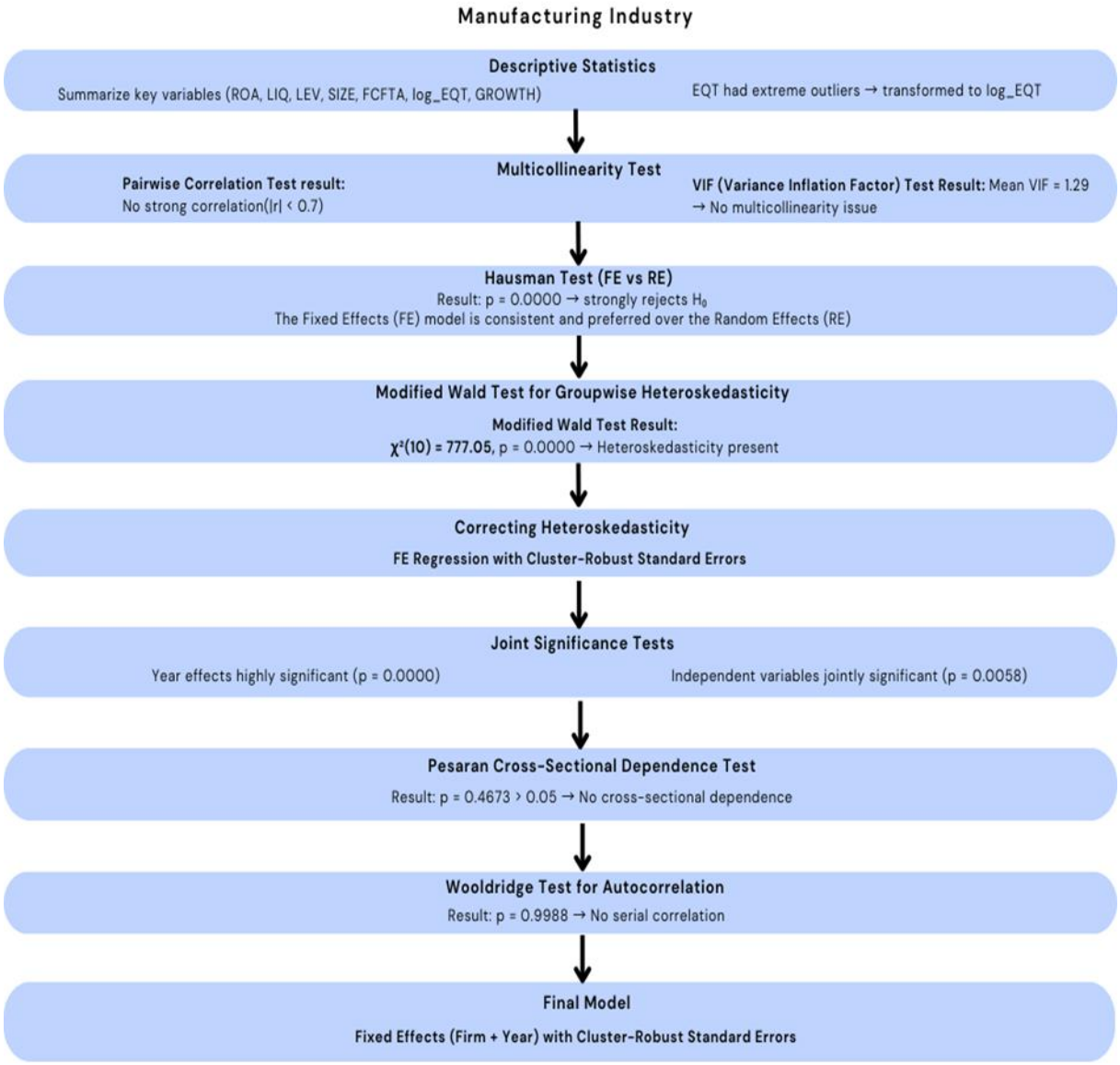

Figure 2: Manufacturing Tests overview

The next test is the Modified Wald test, which examines severe heteroskedasticity of groups (X^2 (10) = 777.05, p = 0.0000), and thus the model is re-estimated with FE cluster-robust standard errors. The joint significance tests result in a significant year effect and independent variables (IV) are jointly significant (p = 0.0058), confirming that the model has explanatory power. The Pesaran test, therefore, points to the absence of CSD (p = 0.4673), whereas the

Wooldridge test denotes the absence of serial correlation (p = 0.9988). The combination of these diagnostics warrants an FE model with controls on the firms and year of operation, estimated with cluster-robust standard errors to become the ultimate specification of the manufacturing industry.

3.3 Real Estate industry

3.3.1 Descriptive statistics (central tendency, spread, ranges)

Table 1 shows that ROA has a low mean profitability with high dispersion, indicating sizable swings across years and firms. LEV has the highest mean among the regressors, consistent with debt-dependent financing patterns. SIZE (log assets) averages 3.648578 with the widest range among the controls, reflecting substantial firm-size heterogeneity. FCFTA is negative on average with a pronounced left tail (min −0.3318909), pointing to cash-flow tightness across several firms. LIQ and EQT also have small positive means, indicating limited liquidity buffers and moderate equity ratios. GROWTH remains close to zero, implying stagnation or only very modest expansion over the sample period.

Table 1: Descriptive Statistics

Variable	Mean	Std. Dev.	Min	Max	Description
ROA	0.0270459	0.0876893	–0.2940589	0.2597383	Return on Assets
LIQ	0.0228026	0.0324852	0.0009612	0.2122598	Liquidity Ratio
LEV	0.2870272	0.0762269	0.1243269	0.5127569	Leverage Ratio
SIZE	3.648578	0.3495559	3.003159	4.250005	Log of Total Assets
FCFTA	–0.038979	0.0594635	–0.3318909	0.0421795	Free Cash Flow to Assets
EQT	0.0684617	0.0256191	0.025205	0.1632938	Equity Turnover Ratio
GROWTH	0.0010036	0.00316	–0.0070918	0.0217063	Annual sales growth

3.3.2 Multicollinearity diagnostics

It tests multicollinearity by researching the correlation between all independent variables and computing Variance Inflation Factors (VIF). The pairwise correlation test reveals the existence of any strong linear connections between the predictors, whereas the VIF values indicate whether a variable inflates other variables or not (Appendix 2.1 & 2.2). The combination of these tests is to guarantee that the predictors have no harmful multicollinearity and that the regression estimates are reliable and stable.

Table 2: Multicollinearity Diagnostics

Diagnostic	Result	Interpretation
Highest correlation	0.324 (EQT–GROWTH)	Moderate relationship
Mean VIF	1.35	No multicollinearity
Max VIF	1.53 (EQT)	Acceptable range

The pairwise correlation test suggests ROA correlates negatively with LIQ (= −0.2593) and LEV (= −0.3191), but positively with GROWTH (= 0.2343) (Appendix 2.1). The largest inter-IV correlations are EQT–GROWTH (= 0.3241) and LIQ–LEV (= 0.3198); both are moderate and well below standard red flags ($r \geq 0.7$). VIFs are uniformly low (max 1.53, min 1.27, mean 1.35). In conclusion, there is no multicollinearity problem; coefficients are unlikely to be variance-inflated from linear dependencies.

