

Interest rate, financial reporting quality, and corporate operational efficiency: The mediating role of inventory levels

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Abstract

An analysis of multinational businesses and their level of effectiveness in operating efficiency, as it relates to the level of effectiveness in their operating efficiency and the quality of their financial reports ("financial reporting"), and inventory levels as factors determining differences in efficiency among different organizations. The data analyzed consisted of panel data from a sample of multinational companies for the period between 2015 and 2023. The results of the analyses suggest that increases in interest rates will decrease a multinational enterprise's operational efficiency by raising the cost of financing and inhibiting or making it more difficult for a multinational enterprise to obtain financial capital from external sources. Additionally, firms with relatively high-quality financial reporting can respond to changes in monetary conditions more effectively than firms that do not maintain high-quality financial reporting. Conversely, inventory levels do not have a meaningful influence on operational efficiency. Overall, the results suggest that there are influences on firm efficiency other than macroeconomic conditions, such as the quality of financial reporting and an organization's capacity to adjust to changes in the global economy.

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1. Introduction

Interest rate affects firms through several channels that extend beyond borrowing costs alone. Changes in interest rates influence access to external finance, alter the cost of capital, and shape how managers distribute resources across investment, production, and routine operations. Because of this, monetary conditions can affect not only corporate financing choices, but also the efficiency with which firms convert resources into operating outcomes [1, 2]. This occurs through various mechanisms, such as central banks altering interest rates, with changes in interest rates affecting a company's capital costs and how easily a company can borrow money to fund its operations and make investments [3, 4]. Therefore, a growing amount of research has focused on how interest rates affect firm-level outcomes, including operational efficiency. Operational efficiency refers to how well a firm maximizes its resources in generating revenues and is a major driver of a firm's financial performance and long-term sustainability [5, 6].

There is a great deal of existing evidence supporting the idea that interest rates have an impact on many different types of outcomes for firms. Within this impact, investments and financing choices and performance in the market are all affected by the state of the economy, whether it be through interest rates or some other factor [7, 8]. Nonetheless, the effect of interest rate on operational efficiency continues to be somewhat unclear, because the majority of studies regarding the impact of monetary conditions tend to focus primarily on the impact of monetary conditions on a firm's operations rather than examining the other internal characteristics (e.g., quality of reporting systems, management of operational resources) that may impact how a firm responds to the monetary environment [9, 10]. As a result, firms that operate in the same monetary environment may have varying levels of efficiency because the quality of their internal reporting systems and/or the manner in which they manage/ maintain their operational resources (e.g., inventory) varies significantly from firm to firm.

In terms of firm efficiency, it appears that the level of inventory may play an important role [11, 12]. Maintaining a higher-than-needed amount of inventory results in higher holding costs, which can tie up resources when they are needed elsewhere. An insufficient number of items on hand may impede production and decrease sales performance [13, 14]. However, previous studies have not provided us with a clear answer regarding how the amount of the inventory available to a company directly affects its operational efficiency. The impact of the inventory seems to be dependent on both the firm's unique characteristics and the economic conditions surrounding that company. Therefore, this study treats inventory as an internal operation variable that might be used to explain differences in operational efficiency between different companies rather than as a universally good or bad impact [15, 16].

While quality financial reporting is important for how firms operate, it is also important for how firms react exogenously to variations in external economic conditions such as interest rates and other financing conditions [17, 18]. Quality financial reporting increases the accuracy, transparency, and reliability of financial statement information, which managers and stakeholders use for their decision-making. Higher-quality financial reporting reduces information asymmetry and boosts stakeholders' confidence in firms. Consequently, firms with high-quality financial reporting are likely to be better able to withstand, enhance, or diminish the effects of exogenous fluctuations in interest rates and other financing conditions on their operational outcomes [19, 20].

This research seeks to contribute to the extant knowledge on the linkages between interest rate and operational efficiency using the gauge of corporate operational performance and distinguishing between the separate effects of inventory values and financial reporting quality. In doing so, this study identifies whether inventory values play a mediational role and under what conditions. This study further examines whether the quality of financial reporting, operational performance, and interest rate relations are mitigated (increased/decreased). By connecting macro-economic perspectives on interest rate to micro-level firm operational characteristics, this study provides a richer assessment of the dynamics created by interest rate at the firm level.

The econometric analysis will take place using panel data from a sample of international companies over the period of 2015-2023 to determine if the relationships we have proposed are true. This research is of great value to policymakers, corporate executives, and investors. From a policy perspective, if policymakers understand how interest rates affect a company on an individual firm level, this understanding will help them create more appropriate policies. From a management perspective, if management understands how the quality of the financial reporting and operating practices of a company impacts their strategic decision-making, they will make better decisions. Finally, from an investor's perspective, this research should provide important information regarding how the macroeconomic environment affects any company through its internal structure and processes.