3.3.3 Hausman Test

The Hausman test, represented in Table 3 for the RES industry, produced a p-value of 0.0880. Since this value is above the 0.05 threshold, the analysis technically suggested a failure to reject the null hypothesis, thereby indicating the more efficient Random Effects model as the default choice. However, the test output included a critical warning ("V_b-V_B is not positive definite"), which, combined with the proven presence of groupwise heteroskedasticity (p = 0.0014) and CSD (p = 0.0404), rendered the standard Hausman test invalid. Consequently, the analysts correctly selected the FE (Firm + Year) model with

Driscoll–Kraay (DK) Standard Errors for its consistency and robustness against the confirmed residual problems.

Table 3: Hausman Test

Test Component	Value
Null Hypothesis (H_0)	The difference in coefficients is not systematic
Chi-square (X^2)	11.01
Degrees of Freedom	6
p-value (Prob > X^2)	0.0880
Note	(V_b - V_B) is not positive definite

3.3.4 Baseline FE fit and heteroskedasticity correction

Baseline FE fit refers to a preliminary approximation of the Fixed Effects model that would explore the extent to which the model can account for variations within firms over time by tests including the overall F-test and within R^2. Once the estimation of the baseline model is performed, heteroskedasticity needs to be checked (typically through the Modified Wald test). In case heteroskedasticity exists, it is necessary to resort to a correction by simple robust standard errors, i.e., cluster-robust, or DK, to ensure the soundness of the statistical inferences.

Table 4: FE Fit and Heteroskedasticity Correction

Test	Statistic	p-value	Inference
F-test (overall)	4.43	0.0006	Model significant
Within R^2	0.2403	—	Moderate fit
Modified Wald	$X^2(10)=28.65$	0.0014	Heteroskedasticity detected

Initial FE (firm effects) is jointly significant, with Within $R^2 = 0.2403$. EQT loads negatively and significantly (= −1.6108), GROWTH positively and significantly (= 10.5399). In Appendix 2.3, FEs are required (test of all ui=0, p = 0.0259). The Modified Wald detects groupwise heteroskedasticity since $X^2(10) = 28.65$, p = 0.0014 in the test result Table 4. Re-estimating FE with cluster-robust SEs leaves coefficients unchanged but adjusts inference where GROWTH (p=0.000) and EQT (p=0.016) stay significant; LEV becomes marginal (p = 0.054). The model remains jointly significant as the result demonstrates in Appendix 2.4, F = 8.75 and p = 0.0024.

3.3.5 Cross-Sectional Dependence and Final Estimator

The CD test of Pesaran is used to research CSD. The concept is that of examining whether the firms in the panel are exposed to common shocks or correlated disturbances at the unit level. Where the extent of dependence is found to be substantial, the usual FE model becomes invalid, and the re-estimation is done by FE with DK standard errors, which are robust to heteroskedasticity, serial correlation, and cross-sectional dependence, so that the resultant estimator is valid and consistent.

Table 5: Cross-Sectional Dependence & Final Estimator

Test	Statistic	p-value	Decision
Pesaran CD	-2.05	0.0404	CSD present
Final Model	FE + Driscoll–Kraay SEs	—	Corrected model

Table 5 contains Pesaran's CD test to check cross-sectional dependence, consistent with common-year shocks and market co-movement. Re-estimating with DK SEs (robust to heteroskedasticity, serial correlation, and CSD) changes inference where EQT becomes insignificant (p=0.109); GROWTH remains positive, marginal (p=0.061) in Appendix 2.6. A joint test exhibited in Appendix 2.7 that the financial variables are not jointly significant (F(6,9)=2.09, p=0.1539), while year effects are extremely strong (F(6,9)=1040.69, p=0.0000). Hence, the chosen model is FE (firm + year) with Driscoll–Kraay SEs.

3.4 Manufacturing industry

3.4.1 Descriptive statistics and outlier handling

Table 6: Descriptive Statistics

Variable	Mean	Std. Dev.	Min	Max	Description
ROA	0.0497263	0.0513469	–0.167421	0.1563821	Return on Assets
LIQ	0.0665494	0.0462867	0.0034021	0.1919234	Liquidity ratio
LEV	0.279732	0.088366	0.10625	0.5180438	Leverage ratio
SIZE	3.576638	0.8533736	2.334253	4.905423	Log of total assets
FCFTA	0.0453394	0.0423792	–0.1396145	0.1443287	Free cash flow to assets
GROWTH	0.0467682	0.118202	–0.3507719	0.3185899	Annual sales growth
EQT	2.885399	6.263079	–25.91176	24.81228	Equity Turnover Ratio
log_EQT	1.092458	1.166637	–3.292563	3.25085	Log of equity turnover ratio

ROA shows moderate profitability dispersion in the descriptive statistics Table 6. LIQ has a mean of 0.0665494 with a relatively tight spread (SD 0.0462867), while LEV averages 0.279732, reflecting moderate leverage across firms. SIZE has a mean of 3.576638 (SD 0.8533736), indicating substantial firm-size heterogeneity. FCFTA is generally positive, and GROWTH shows both contractions and expansions. EQT is highly outlier-prone, so a signed-log transformation is applied, producing log_EQT to stabilize the distribution effectively without dropping any observations.

3.4.2 Multicollinearity diagnostics

The pairwise correlation test reflects that ROA is most strongly associated with FCFTA, and modestly with GROWTH (0.2100) and log_EQT (0.2137). LIQ and LEV show a weak connection to ROA. The highest Intercorrelations remain moderate in Appendix 3.1 (e.g., LEV–log_EQT 0.2689; SIZE–log_EQT −0.3516; LIQ–SIZE −0.3206; LIQ–FCFTA 0.3040). VIFs are very low (1.06–1.52; mean 1.29). Overall, no multicollinearity; the signed-log of EQT improved stability further.

Table 7: Multicollinearity Diagnostics

Diagnostic	Result	Interpretation
Highest correlation	0.5479 (ROA–FCFTA)	Moderate
Mean VIF	1.29	No multicollinearity
Max VIF	1.52	Acceptable range

3.4.3 Hausman Test

The Hausman test in the following Table produced a p-value of 0.0000 for the MFG Industry, which is highly significant. This result strongly rejects the null hypothesis, confirming that the FE model is the consistent choice. This conclusion, indicating a systematic difference between FE and RE, supports the use of the FE model. The analysis proceeded with the FE model with Cluster-Robust Standard Errors to also address the severe groupwise heteroskedasticity (p=0.0000) confirmed in the data, making the final model robust.

Table 8: Hausman Test

Test Component	Value
Null Hypothesis (H_0)	The difference in coefficients is not systematic
Chi-square (X^2)	46.17
Degrees of Freedom	15

p-value (Prob > X^2)	0.0000
Note	(V_b - V_B) is not positive definite

3.4.4 FE fit and heteroskedasticity correction

The baseline FE model (firm + year) is statistically significant overall with a Within R^2 of 0.2889, indicating a moderate level of explanatory power. In the initial FE estimation, FCFTA exhibits a clear positive association with profitability (coef = 0.334, p = 0.015), and log_EQT is also significant (p = 0.026), whereas LIQ, LEV, SIZE, and GROWTH remain small and statistically insignificant (Appendix 3.3). Firm-level FEs are necessary, as indicated by the significant test of ui = 0 (p = 0.0025). The Modified Wald test strongly confirms groupwise heteroskedasticity necessitating the use of cluster-robust standard errors. After applying robust clustering in Appendix 3.4, coefficient magnitudes remain unchanged; however, individual significance disappears (FCFTA becomes marginal with p = 0.088, and log_EQT loses significance with p = 0.194, while all other regressors also remain insignificant). Nevertheless, the regressors are jointly significant (F(6,9) = 6.85, p = 0.0058), and the year dummies are strongly significant (F(9,9) = 149.05, p = 0.0000), indicating meaningful common time effects (Appendix 3.5). Accordingly, the most appropriate specification for the manufacturing data is the FE model with firm and year controls, estimated using cluster-robust standard errors.

Table 9: FE Fit and Heteroskedasticity Correction

Test	Statistic	p-value	Inference
F-test (overall)	F(15,75) = 2.03	0.0236	The model is statistically significant
Within R^2	0.2889	—	Moderate explanatory power
Modified Wald	$X^2(10)$ = 777.05	0.0000	Heteroskedasticity detected

3.4.5 Autocorrelation & cross-sectional dependence

Pesaran CD test conducted to check the CSD, and the output exhibits no CSD (Appendix 3.6). Autocorrelation is checked by the Wooldridge test (Appendix 3.7), resulting in no first-order autocorrelation since the p-value is above 5% significance level. Therefore, cluster-robust (firm) SEs are sufficient; DK is unnecessary for the manufacturing industry.

Table 10: Autocorrelation & CSD

Test	Statistic	p-value	Decision
Pesaran CD	– 0.727	0.4673	No CSD
Wooldridge	0.000	0.9988	No autocorrelation
Final Model	FE + Cluster-Robust SEs		Corrected model

3.5 Model-Fitness Summary (Both Industries)

Key model-fitness diagnostics of both the RES and the MFG industries are summarised in the table presented below, showing how each of the identified issues is dealt with in an attempt to provide a reliable estimation. The two industries are also heteroskedastic, and strong standard errors explain this problem. Nevertheless, the RES industry is the only one that exhibited cross-sectional dependence and hence, when correcting Driscoll-Kraay, the cluster-robust standard errors are adopted, whereas in the case of the MFG industry, cluster-robust standard errors are employed since there is no CSD.

In the two instances, low or zero values of the respective statistics imply that the effect of autocorrelation is insignificant. The FE model with year effects has been the best specification in both sectors, which has been in line with the methodological design of the study. The domination of the year effects in the two industries confirms that the use of the corrected FE models gives the best and most sound fit to the data.

Table 11: Model-Fitness Summary

Aspect	Real Estate	Manufacturing	Conclusion
Heteroskedasticity	Present	Present	Both corrected using robust SEs
CSD	Yes	No	DK used for RES; Cluster for MFG
Autocorrelation	Minor	None	Insignificant in both
Model type	FE + Year Effects	FE + Year Effects	Matches proposal
Best fit measure	Year effects dominate	Year effects dominate	Robust models confirmed

4 Methodology

The chapter outlines the methodological framework in which the effects of financial resources on firm performance in the Real Estate and Manufacturing industries are to be analysed. To begin with, the research design is identified, and the theoretical framework it is based is offered, employing the Resource-Based View (RBV). This chapter further develops the empirical model, rationalises the transformations of the variables, and conducts diagnostic tests to choose the most suitable estimator, including multicollinearity, heteroskedasticity, cross-sectional dependence, autocorrelation, and the Hausman test. The final part provides a summary of the information sources, measuring variables, and general approach to methodology, which seems to be clear and logical in the context of the empirical analysis.

4.1 Research Design and Approach

This study employs a quantitative comparative research design to examine the impact of financial resources on firm performance across two major UK industries: Manufacturing and Real Estate. A panel data approach is adopted, allowing this study to control for firm-specific heterogeneity and capture time-varying effects from 2015 to 2024. The model measures how differences in financial resource management influence profitability and operational performance within and across industries.

It is designed on the previous empirical studies, such as Sari and Ainun (2024) and Tahat et al. (2018), which quantified the performance of the firm using financial metrics along with firm-level panel data. This may be correlated with the Resource-Based View (RBV) that has emphasised financial resources as strategic resources that could generate sustainable competitive advantages when exploited (Nassar, 2018).

4.2 Theoretical Foundation

The paper is premised on the Resource-Based View (RBV), which presupposes that the forces of firm performance are considered to be the internal resources, either tangible or intangible, with value, rarity, inimitability, and substitutiveness. In this model, the inputs that are regarded to be essential are financial resources (liquidity, leverage, and free cash flow) that enable firms to be able to invest, innovate, and survive in fluctuating market conditions. Earlier research, including Nassar (2018) and Sari and Ainun (2024), confirmed that companies that have better internal financial structures are more robust and profitable. The RBV view is especially applicable in the comparison of industries that vary in terms of financial structures in the sense that manufacturing is heavily dependent on internal financing, whereas real estate is largely dependent on external financing and liquidity.

4.3 Variable Transformation Justification

SIZE is a log-transformed scale in both industries as the values of raw assets are excessively large and skewed, and in the log form, the scale is smaller, more reliable, and interpretable. Again, the manufacturing sample has changed its EQT due to the extreme outliers and the abnormally wide range that would distort the estimates of the coefficients. The signed-log transformation has minimised the distortions without the restoration of the direction of the variable. The remaining variables, i.e. LIQ, LEV, FCFTA, and GROWTH, are not transformed since they reported normal ranges of finance, no extreme skewness and no extreme outliers, and tests of diagnostics showed no multicollinearity or functional form issues.

Furthermore, a FE model with strong standard errors already adjusts for heteroskedasticity of standard error, error dependence within firms, so it is possible to make valid inferences without any additional transformations.

4.4

4.5 Model Justification

The paper uses a firm FE panel model as its main estimator, taking into consideration unobservable heterogeneity among firms and year-specific shocks. The frameworks of the functional model are based on the empirical models utilised by Asaleye et al. (2018) and Sinha and Das (2021), who investigated the correlation between financial variables and the productivity of firms in the sector.