2. Research contributions

This study is novel in the sense that it advances the literature on the real effects of interest rate by introducing the operational efficiency of corporations as a relevant outcome. Recent studies on the real effects of interest rates have traditionally focused on investment, productivity, and other conventional outcomes. In contrast, this

study examines how different monetary conditions affect firms' capacity to use resources efficiently in their routine activities [21, 22].

We also contribute to the accounting and corporate finance literature by incorporating information quality into the interest rate transmission framework and showing that firm transparency and the information environments related to reporting influence corporate efficiency and how firms react to external shocks. This is supported by recent research that finds that stronger information environments are positively associated with several efficiency-related outcomes for firms [23, 24]. Building on the identification of poor information quality as a principal cause of interest rate failure, our study addresses a significant void in the business cycle literature by providing the first empirical investigation of the transmission mechanism of monetary policy. Second, our study links the information quality framework in accounting and corporate finance to the interest rate transmission mechanism and documents the relative impact of transparency and information environments at the firm level on measures of efficiency for individual firms, as well as their overall responsiveness to exogenous shocks. This link is supported by recent evidence that information environments are associated with efficiency-related outcomes for corporations [25, 26].

Our third study investigates whether inventory levels matter as an operational factor that affects firm performance. We find that, for our sample of large US publicly traded manufacturers, inventory levels do not matter for operational efficiency. This result contributes to the literature by suggesting that improving inventory decisions can increase firm performance, but perhaps not through enhancing operational efficiency in all settings. Recent research on inventory leanness and inventory positioning suggests that performance benefits from such initiatives may not be universal [27].

Using a rich set of firm-level data, this study analyzes the determinants of productivity and efficiency at the firm level. The analysis incorporates macroeconomic conditions, aspects of firms' information environments, and various other firm characteristics into a single framework to provide a more complete explanation of a firm's operational efficiency. The study thus contributes to both the interest rate literature and the accounting literature by arguing that firm performance is determined not only by external policy conditions but also by factors related to the quality of the information environment within a firm and the firm's operational structure.

3. Literature review

There has been an increase in recent years in studies focusing on how monetary policies impact business through both macroeconomic metrics and business metrics derived at the company level, including investing behaviors, productivity measures, and how businesses allocate resources. As the evidence has shown that interest rates have an indirect effect on a company's financing conditions and ability to finance its operations, they also have a direct effect on a company's ability to fund operations through the amount and willingness of banks to provide funds. Furthermore, the Ottonello and Winberry studies have empirically demonstrated that interest rate indirectly impacted firms' financing conditions via corporate financial heterogeneity, as well as directly through capital flow restrictions by creating barriers and hindrances in private investment activities across all companies in a firm. In fact, the empirical results demonstrate a statistically significant effect of interest rate on a company's investment decisions at both the aggregate level and the firm level. Overall, the empirical evidence supports that the majority of firms from various economies will have varying reactions to changes in monetary policy, depending on how they relate to one another through corporate finance and purchasing levels of previously funded capital by banks. Similarly, the studies completed by Gnewuch and Zhang demonstrate that interest rate influences the average investment rate and variance within the investment rate's distribution for different types of firms and through the geographic production network within and between regions [25].

The relationship between interest rate and corporate operational efficiency has been researched. However, there has not been substantial evidence to support this claim (e.g., various forms of financing (capital allocation), and the effects that productivity will have on the physical nature of input into a particular firm). While the authors of [24] have shown that changes in nominal rates have an indirect effect on productivity. Gopinath et al. found

that capital allocation can have a very significant impact on overall productivity. Overall, these findings provide an excellent rationale for assuming that monetary policy's impact on resource allocation and production will also affect operational efficiency for businesses. Thus, we should expect the effects of interest rate on efficiency-related factors to have indirect and direct influences through its effects on the allocation and performance of our resources [17].

A different part of the literature reviews the quality of financial reporting and its actual economic impacts. A lot of the literature focuses on reducing the information asymmetries and helping managers make better decisions through economic reporting. For example, Biddle et al. [4] found that a higher quality of financial reporting increased the efficient use of investment resources through greater transparency. Furthermore, research by Chen et al. [7] and Bushman and Smith [6] provides evidence that reliable financial statements help allocate resources more effectively within corporations and thus improve corporate decision-making. The authors of [13, 19] demonstrated that corporate governance is improved through the quality of financial statements and that the efficient use of financial resources is improved. A comprehensive review in [10] provides evidence that financial reporting is an important source of actual behavior for corporations, beyond capital markets.

The way in which a corporation reacts to external economic disturbances, such as shifts in monetary policy, is likely to be impacted by financial reporting quality. High-quality financial reporting reduces a firm's uncertainty, improves its access to capital, and results in better operational decisions. As a result, financial reporting quality may serve as a moderating variable that either increases or decreases the strength of the relationship between interest rate and measures of corporate performance.

Although there is a very extensive body of literature concerning inventory management (IM) and its effects on organizational performance, there is limited research focusing on the importance of inventory management within working capital management (WCM). The levels of inventories maintained by firms are crucial in the working capital management process and affect all operational processes of a company. Inventory management (IM) has had a significant impact on firm performance and operational efficiency by affecting the firm's working capital management (WCM) over the past few years. According to this research study, there is a high incidence of inefficiency associated with both excess and insufficient investments into WCM. Previous research conducted by Blinder and Maccini [5] further supports this research goal by emphasizing the need to investigate the relationship between IM and the economic activities of a company through WCM methods. In addition, Eroglu and Hofer [12] identified an association between IM and the operational strategy of a firm used to measure its level of performance and operational efficiency.

Because IM plays such a pivotal role in establishing a competitive advantage within today's business environment, effective inventory management is now an essential element in determining the performance of organizations. Multiple studies have been completed in this area. One such study, a systematic literature review by Panigrahi et al. [26], analyzed the IM practices of small to medium-sized enterprises (SMEs). Kiymaz et al. further acknowledged the significant effect WCM has on firm performance based on the number of days products are held in inventory for both developed and developing markets. Choi et al. [8] discussed efficient inventory management practices and their effects on profitability within organizations. Effective inventory management practices directly affect profitability by enhancing operational performance, as discussed in the paper by [27]. How a firm manages its inventory is affected by the degree of uncertainty concerning its inventory policy, as discussed by [23].

4. Theoretical framework

Generally speaking, the effect of interest rate on the outcome of firm activity can be described in terms of the manner in which it affects the conditions of financing, the allocation or investment decisions made by individuals or groups with respect to financing, and finally, how firms allocate resources. Changes in interest rates are typically enacted through interest rates and subsequently determine the firm's cost of capital and its

access to liquidity, which ultimately affect any of the operational decisions made by the given firm. For example, when a central bank utilizes an expansionary interest rate via a decrease in interest rates, this generally provides firms with a lower cost of borrowing, which makes it more beneficial for firms to invest in new capital or to effectively utilize existing capital; therefore, increasing the operational efficiency of the firm. On the other hand, when a central bank utilizes a contractionary interest rate via an increase in interest rates, this generally creates financing constraints that firms would experience, which could decrease their level of efficiency [14, 20]. Corporate operational efficiency can be viewed as directly attributable to monetary policy. Firms utilize external financing to support the operation of their business and invest in their business. Therefore, when monetary conditions change, firms' ability to operate efficiently is also likely to change. This conclusion is supported by the results of numerous studies providing evidence of significant effects of interest rate shocks on firms' productivity, investment behavior, and overall performance [3, 15].

The quality of financial reporting plays an important role in resolving information asymmetries between parties and improving overall efficacy in decision-making by organizations. According to agency theory, having high-quality financial reports creates transparency and permits stakeholders to monitor manager action. This ultimately decreases agency costs and helps to ensure that all users of such reports (stakeholders) allocate their capital more efficiently. Further, empirical evidence has established that organizations that produce higher-quality financial reports make more efficient investments and, thereby, allocate their resources more effectively [4, 7].

Furthermore, the broader academic literature also supports the view that high-quality financial reporting has substantial economic impacts beyond capital markets, with numerous consequences to the operational actions and strategies of firms. High-quality financial reporting enhances the validity of the information presented in a financially related report and supports more effective decision-making by both parties when making decisions within an organization or externally [10, 13].

Focusing on the relationship between interest rate and operational efficiency, this study examines the role of financial reporting quality. The ability to cope with disturbances stemming from fluctuations in the economy, such as those resulting from changes in interest rates, is influenced by firms' ability to transmit information transparently. Thus, high financial reporting quality strengthens the positive effect of favorable monetary conditions on firms' efficiency and attenuates the negative effect of tight monetary conditions that force firms to reduce production and shut down vulnerable divisions.

The management of inventories is an important aspect of the management of working capital, and it supports the operations of the business as a whole. According to inventory management theory, firms should maintain their inventory levels at an optimal point where they can minimize their costs and continue to produce and sell goods. In addition to reducing the cost of holding and shortages, efficient inventory management improves the overall operational performance of the business.

Recent empirical evidence confirms that inventory management has a significant effect on a firm's ability to perform. For example, in a recent study by [26], effective inventory management practices were positively correlated with improved firm performance, particularly when firms operate in dynamic, resource-constrained environments. Similarly, the authors of [27] found that efficiency in inventory management significantly impacts a firm's operational profitability and resilience.

Despite this evidence to support the critical role of inventory management in firm performance, the relationship between inventory levels and operational efficiency is uncertain. Although efficient practices in inventory management may enhance a firm's performance, the relationship between inventory levels and performance may be dependent upon the characteristics of the firm and the prevailing economic conditions. As such, it appears as though the effects of inventory levels on operational efficiency would not necessarily be significant across all contexts. On the basis of theoretical predictions, this research builds up and tests a cohesive framework that connects interest rate with both measurement (financial reporting) standards and operational efficiency, as

well as changes to inventory management (these three variables constitute what is called an "integration"). It seeks to identify the impact that interest rate has on operational performance measures and further explores the moderating effect that measuring (financial reporting) standards have within that context. The study formulates a unified, cohesive model of these measures so that it can evaluate how the interest rate has affected operational performance (both alone and in comparison to other measurement standards).