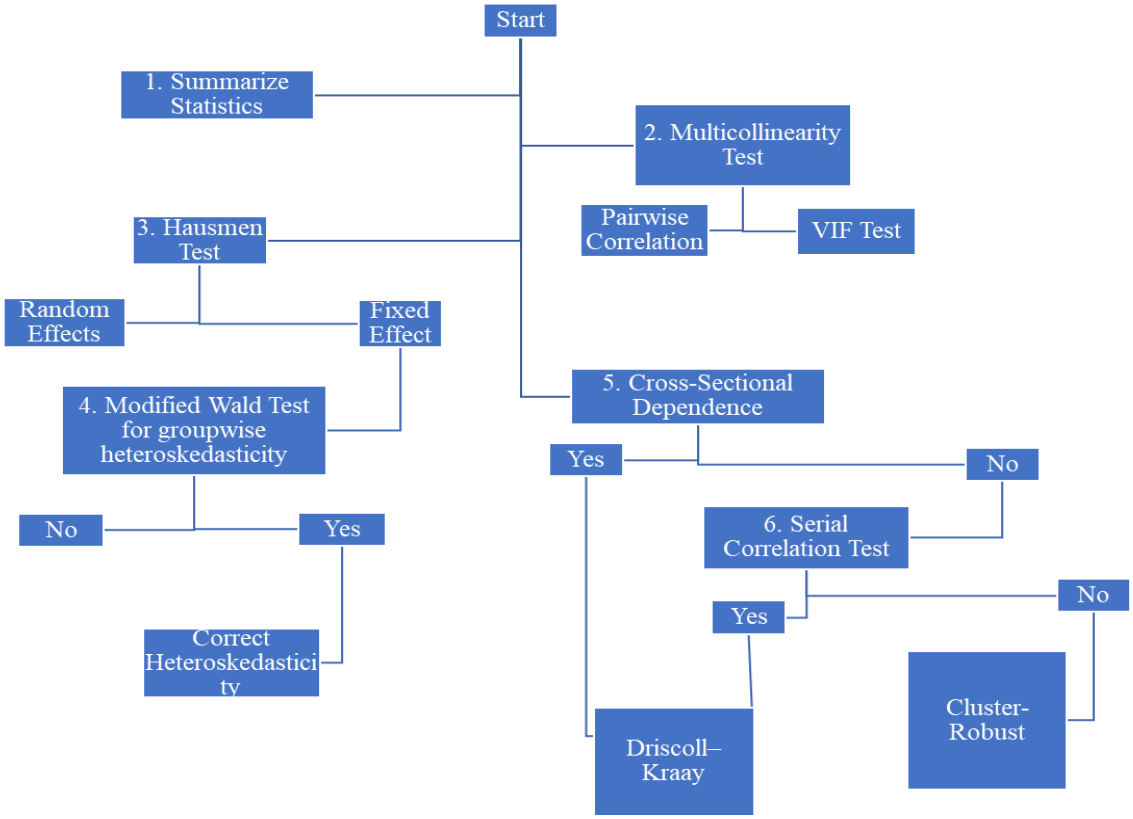

Figure 3: Empirical Testing Flowchart for Panel Data

The flowchart of the empirical test provides an organised process for diagnosing and selecting the most suitable econometric model in panel-data analysis. The initial step is to summarise the descriptive statistics in a way that can be interpreted to learn the fundamental characteristics of the data set, such as the distribution of variables, central tendency, as well

as anomalies that may be present. Once this initial understanding has been achieved, the next step will be to evaluate the multicollinearity of the independent variables. This is normally achieved through pairwise correlation matrices and the VIF test. Multicollinearity is high, which compromises the validity of the coefficient estimates, and hence it is important to ensure that it is identified and dealt with at an early stage.

When multicollinearity has been tested, it is then taken to a critical model-selection test, which means the Hausman test. The test is a measure of a Fixed Effects (FE) or a Random Effects (RE) model. The major finding is in favour of the FE model, and the non-significant one is in favour of the RE model. Once the base model is chosen, the second step would be testing the groupwise heteroskedasticity with the help of the Modified Wald test. In case heteroskedasticity is established, then it should be fixed with the help of Robust standard errors so that the result will not lead to biased inferences.

Subsequently, the flow chart of the empirical test assists the user in testing the existence of CSD, whereby entities (e.g., countries or firms) affect one another. If there is the existence of CDS, it is desirable to further use the DK estimator since it eliminates heteroskedasticity, serial correlation, and cross-sectional dependence in the same direction. The absence of CSD implies that the next diagnosis is concerned with serial correlation or autocorrelation. In case there is a serial correlation, DK is the estimator of choice; however, if there is no serial correlation, cluster-robust standard errors are adequate to guarantee valid statistical inference.

In general, the flow chart is detailed and rational and can essentially be considered a sequence of diagnostic tests, which would guarantee the appropriate representation of the final best-fitted model and provide credible and resilient results applicable to any empirical research in economics, finance, or social sciences.

Formula

$$ROA_{it} = \beta_0 + \beta_1 LIQ_{it} + \beta_2 LEV_{it} + \beta_3 SIZE_{it} + \beta_4 FCFTA_{it} + \beta_5 EQT_{it} + \beta_6 GROWTH_{it} + \alpha_i + \gamma_t + \varepsilon_{it}$$

Where:

1. (ROA_{it}) = Return on Assets (firm performance indicator)
2. (LIQ_{it}) = Liquidity ratio
3. (LEV_{it}) = Leverage ratio
4. ($SIZE_{it}$) = Firm size (log of total assets)
5. ($FCFTA_{it}$) = Free cash flow to total assets
6. (EQT_{it}) = Equity turnover ratio
7. ($GROWTH_{it}$) = Annual growth in sales
8. (α_i) = Firm-specific effects
9. (γ_t) = Year effects
10. (ε_{it}) = Error term

4.6 Estimation Techniques and Diagnostic Testing

To have solid and unbiased outcomes, several diagnostic and estimation processes are executed:

Table 12: Estimation Techniques

Diagnostic Test	Purpose	Method	Outcome
VIF and Correlation Analysis	Check multicollinearity	Correlation matrix and VIF test	All VIF < 2 → No issue
Modified Wald Test	Detect heteroskedasticity	Firm-level FE residuals	Detected in both sectors
Pesaran CD Test	Identify CSD	Driscoll–Kraay correction for RES sector	Present only in the RES industry
Wooldridge Test	Test autocorrelation	Firm-clustered residuals	Absent in both sectors
Hausman Test	Choose between FE and RE	FE preferred	Fixed effects selected

4.7 Data Sources and Measurement of Variables

Financial data on the firm level is gathered from the LSEG workspace, specifically, based on the annual financial statements and financial summary reports of the companies in the period 2015-2024. Variables are calculated in accordance with the methodologies that are developed in the literature:

ROA = Net income / Total assets (Sari and Ainun, 2024)

LIQ = Current assets / Current liabilities (Jolly and Singla, 2020)

LEV = Total debt / Total assets (Asaleye et al., 2018)

SIZE = Logarithm of total assets (Opeyemi, 2019)

FCFTA = (Operating cash flow – Capital expenditures) / Total assets (Sinha and Das, 2021)

EQT = Total equity / Total assets (Tahat et al., 2018)

GROWTH = (Total assets$_t$ – Total assets$_{t-1}$) / Total assets$_{t-1}$ (Montgomery et al., 2018)

4.8 Justification of Method

The use of a fixed-effects (FE) model is both theoretically and statistically justifiable. FE estimation, as introduced by Sinha and Das (2021) and Asaleye et al. (2018), is the model that reflects firm-specific and time-invariant (i.e., managerial skill, asset structure, and strategic orientation) factors that are not observable but hold paramount importance in the analysis of performance. Moreover, the model is established to capture macroeconomic shocks and industry-wide fluctuations, such as the changes in interest rates and policy reforms by the addition of the year effect (γt). This strategy reinforces internal validity, and it is in accordance with the RBV theory, which focuses on internal financial capabilities rather than external market forces in determining the fate of firms.

4.9 Summary of Methodological Framework

This framework outlines the structure of this study, starting with its theoretical foundation in the RBV and the FE model, accommodating both such differences in firms and time. Driscoll-Kraay provides strong results in corrections, whereas the empirical foundation is constructed on the basis of the 2015-2024 UK panel data. The research questions are directly related to the hypotheses tested, which evaluate the influences of financial resources on the firm's performance across industries.

Table 13: Summary of Study Design and Methodological Framework

Step	Description	Supporting Studies
Theoretical Base	Resource-Based View	Nassar (2018); Sari and Ainun (2024)
Model Type	Fixed Effects (Firm + Year)	Asaleye et al. (2018); Jolly and Singla (2020)
Error Correction	Driscoll–Kraay	Huang et al. (2025); Sinha and Das (2021)
Main Data	2015–2024 panel, UK industries	Company annual reports and financial summaries
Hypotheses Tested	Financial resources' impact on ROA by sector	Derived from research questions

5 Research Findings

The chapter starts with an introduction that provides the empirical findings of the panel regression models conducted on the two industries. It emphasized the fact that Fixed Effects (FE) models that include firm and year controls are applied and that powerful estimation methods, namely Driscoll-Kraay of Real Estate and Cluster-Robust of Manufacturing. Both have been utilized to eliminate heteroskedasticity, autocorrelation, and cross-sectional dependence. The section further gives the normal significance levels to be applied during interpretation.