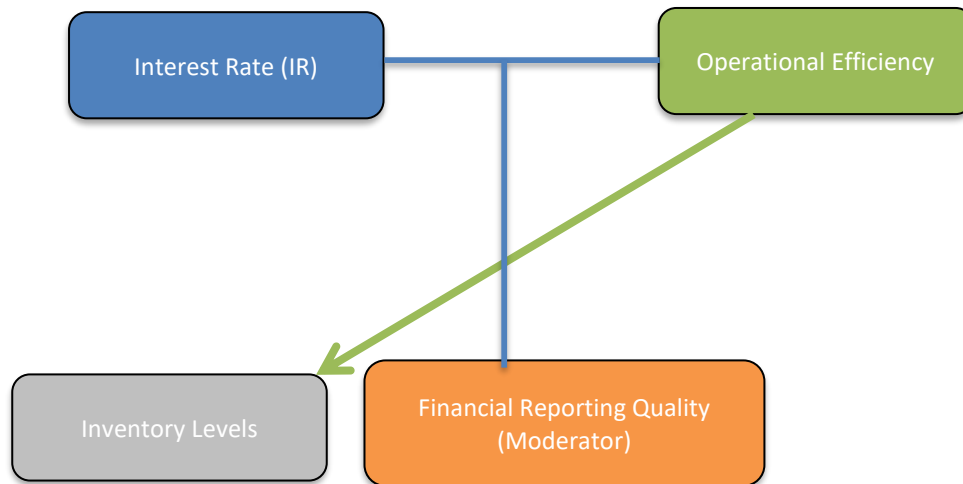


Figure 1. Conceptual framework of the study

Figure 1 displays the study's conceptual framework, showing the direct relationship between interest rate and corporate operational efficiency, the moderating role of financial reporting quality on the aforementioned relationship, and the operational factor, inventory levels, which are expected to affect operational efficiency, although not necessarily mediating between interest rate and efficiency. The framework incorporates both macroeconomic and firm-specific variables to analyze the determinants of corporate operational efficiency.

5. Hypotheses development

Interest rate plays an integral role in affecting the productivity of firms due to its impact on the overall access to financial resources and on the decision-making processes towards investing those resources. For example, when interest rates change, this impacts the cost of capital to firms and therefore has a distinct influence over whether firms will use external sources of capital when making operational plans for utilizing their existing resources. Therefore, when interest rates fall as a result of an expansionary monetary policy, it decreases the cost of borrowing money and thus allows firms to utilize their available assets and resources their existing assets more efficiently than before. Conversely, when interest rates rise as a result of a contractionary monetary policy, this increases the cost of capital to firms and can restrict the ability of firms to effectively operate, as financing may be more difficult to obtain. Overall, there exists compelling empirical evidence that interest rate directly impacts a firm's productivity and its associated investment levels and performance outcomes [14].

Based on this theoretical and empirical foundation, the following hypothesis is proposed:

H1: Interest rate has a significant effect on corporate operational efficiency.

Interest rate affects firm performance via firm-specific factors (i.e., financial reporting quality). Additionally, reporting at higher levels of quality reduces information asymmetry, creates higher levels of transparency, and provides greater access to outside financing. High-quality financial reporting is likely to create greater degrees of certainty for an investor and reduce the level of uncertainty that exists with a firm's ability to adjust its operational and financial strategies as a result of changes that occur due to monetary policy. Several studies have indicated that high-quality financial reporting can have material consequences for how efficiently organizations are able to conduct capital investment and appropriately allocate resources [4] [7] [10] [13]. Therefore, we hypothesize that high-quality financial reports will impact firm performance and will moderate the relationship between interest rate and operational efficiency. Therefore, we make the following hypothesis:

H2: Financial reporting quality significantly moderates the relationship between interest rate and corporate operational efficiency.

Another important aspect of operations that could affect the efficiency of a company is inventory management. The level of inventories affects how a company manages all aspects of production (i.e., production, selling, and liquidity), and therefore, inventory is a fundamental component of the company's working capital management. Theoretically, a company that has an efficient system of inventory management will improve its operational performance due to lower holding costs and increased turnover. However, if the company has too much inventory, it may create inefficiencies and allocate capital improperly; on the other hand, if a company has too little inventory, it can disrupt its production and selling process.

Recent empirical studies have indicated conflicting evidence regarding the relationship between inventory levels and performance at the firm level. One study indicates that companies with effective inventory management display better performance and enhanced operational outcomes [26]. Another study indicates that effective inventory management and its influence on profitability and flexibility will differ among companies and across different economic situations. Therefore, context will be an important factor in determining how effective a company's inventory management system is [27].

This conflicting evidence suggests that the question of whether or not inventory levels have a significant impact on a company's operational efficiency has not yet been adequately addressed, particularly with respect to different types of companies and different macroeconomic environments, which is further evidence to support the hypothesis that inventory levels do not necessarily have a significant impact on operational efficiency for all companies and in all macroeconomic environments. Therefore, while inventory management is operationally important, its direct impact on efficiency may not be statistically significant in all contexts. Based on this reasoning, the following hypothesis is proposed:

H3: Inventory levels have a significant effect on corporate operational efficiency.

We use a panel dataset of 33 multinational firms observed over the period 2015–2023, resulting in 297 firm-year observations. The use of panel data enhances the quality of the analysis by controlling for firm-specific unobservable characteristics and time effects that may influence differences in operational efficiency and productivity outcomes.

To test the proposed hypotheses, the study employs multiple panel regression models. The baseline model examines the direct effect of interest rate on operational efficiency:

$$OE_{it} = \beta_0 + \beta_1 MP_{it} + \sum \beta_k \text{Control}_{it} + \epsilon_{it}$$

To test the moderating role of financial reporting quality, an interaction term is introduced:

$$OE_{it} = \beta_0 + \beta_1 MP_{it} + \beta_2 FRQ_{it} + \beta_3 (MP_{it} \times FRQ_{it}) + \sum \beta_k \text{Control}_{it} + \epsilon_{it}$$

Finally, the effect of inventory levels on operational efficiency is examined as follows:

$$OE_{it} = \beta_0 + \beta_1 INV_{it} + \sum \beta_k \text{Control}_{it} + \epsilon_{it}$$

Where i denotes firm and t denotes time.

This study employs several variables categorized into dependent, independent, moderating, and control variables. Table 1 presents a summary of all variables, their measurements, and definitions.

Table 1. Definition and measurement of variables

Variable	Symbol	Measurement	Description
Operational Efficiency	OE	Sales / Total Assets	Measures the firm's ability to generate revenue from its assets
Interest	MP	Interest Rate	Annual interest rate of the firm's home country
Financial Reporting Quality	FRQ	Accrual-based proxy	Reflects the quality and transparency of financial reporting
Inventory Levels	INV	Inventory / Total Assets	Represents the proportion of inventory within the firm's resources
Firm Size	SIZE	Ln(Total Assets)	Controls for firm scale effects
Leverage	LEV	Total Debt / Total Assets	Captures financial risk and capital structure
Liquidity (Quick Ratio)	QR	(Current Assets – Inventory) / Current Liabilities	Measures short-term liquidity excluding inventory
Operating Cash Flow	OCF	Operating Cash Flow / Sales	Reflects internal cash generation ability

Operational efficiency (OE) reflects the firm's revenue-generating ability based on the ratio of sales to the total dollar amount of all available assets to the firm, as shown above in Table 1. Hence, operational efficiency demonstrates how well or poorly the firm has generated revenue from the investable base of its assets. Therefore, the interest rate reflects the rate of interest set for each country annually, thereby reflecting the actual degree of the interest rate being loose or tight based on its application to the firm.

Financial Reporting Quality (FRQ) is determined using several different proxies related to different accruals, and as a result, higher financial reporting quality indicates higher quality of reported financial results, as compared to the level of manipulation of reported earnings. To determine the level of Inventory (INV), measured by taking the total dollar amount of all inventories divided by the total dollar amount of all firm assets. To determine the control variables that have an impact on firm-level operations, we will be using four different control variables: total assets, debt/asset ratio, liquidity, and cash flow from operations. These control variables have been previously used in the empirical finance research literature to control for omitted variable bias.

The study also utilizes panel data regression methods for estimating the proposed models (both Fixed Effects and Random Effects), as well as conducting a Hausman test to determine the appropriate model to utilize in this instance. To guarantee the results are valid, potential problems, such as multicollinearity (using the Variance Inflation Factor) and heteroskedasticity (using standard tests), were examined. Robust standard errors were generated if heteroskedasticity was present. In addition, potential autocorrelation within the panel data was taken into consideration. Finally, all estimations for this study were conducted using EViews, which is an established software application in empirical financial and economic research.

The data used in this study were collected from firms' financial statements and international financial databases. Macroeconomic data, including interest rates, are obtained from official central bank sources and global financial databases. We employ a panel data regression setting that allows for the control of unobservable firm-specific fixed effects, as well as for time-series variation. Including financial reporting quality as an interaction effect with interest rate provides additional insight into the role of firm-specific factors. Furthermore, incorporating a measure for inventories as an internal operational factor allows us to assess the marginal importance of internal decisions on efficiency in an environment of macroeconomic shocks.

6. Results

This section presents the empirical findings found within the data of this study using both panel data regression analyses. Following this is a descriptive statistical summary demonstrating the distribution of the data across

the different panels, followed by an investigation of multicollinearity diagnostics confirming that the regression models used are appropriate for the data being examined. Lastly, the results of regression analyses will be presented in order to explore the effects of interest rate on operational efficiency, how the quality of financial reporting mediates the relationship between interest rate and operational efficiency, and how levels of inventory impact operational efficiency. To increase clarity and coherence in presenting results, all results presented will be done so in an order to make it easier to understand the information presented.