5.1 Overview

This section presents the empirical findings from the panel regression estimations of the effects of financial resources on the performance of firms in the UK Real Estate and manufacturing sectors from 2015 to 2024. The analyses used FE models where the firm and year are controlled. The heteroskedasticity, autocorrelation, and cross-sectional dependence are corrected with the help of robust estimation techniques, Driscoll-Kraay applied to the RES sector and Cluster-Robust SEs to the MFG sector. The conventional levels of statistical significance are reported:

- $p < 0.01$ = highly significant
- $p < 0.05$ = significant
- $p < 0.10$ = marginally significant

5.2 Real Estate Industry Results

Table 14: Output from Real Estate Industry

Variable	Coefficient	Robust SE (DK)	t-stat	p-value	Significance
LIQ	-0.0015	0.2305	-0.01	0.995	Not significant
LEV	-0.3148	0.2524	-1.25	0.244	Not significant
SIZE	-0.0048	0.0658	-0.07	0.944	Not significant
FCFTA	0.0944	0.0995	0.95	0.367	Not significant
EQT	-1.6090	0.9041	-1.78	0.109	Marginally significant at the 10% Level
GROWTH	10.8765	5.0703	2.15	0.061	Marginally significant (+) (10%)
Constant	0.3267	0.3070	1.06	0.315	—
			—	—	—
Within R^2	0.4219	—	—	—	—
Joint significance of regressors	F(6, 9) = 2.09		—	0.1539	Model jointly insignificant (robust)
Joint significance of year fixed effects	F(6, 9) = 1040.69		—	0.0000	Highly significant

The regression analysis, utilising robust DK standard errors, reveals that only GROWTH (p=0.061, positive) and EQT (p=0.109, negative) exhibit a statistically marginal relationship with firm performance at the 10% level. Crucially, the F-test shows the set of regressors is not jointly significant (p=0.1539), indicating that these financial variables, as a whole, do not reliably explain performance.

Furthermore, while the model captures a moderate within R^2 of 0.4219, the year FE's are highly significant (p=0.0000), strongly suggesting that time-specific, macroeconomic

factors (like interest rate movements or credit cycles) are the dominant drivers of performance, overshadowing the influence of the individual financial metrics included in this model.

5.3 Manufacturing Industry Results

Table 15: Output from Manufacturing Industry

Variable	Coefficient	Robust SE (Cluster)	t-statistics	p-value	Significance
LIQ	-0.1318	0.1724	-0.76	0.464	Not significant
LEV	-0.0690	0.1070	-0.65	0.535	Not significant
SIZE	0.0306	0.0257	1.19	0.263	Not significant
FCFTA	0.3338	0.1689	1.98	0.080	Marginally significant (+)
EQT	0.0118	0.0084	1.40	0.194	Not significant
GROWTH	0.0516	0.0352	1.47	0.176	Not significant
Constant	-0.0458	0.0998	-0.45	0.663	Not significant
Within R^2	0.2889 (=0.29)	—	—	—	—
F-statistic	F(6, 9) = 6.85	—	—	p = 0.0058	Model jointly significant
Year Effects (i.Year)	F(9,9)=149	—	—	p = 0.0000	Highly significant (joint)

The findings from Table 15 indicate that all the financial variables have no statistical significance at 5% level for MFG companies. FCFTA positively influences profitability, yet this impact is rather weak (p = 0.080), which further proves that there is minimal evidence that internal cash generation promotes the performance of firms. Also positive, but no significant impact is shown in growth. Other variables such as liquidity, leverage, size and equity do not have any significant impact on ROA in this sample.

The within-firm variation is explained by the model at about 29% which is moderately strong. The jointly significant variables include the year effects, and they are significant. This result indicates that industry-wide or macroeconomic changes over the years have a strong influence on the profitability.

5.4 Comparative Discussion

The regression analysis is used to make comparisons of various robust standard errors in the drivers of firm performance in the RES and MFG industries.

Table 16: Comparative Discussion

Feature	Real Estate Industry	Manufacturing Industry
Robust Standard Errors Used	Driscoll-Kraay	Clustered Robust
Statistically Significant Variables ($p < 0.10$)	GROWTH (Positive) and EQT (Negative).	FCFTA (Positive)
Most Significant Variable	GROWTH (p=0.061)	FCFTA (p=0.080)
Highly Insignificant Variables	LEV, LIQ, SIZE, FCFTA	LIQ, LEV, SIZE, log_EQT, GROWTH
Joint Significance of Regressors	Insignificant (p=0.1539). The financial variables, as a group, do not reliably explain performance.	Significant (p=0.0058). The variables collectively have a reliable impact.

Within R^2 (Explanatory Power)	0.4219 (Moderate).	0.2889 (Moderate, Approximately 29%).
Joint Significance of Year FE	Highly Significant (p=0.0000).	Highly Significant (p=0.0000).
Dominant Performance Driver	Time-specific, macroeconomic factors (e.g., interest rate cycles) strongly overshadow the individual financial metrics.	Industry-wide or macroeconomic changes over time strongly affect profitability.

In Real Estate, only GROWTH (positive) and the Equity Ratio (EQT) (negative) depict a marginally significant relationship at the 10% level, and the regressors are not jointly significant, indicating a weak predictive model.

In contrast, the Manufacturing model is jointly significant, though only FCFTA (cash flow to total assets) shows a marginal positive impact. While the Real Estate model has a higher Within R^2 (0.4219) than Manufacturing's 0.2889, a common thread is the highly significant year fixed effects in both industries. This suggests that time-specific macroeconomic factors are a dominant driver of profitability across both sectors, outweighing the consistent influence of internal financial variables.

6 Economic Significance and Explanation of Results

6.1 Overview

Statistical significance indicates that some financial variables have an impact on firm performance, but “economic” significance gauges the magnitudes and meaningfulness of these impacts in real terms. This section discusses coefficient magnitudes, practical significance and compatibility with the RBV. This study aims to ascertain the extent financial capabilities (liquidity, leverage, equity, free cash and growth) can materialise into performance of the UK manufacturing and real estate sectors.

6.2 Economic Significance in the Real Estate Industry

The real estate model indicates two variables whose marginal significance would be at the 10% level. Growth (GROWTH) has a positive coefficient of 10.8765, implying that 1% increase in asset growth will raise ROA by an average of 0.109%. This marginal increase implies that growth and investment operations are favourable to profitability under stable market conditions. It also indicates the reliance of the industry on the expansion of assets, as well as investor loyalty.

The coefficient of Equity Ratio (EQT) is negative (–1.6090). This implies that the profitability reduces by approximately 1.61% as the equity ratio goes up. Equity dependence may also water down profits and be indicative of self-protective mechanisms in times of uncertainty. It confirms previous researchers who established that equity-heavy structures do not enhance the capital efficiency of long-term, asset-intensive industries (Nassar, 2018).

Not statistically significant, leverage (LEV) means, however, that the negative coefficient (-0.3148) is not meaningless. An increase in debt levels lowers the level of profitability due to the cost of debt and debt servicing. The trend follows evidence found by Jolly and Singla (2020), who demonstrated that leverage increases short-term returns but increases long-term risk. Huang et al. and Cai and Ward (2025) mentioned similar concerns as they emphasise that too much borrowing leads to financial vulnerability.