According to the descriptive statistics in Table 2, there is a significant difference in company performance compared to one another. The performance metric operating efficiency (OE) demonstrates a large amount of variation as its standard deviation is substantially larger than the mean. Therefore, we see that there is a significant difference in how effectively the companies are using their assets, thus making the ability for panel data analysis appropriate.

Interest rate (MP) has moderate variation as there is a difference between the various interest rate environments of each country at different points in time. Financial reporting quality (FRQ) has a large amount of variation, which indicates that there are significant differences in transparency and reporting practices between the companies within this study. The control variables for the study, which are firm size (SIZE) and liquidity (QR), displayed some variation as well, indicating that there are differences among the companies' financial status and operational structure.

Table 2. Descriptive statistics

Variable	Mean	Std. Dev.	Min	Max
OE	10.65	62.22	0.0003	607.83
MP	1.04	1.66	-0.75	5.35
FRQ	8.55	21.99	0.11	142.03
SIZE	12.36	2.55	7.34	18.48
LEV	0.22	0.18	0.00	1.40
QR	2.83	2.73	0.57	15.69

This figure shows the distribution of operational efficiency (OE). The distribution is highly skewed, with a lot of observations at the low end of the figure and very few observations at the right-hand side of the figure. However, even though most firms do not operate very efficiently, there are some firms that are extremely efficient. Figure 2 shows clearly that the data are not normally distributed and thus supports the use of robust empirical methods in the analysis.

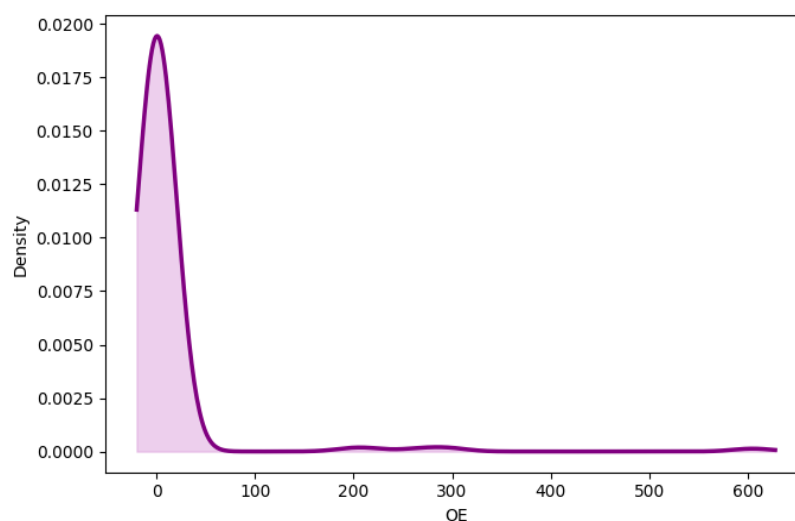


Figure 2. Distribution of operational efficiency

Table 3. Variance inflation factor

Variable	VIF
MP	1.03
FRQ	1.01
SIZE	1.16
LEV	1.09
QR	1.08

The multicollinearity diagnostics in Table 3 suggest that there is no multicollinearity problem in this study, since all VIF values are below 10. The values of VIF are close to 1, which indicates that the independent variables in this study are largely uncorrelated with each other. This feature enhances the reliability of the regression estimates. Moreover, the values of VIF indicate that each variable contributes independently to explaining operational efficiency. In summary, the absence of multicollinearity is beneficial to test hypotheses using the developed econometric model in this study.

Table 4. Baseline regression results

Variable	Coefficient	t-Stat	Prob.
MP	-4.846	-2.606	0.009
SIZE	-3.205	-2.596	0.009
LEV	8.787	0.515	0.606
QR	-0.833	-1.334	0.182
Constant	56.270	2.730	0.006

According to the results of the OLS regression analysis presented in Table 4, interest rate places greater pressure on companies and reduces their operational efficiency. An increase in interest rates (the price of borrowed funds) decreases operational efficiency. This is evident in Figure 2 (shown below), which presents a graphic representation of the strong negative relationship between interest rate and operational efficiency. Larger organizations may also have impaired operational efficiencies due to higher levels of complexity associated with running a large company compared to a smaller company; this is consistent with the negative relationship between operational efficiency and firm size. Conversely, operational efficiency is not significantly affected by firms' use of financial leverage or liquidity when examined for the sample used in this study.