Performance is also affected by financial innovation. Montgomery, Squires and Syed (2018) discovered that crowdfunding enhances access to finance but increases the sensitivity to volatile external financing. This upholds the opinion that external finance can facilitate initial growth, but excessive amounts of this kind of finance undermine long-term stability. In sum, it can be concluded that the findings indicate that to be more profitable and less exposed to financial risk, real estate companies have to control the debt, equity, and growth ratios.

6.3 Economic Significance in the Manufacturing Industry

Free Cash Flow to Total Assets (FCFTA) has a positive and significant effect on profitability, and the coefficient of the effect is about 0.33, which is significant but marginally important ($p = 0.080$). This implies that an increase in FCFTA by one percent is linked to an increase in the ROA by 0.33 percent, suggesting the economic applicability of internally obtained liquidity (Sari and Ainun, 2024). The magnitude size justifies the idea that internal funds help firms to remain operationally stable, absorb shocks and finance productive investment (Nassar, 2018). The development is also rather weakly correlated with the performance (0.05), which means that the development of the firms can lead to a slight improvement in the performance, but it is not significant. It coincides with other articles, such as the one by Sinha and Das (2021), where reinvestment and good usage of capital are the main performance drivers in manufacturing firms.

The leverage coefficient is a negative but insignificant (–0.07) value that indicates that debt funding has no effect on improving profitability and, in fact, any impact is not significant (Asaleye, Adama and Ogunjobi, 2018). This will mean that the manufacturing firms in the UK may be at a balance point in terms of debt, where the additional increase in leverage cannot cause a great economic impact. In most cases, the results indicate that internal financial capability and external borrowing are less beneficial to manufacturing performance. This is in favour of the RBV, where internal liquidity and financial efficiency come in handy, as firm-specific resources that may be utilised to enhance profitability in the long run.

7 Conclusion

In practice, the results have significant implications for managers, investors and policymakers. The manufacturing managers should aim at ensuring that there is better management of cash, healthy liquidity, and reinvesting profits to increase the capacity of operations. Instead, real estate companies ought to focus on outstanding debt management, diversification of funds, and financial risks in order to mitigate the effects of market volatility. The policymakers also use these findings to inform the development of industry-specific financial policies that would support prudent leverage and consistent access to financing in all sectors.

In addition, the current paper adds to the existing knowledge on the topic of financial performance by providing comparative and industry-specific evidence in the United Kingdom. It shows that financial resources are essential when it comes to the performance of firms; however, their performance is determined by their structure, sources and management in the context of industries. Research in the future might be built upon this study by incorporating the macroeconomic control variables or cross-country comparison to further generalise the results and understand how financial resources contribute to the competitiveness of firms in different institutional settings.

Economically, the results indicate that manufacturing companies can be self-reliant and manage capital efficiently, and the real estate companies are sensitive to the macroeconomic environment and the costs of capital. The prevalence of time effects in both models also brings about the importance of economic cycles, policy changes and market fluctuations in generating various results in manufacturing and real estate companies. Therefore, the ability to manage funds efficiently is not only a good attribute, but it is essential, and not enough to generate outcomes. It is the industry that seeks dynamics and external shocks that will probably have any impact.

Theoretically, this study reinforces the Resource-Based View as it demonstrates the specificity of the values and rarity of financial resources to the industry. In the case of manufacturing companies, they receive their sources of funds internally, and the capital is managed efficiently and uniquely and leveraging performance. In real estate, on the other

hand, financial resources tend to be more homogenous and market-driven, hence less capable of supporting a sustainable competitive advantage.

The implications of the results for managers, investors, and policymakers in real-world settings are important. To the managers of the manufacturing, cash flow management, healthy liquidity, and profit reinvestment are acceptable managerial practices to increase the operating capacity. Since real estate organisations work with increased, yet unpredictable, levels of leverage, they should focus on the operations toward the optimisation of debts, diversification of funding, and control of financial risks to minimise the exposure to risk in the market. Another way in which policymakers can be informed about these findings is through their research geared towards ensuring that industry-specific financial policies could be used to help in motivating the acceptable leverage and firm access to financing in the sectoral industries.

Finally, this research offers a significant contribution to a greater knowledge of financial performance and, more specifically, comparative and industry-based evidence in the UK. The study indicates that even though financial resources are essential in the performance of firms, such variedness rests on the organisational structure, acquisition, and exploitation of financial resources. Future analysis might expand on this study by incorporating macroeconomic control variables, or in a cross-country comparison that may enable researchers to make even greater generalised inferences and knowledge on financial resources and their role in making firms competitive in different institutions.

7.1 Suggestion for Further Research

The gaps that have been identified in the introduction can be used to further develop the topic in the future through research. To begin with, this research considered only two industries; hence, in later studies, more industries in the UK can be compared to determine whether financial resources have different impacts on the performance of other industries as well. It is also possible that researchers subdivide the industries into smaller groups, such as manufacturing of various types or real estate companies of various types, so that the differences within each industry could be better understood.

Second, broader economic factors are not considered in this study. The inclusion of macroeconomic factors such as interest rates, inflation or GDP growth would contribute to demonstrating the impact of the variation in the economy on the correlation between financial resources and the performance of the firms. This is more so since real estate is a business that is reliant on the borrowing conditions, and manufacturing is influenced by the economic cycles.

Finally, it is possible that future research may compare the UK with other nations. This would contribute to demonstrating whether the financial resources have the same effect in other economic systems. It would also be a more comprehensive picture of the contribution of the financial resources towards the long-term success by using other performance measures as Return on Equity (ROE) or market value.

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Appendices

Appendix 1. Industry-wise Company Selection List

Serial	Real Estate Industry	Manufacturing Industry
1	SEGRO PLC	BAE Systems PLC (BAES.L)
2	Big Yellow Group PLC (BYG.L)	GSK plc (GSK.L)
3	Assura PLC (AGRP.L)	Rolls-Royce Holdings PLC (RR.L)
4	Great Portland Estates PLC (GPEG.L)	Diageo PLC (DGE.L)
5	Shaftesbury Capital PLC (SHCS.L)	Spirax Group PLC (SPX.L)
6	Hammerson PLC (HMSO.L)	DiscoverIE Group plc (DSCV.L)
7	British Land Company PLC (BLND.L)	McBride PLC (MCB.L)
8	Land Securities Group PLC (LAND.L)	Ibstock PLC (IBST.L)
9	LondonMetric Property PLC (LMPL.L)	Morgan Advanced Materials PLC (MGAMM.L)
10	Tritax Big Box Reit PLC (BBOXT.L)	Bakkavor Group Plc (BAKK.L)

Appendix 2. Empirical Tests for the Real Estate Industry with Stata Codes

Appendix 2.1 Pairwise Correlation Test

```
. pwcorr ROA LIQ LEV SIZE FCFTA EQT GROWTH, star(5)
```

	ROA	LIQ	LEV	SIZE	FCFTA	EQT	GROWTH
ROA	1.0000						
LIQ	-0.2593*	1.0000					
LEV	-0.3191*	0.3198*	1.0000				
SIZE	-0.1370	-0.2301*	-0.0839	1.0000			
FCFTA	-0.1958	-0.0814	-0.0923	0.3288*	1.0000		
EQT	0.0598	-0.0015	0.1620	-0.2031*	0.2692*	1.0000	
GROWTH	0.2343*	0.1490	-0.1203	-0.0702	-0.0519	0.3241*	1.0000

Appendix 2.2 VIF Test

```
. vif
```

Variable	VIF	1/VIF
EQT	1.53	0.652925
FCFTA	1.38	0.722470
SIZE	1.34	0.743669
GROWTH	1.29	0.777462
LEV	1.28	0.782812
LIQ	1.27	0.789392
Mean VIF	1.35	

Appendix 2.3 Modified Wald Test for groupwise heteroskedasticity

```
. xtreg ROA LIQ LEV SIZE FCFTA EQT GROWTH, fe

Fixed-effects (within) regression               Number of obs      =       100
Group variable: CompanyCode                     Number of groups   =        10

R-squared:                                      Obs per group:
     Within  = 0.2403                                         min =        10
     Between = 0.0096                                         avg =      10.0
     Overall = 0.1035                                         max =        10

                                                F(6,84)            =      4.43
corr(u_i, Xb) = -0.5268                         Prob > F           =    0.0006
```

ROA	Coefficient	Std. err.	t	P>|t|	[95% conf.	interval]
LIQ	-.215549	.2998197	-0.72	0.474	-.8117734	.3806753
LEV	-.3277621	.1754	-1.87	0.065	-.6765643	.0210401
SIZE	-.0493984	.0740115	-0.67	0.506	-.1965783	.0977815
FCFTA	-.0950357	.220115	-0.43	0.667	-.5327586	.3426871
EQT	-1.610782	.7364661	-2.19	0.032	-3.075326	-.1462389
GROWTH	10.5399	3.410761	3.09	0.003	3.757224	17.32257
_cons	.4022658	.3066635	1.31	0.193	-.2075682	1.0121
sigma_u	.05889264					
sigma_e	.0737534					
rho	.38935556	(fraction of variance due to u_i)				

F test that all u_i=0: F(9, 84) = 2.25 Prob > F = 0.0259

```
. xttest3

Modified Wald test for groupwise heteroskedasticity
in fixed effect regression model

H0: sigma(i)^2 = sigma^2 for all i

chi2 (10)  =          28.65
Prob > chi2 =          0.0014
```

Appendix 2.4 Heteroskedasticity Correction Test

```
. xtreg ROA LIQ LEV SIZE FCFTA EQT GROWTH, fe vce(robust)

Fixed-effects (within) regression               Number of obs      =       100
Group variable: CompanyCode                     Number of groups   =        10

R-squared:                                      Obs per group:
     Within  = 0.2403                                         min =        10
     Between = 0.0096                                         avg =      10.0
     Overall = 0.1035                                         max =        10

                                                F(6,9)             =      8.75
corr(u_i, Xb) = -0.5268                         Prob > F           =    0.0024

                         (Std. err. adjusted for 10 clusters in CompanyCode)
------------------------------------------------------------------------------
             |               Robust
         ROA |      Coef.   Std. err.      t    P>|t|     [95% conf. interval]
-------------+----------------------------------------------------------------
         LIQ |   -.215549   .2738009    -0.79   0.451    -.8349297    .4038316
         LEV |  -.3277621   .1477018    -2.22   0.054    -.6618868    .0063626
        SIZE |  -.0493984   .0636496    -0.78   0.458    -.1933839    .0945871
       FCFTA |  -.0950357   .2248488    -0.42   0.682    -.6036789    .4136075
         EQT |  -1.610782   .5475939    -2.94   0.016    -2.849526   -.3720389
      GROWTH |    10.5399   1.729949     6.09   0.000     6.626481    14.45331
       _cons |   .4022658   .2754972     1.46   0.178    -.2209522    1.025484
-------------+----------------------------------------------------------------
     sigma_u |   .05889264
     sigma_e |    .0737534
         rho |   .38935556   (fraction of variance due to u_i)
------------------------------------------------------------------------------
```

Appendix 2.5. Cross-Sectional Dependence Test

```
.
. xtcsd, pesaran abs


Pesaran's test of cross sectional independence =    -2.050, Pr = 0.0404

Average absolute value of the off-diagonal elements =     0.372
```

Appendix 2.6. Dependence-Robust Estimation (Driscoll–Kraay)

```
. xtscc ROA LIQ LEV SIZE FCFTA EQT GROWTH i.Year, fe lag(2)

Regression with Driscoll-Kraay standard errors   Number of obs      =       100
Method: Fixed-effects regression                 Number of groups   =        10
Group variable (i): CompanyCode                  F( 15,     9)      =      2.09
maximum lag: 2                                   Prob > F           =    0.1327
                                                 within R-squared   =    0.4219
```

ROA	Coefficient	Drisc/Kraay std. err.	t	P>|t|	[95% conf.	interval]
LIQ	-.0015044	.2304687	-0.01	0.995	-.5228609	.5198521
LEV	-.3148043	.2524437	-1.25	0.244	-.8858715	.256263
SIZE	-.0047628	.0657722	-0.07	0.944	-.1535499	.1440243
FCFTA	.0944142	.0994973	0.95	0.367	-.1306644	.3194927
EQT	-1.609042	.9040736	-1.78	0.109	-3.654199	.4361142
GROWTH	10.87654	5.070349	2.15	0.061	-.5933859	22.34647
Year						
2015	0	(empty)				
2016	-.0804927	.0126307	-6.37	0.000	-.1090653	-.0519202
2017	-.088505	.0109381	-8.09	0.000	-.1132486	-.0637614
2018	-.0892336	.0151202	-5.90	0.000	-.1234378	-.0550294
2019	-.1053327	.0136665	-7.71	0.000	-.1362486	-.0744169
2020	-.1311314	.0093472	-14.03	0.000	-.1522763	-.1099865
2021	-.0832529	.0089061	-9.35	0.000	-.1033999	-.0631059
2022	-.0853495	.0104214	-8.19	0.000	-.1089244	-.0617746
2023	-.1403494	.0110661	-12.68	0.000	-.1653827	-.115316
2024	-.0856154	.0160238	-5.34	0.000	-.1218638	-.0493669
_cons	.326663	.3070131	1.06	0.315	-.367849	1.021175

Appendix 2.7 Joint Significant Tests

```
. test LIQ LEV SIZE FCFTA EQT GROWTH

 ( 1)  LIQ = 0
 ( 2)  LEV = 0
 ( 3)  SIZE = 0
 ( 4)  FCFTA = 0
 ( 5)  EQT = 0
 ( 6)  GROWTH = 0

       F(  6,     9) =    2.09
            Prob > F =    0.1539
```

```
. testparm i.Year

 ( 1)  2016.Year = 0
 ( 2)  2017.Year = 0
 ( 3)  2018.Year = 0
 ( 4)  2019.Year = 0
 ( 5)  2020.Year = 0
 ( 6)  2021.Year = 0
 ( 7)  2022.Year = 0
 ( 8)  2023.Year = 0
 ( 9)  2024.Year = 0
       Constraint 1 dropped
       Constraint 2 dropped
       Constraint 6 dropped

       F(  6,     9) = 1040.69
            Prob > F =    0.0000
```

Appendix 3. Empirical Tests for the Manufacturing Industry with Stata Codes

Appendix 3.1. Pairwise Correlation

```
. pwcorr ROA LIQ LEV SIZE FCFTA GROWTH log_EQT, star(5)
```

	ROA	LIQ	LEV	SIZE	FCFTA	GROWTH	log_EQT
ROA	1.0000						
LIQ	0.1424	1.0000					
LEV	0.1691	0.0140	1.0000				
SIZE	0.0387	-0.3206*	0.1691	1.0000			
FCFTA	0.5479*	0.3040*	0.0828	0.0741	1.0000		
GROWTH	0.2100*	0.1629	-0.0480	-0.0306	0.1983*	1.0000	
log_EQT	0.2137*	-0.0522	0.2689*	-0.3516*	-0.0191	-0.0222	1.0000

.