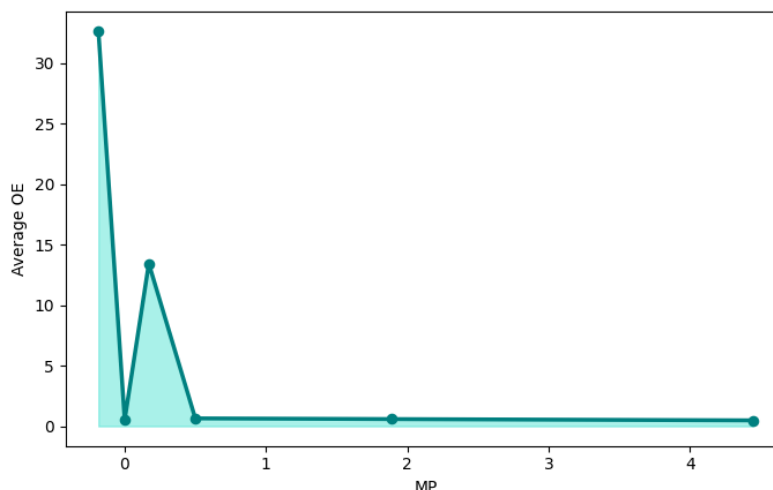


Figure 3. Relationship between interest rate and operational efficiency

Table 5. Moderation regression results based on the moderating role of financial reporting quality (H2)

Variable	Coefficient	t-Stat	Prob.
MP	-0.588	-0.368	0.713
FRQ	1.741	2.837	0.005
MP $\times$ FRQ	-0.300	-2.654	0.008
SIZE	-2.892	-2.219	0.026
LEV	23.201	1.307	0.191
QR	-0.803	-1.282	0.200

Table 5 depicts a summary of the outcome of several multiple regression analyses used to determine whether financial reporting quality moderated the relationship between economic policy and productive efficiency. Economic policy did not have a statistical significance with productive efficiency (ref: Table 3), nor did productive efficiency have a statistical significance with economic policy. However, the interaction term between economic policy and financial reporting quality (moderated variable) was negatively correlated to productive efficiency with a statistical significance of 1%, indicating a conditional relationship exists between the quality of financial reporting (i.e., the financial statements upon which economic policy was based) and Economic Policy.

In addition, financial reporting quality and the slope of the relationship between interest rate (interest rates or real rates) and operational efficiency are also evaluated in a two-way interaction for each industry, as presented in Figure 3. This figure demonstrates an increasing positive relationship between the slope of the relationship between interest rate and operational efficiency and financial reporting quality. Therefore, when financial reporting quality increases, firms will experience a much larger negative slope than those with lower financial reporting quality, who will have a flatter slope.

The negative interaction term coefficient suggests that as financial reporting quality increases, the negative impact of contractionary interest rate on operational efficiency increases. Therefore, transparent firms are more negatively impacted than firms that are less transparent during periods of poor monetary conditions. The reasoning for this may be that transparent firms are able to adjust to the changes in the cost of financing quickly and effectively, and therefore can incorporate the effects of interest rate shocks into their operational efficiency measures in an efficient manner.

The quality of financial reporting can, from an economic perspective, reduce the information asymmetry in the marketplace and improve the responsiveness of managers, as a result, to changes in interest rates. In this way, the responsiveness will increase the extent to which negative monetary shocks will be transmitted to the firm, leading to a larger impact on operational efficiency, as evidenced by observation. Conversely, firms with lower quality financial reporting will likely have a delayed or diminished responsiveness due to information frictions.

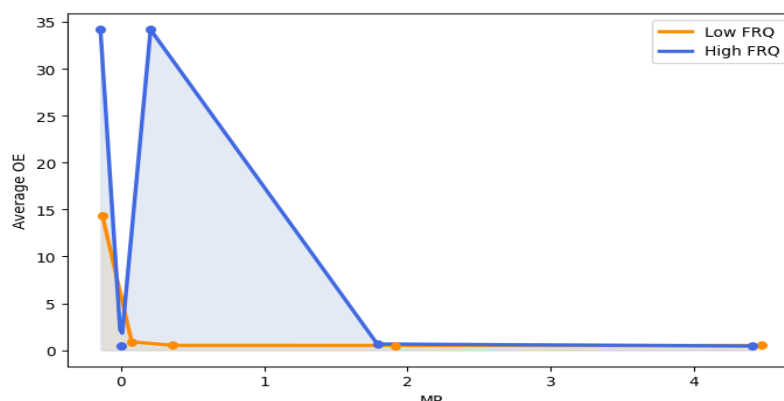


Figure 4. The moderating effect of financial reporting quality on the relationship between interest rate and operational efficiency

In summary, these findings demonstrate that the quality of financial reporting directly affects operational efficiency but also explains how firms respond to macroeconomic policy. This emphasizes the critical importance of transparency in the interest rate transmission process at the firm level.

Table 6. Inventory regression results based on inventory levels and operational efficiency (H3)

Variable	Coefficient	t-Stat	Prob.
INV	-0.0001	-1.651	0.099
SIZE	-2.903	-2.604	0.009
LEV	8.839	0.501	0.617
QR	-0.615	-1.114	0.265

In Table 6, the inventory level was not statistically significant at the 5% conventional significance level. Although the coefficient reached a significance level of 10%, the weak economic effect created by the coefficient would indicate that inventory in and of itself does not significantly impact operational efficiency. This finding confirms the perspective of inventory-performance relationships being complicated and dependent on other firm-specific conditions and/or nonlinear dynamics. Additionally, high variability in the amount of inventory levels between firms indicates that it would be inappropriate to view inventory as the primary driver of operational efficiency in this context.