Appendix 3.2. VIF Test

```
. vif
```

Variable	VIF	1/VIF
SIZE	1.52	0.656645
log_EQT	1.38	0.722696
LIQ	1.36	0.735814
LEV	1.21	0.825213
FCFTA	1.18	0.846985
GROWTH	1.06	0.945002
Mean VIF	1.29	

Appendix 3.3 Modified Wald Test for groupwise heteroskedasticity

```
. xtreg ROA LIQ LEV SIZE FCFTA log_EQT GROWTH i.Year, fe

Fixed-effects (within) regression               Number of obs      =       100
Group variable: CompanyCode                     Number of groups   =        10

R-squared:                                      Obs per group:
     Within  = 0.2889                                         min =        10
     Between = 0.1025                                         avg =      10.0
     Overall = 0.1754                                         max =        10

                                                F(15,75)           =      2.03
corr(u_i, Xb) = -0.3358                         Prob > F           =    0.0236
```

ROA	Coefficient	Std. err.	t	P>|t|	[95% conf.	interval]
LIQ	-.1317999	.1587935	-0.83	0.409	-.4481328	.184533
LEV	-.0690185	.0967504	-0.71	0.478	-.2617551	.1237182
SIZE	.0306464	.065923	0.46	0.643	-.1006788	.1619717
FCFTA	.3338352	.1344882	2.48	0.015	.0659209	.6017495
log_EQT	.0117938	.005179	2.28	0.026	.0014767	.0221108
GROWTH	.051606	.0416145	1.24	0.219	-.0312943	.1345064
Year						
2016	-.0314037	.0172463	-1.82	0.073	-.0657601	.0029527
2017	-.0049977	.0182473	-0.27	0.785	-.0413481	.0313528
2018	-.0134625	.0183202	-0.73	0.465	-.0499583	.0230333
2019	-.01397	.0187676	-0.74	0.459	-.0513569	.023417
2020	-.0392572	.0195241	-2.01	0.048	-.0781512	-.0003633
2021	-.0148234	.0190962	-0.78	0.440	-.0528651	.0232183
2022	-.0240657	.0207652	-1.16	0.250	-.0654321	.0173008
2023	-.015954	.0199126	-0.80	0.426	-.055622	.023714
2024	-.0144326	.0207893	-0.69	0.490	-.055847	.0269819
_cons	-.045004	.2154633	-0.21	0.835	-.4742289	.3842209
sigma_u	.03681201					
sigma_e	.03777607					
rho	.48707699	(fraction of variance due to u_i)				

```
F test that all u_i=0: F(9, 75) = 3.21                     Prob > F = 0.0025
```

```
. xttest3

Modified Wald test for groupwise heteroskedasticity
in fixed effect regression model

H0: sigma(i)^2 = sigma^2 for all i

chi2 (10)  =         777.05
Prob > chi2 =          0.0000
```

Appendix 3.4 Heteroskedasticity Correction Test

```
. xtreg ROA LIQ LEV SIZE FCFTA log_EQT GROWTH i.Year, fe vce(cluster CompanyCode)

Fixed-effects (within) regression               Number of obs      =       100
Group variable: CompanyCode                     Number of groups   =        10

R-squared:                                      Obs per group:
     Within  = 0.2889                                         min =        10
     Between = 0.1025                                         avg =      10.0
     Overall = 0.1754                                         max =        10

                                                F(9,9)             =         .
corr(u_i, Xb) = -0.3358                         Prob > F           =         .

                              (Std. err. adjusted for 10 clusters in CompanyCode)
------------------------------------------------------------------------------
             |               Robust
         ROA |      Coef.   Std. err.      t    P>|t|     [95% conf. interval]
-------------+----------------------------------------------------------------
         LIQ |  -.1317999   .1724432    -0.76   0.464    -.5218936    .2582938
         LEV |  -.0690185    .106963    -0.65   0.535    -.3109855    .1729486
        SIZE |   .0306464   .0256884     1.19   0.263    -.0274648    .0887577
       FCFTA |   .3338352   .1689336     1.98   0.080    -.0483192    .7159896
     log_EQT |   .0117938   .0084067     1.40   0.194    -.0072236    .0308111
      GROWTH |    .051606   .0351648     1.47   0.176    -.0279422    .1311543
             |
        Year |
        2016 |  -.0314037    .023878    -1.32   0.221    -.0854195    .0226122
        2017 |  -.0049977   .0199007    -0.25   0.807    -.0500161    .0400207
        2018 |  -.0134625   .0186311    -0.72   0.488    -.0556091     .028684
        2019 |    -.01397   .0192272    -0.73   0.486     -.057465    .0295251
        2020 |  -.0392572   .0244619    -1.60   0.143    -.0945939    .0160794
        2021 |  -.0148234   .0269274    -0.55   0.595    -.0757374    .0460906
        2022 |  -.0240657   .0184756    -1.30   0.225    -.0658603     .017729
        2023 |   -.015954   .0221192    -0.72   0.489    -.0659912    .0340831
        2024 |  -.0144326   .0275776    -0.52   0.613    -.0768174    .0479523
             |
       _cons |   -.045004    .099831    -0.45   0.663    -.2708374    .1808295
-------------+----------------------------------------------------------------
     sigma_u |  .03681201
     sigma_e |  .03777607
         rho |  .48707699   (fraction of variance due to u_i)
------------------------------------------------------------------------------
```

Appendix 3.5 Joint Significant Test

```
. test LIQ LEV SIZE FCFTA log_EQT GROWTH

 ( 1)  LIQ = 0
 ( 2)  LEV = 0
 ( 3)  SIZE = 0
 ( 4)  FCFTA = 0
 ( 5)  log_EQT = 0
 ( 6)  GROWTH = 0

       F(  6,     9) =    6.85
            Prob > F =    0.0058
```

```
. testparm i.Year

 ( 1)  2016.Year = 0
 ( 2)  2017.Year = 0
 ( 3)  2018.Year = 0
 ( 4)  2019.Year = 0
 ( 5)  2020.Year = 0
 ( 6)  2021.Year = 0
 ( 7)  2022.Year = 0
 ( 8)  2023.Year = 0
 ( 9)  2024.Year = 0

       F(  9,     9) =  149.05
            Prob > F =    0.0000
```

Appendix 3.6 Pesaran CD Test for Cross-Sectional Dependence

```
. xtcsd, pesaran abs

Pesaran's test of cross sectional independence =    -0.727, Pr = 0.4673

Average absolute value of the off-diagonal elements =     0.368
```

Appendix 3.7 Wooldridge Test for Autocorrelation

```
. xtserial ROA LIQ LEV SIZE FCFTA log_EQT GROWTH

Wooldridge test for autocorrelation in panel data
H0: no first-order autocorrelation
    F(  1,       9) =      0.000
           Prob > F =      0.9988
```

Appendix 4. Formula for Variables Calculation

Variables	Formula
ROA	$\frac{EAT}{Total\ Asset}$
FCFTA	$\frac{OCF - CAPEX}{Total\ Asset}$
LIQ	$\frac{Cash\ \&\ Cash\ Equivalent}{Total\ Asset}$
LEV	$\frac{Long\ Term\ Debt}{Total\ Asset}$
SIZE	Log (Total Asset)
GROWTH	$\frac{Sales\ T - Sales\ (T-1)}{Sales\ (T-1)}$
EQT	$\frac{Sales}{Equity}$