Several robustness checks were performed to validate the main findings. To capture possible delayed responses, a lagged dependent variable of the interest rate variable was included. To limit the effect of extreme outliers on the model's continuous variable predictors, all continuous predictors were winsorized at both the first and ninety-ninth percentiles.

Table 7. Robustness results

Variable	Baseline	Lagged MP	Winsorized
MP	-4.846**	—	-3.680**
MP(-1)	—	-5.557*	—
SIZE	-3.205*	-3.244*	-2.484**
LEV	NS	NS	NS
QR	NS	NS	NS

As shown in Table 7, the coefficient of interest rate remains negative and statistically significant across different specifications. The consistency of the results confirms that the main findings are not driven by outliers or model specification choices.

7. Conclusion

This study examines the impact of interest rate on corporate operational efficiency and explores whether financial reporting quality and inventory levels moderate this relationship. The results of the study provide new insights into the relationships between interest rate and both corporate finance and accounting.

The statistical analysis demonstrated that central banks' monetary policies have a major impact on the operational efficiency of businesses. As interest rates rise, both operational efficiencies decrease, and the cost of providing financing also increases. Additionally, the previously documented empirical findings showed that the quality of a firm's financial reporting moderates the relationship between interest rate and operational efficiency. Therefore, while tightening interest rates (or increasing interest rates) will decrease operational

efficiency, higher-quality firms experience a greater negative impact than lower-quality firms due to the manner in which firms interpret and process financial information. High-quality firms benefit from having greater visibility into their financial statements as a result of their higher-quality financial statements than do low-quality firms; as a result, high-quality firms can respond more quickly and effectively to changes in interest rates than low-quality firms can. Therefore, having high-quality financial statements will enhance operational efficiency while also enhancing the effect of interest rate on operational efficiency.

Results indicate that inventory levels have no substantial effect on operational efficiency, thus offering no support to Hypothesis 3. Since inventory management is critical to operational functions, one might expect inventory to be a prime determinant of operational efficiency. That said, prior studies suggest that there may be a non-linear relationship between inventory and performance and/or that there are a variety of determinants affecting performance, including an organization's inventory strategy, and each of these also is a function of a large number of external and internal variables affecting firms. For example, some organizations may employ various inventory strategies due to the types of businesses they are in and their respective operational characteristics, as well as the physical characteristics of their supply chains. Therefore, the inventory levels of an organization may not necessarily affect performance across all organizations.

This study documents a significant relationship between macroeconomic conditions and firm operational efficiency. Furthermore, the transmission of macroeconomic effects to firm performance is significantly influenced by firm-specific characteristics, notably financial reporting quality. However, the study also finds that operational factors, such as inventory levels, have limited explanatory power for internal efficiency. Taken together, these findings suggest that macroeconomic conditions, notably monetary policy, play a substantial role in determining a firm's operational performance, while firm-specific characteristics strongly affect how macroeconomic conditions impact firm performance.

The objective of this research project is to examine the impact of interest rate and external macroeconomic factors on corporate value through the dissemination of financial data and transparency (with an emphasis on internal vs. external governance), ultimately leading to improvements in the understanding of the determinants of a corporation's value. We find that there is significant interaction between the impact of external policies (i.e., monetary policy) and the internal governance of the corporation; thus, supporting our hypothesis. Furthermore, our findings indicate that firms benefit from increased levels of transparency, but they are also exposed to increased instability in value due to adverse shocks (from both internal and external sources).

The implications of this study for monetary policies (as set by the Fed) include the necessity for central banks to consider the degree to which individual firms might react differently to interest rates (and potentially transparency). More specifically, policymakers need to take into account how firms will react to changes in interest rates based on reporting quality; this is particularly relevant with regard to the economic impact on real activities during tightening periods.

Our findings demonstrate the importance of high-quality financial reporting from a managerial perspective, as it enables firms to be nimbler in reacting to changing economic conditions. At the same time, however, greater transparency exposes the firm to external shock.

This study investigates how firm-specific characteristics, particularly financial reporting quality, affect the relationship between macroeconomic conditions and firm performance. The findings of this study can be particularly useful to investors in their assessment of a firm's sensitivity to interest rate stimuli and overall resilience, and how this is influenced by a range of firm characteristics.

While our study makes significant contributions, it is not without limitations. Specifically, we treat interest rates as the best available proxy for the interest rate stance, though it may not perfectly capture the complexities of the policy action taken by the central authority. In addition, our sample is composed of multinational, transnational MNEs that operate under distinct institutional and economic environments in various countries,

which might add unobserved heterogeneity. Future research would benefit from using alternative measures of interest rate and conducting an industry- or country-level analysis to draw even deeper insights.

Declaration of competing interest

The authors declare that they have no known financial or non-financial competing interests in any material discussed in this paper.

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