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COVID-19 and Tobin's Q: Evidence from the Korean Logistics and Distribution Sector

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Abstract

Purpose: This study empirically investigates how the COVID-19 pandemic affected the Tobin's q of firms operating in the logistics and distribution industries, focusing on whether the adoption of digital transformation and smart supply chain management, prompted by pandemic-induced disruptions, influenced firm valuation. **Research design, data and methodology:** Using Tobin's q as the dependent variable, the study applies multivariate regression analysis on panel data from 2013 to 2023 to compare valuations before and after the pandemic. The pandemic period was marked by operational challenges such as supply chain bottlenecks, labor shortages, rising logistics costs, and shifts in consumer behavior. **Results:** The analysis reveals that after the pandemic, the Tobin's q of logistics and distribution industry firms increased significantly, with the magnitude of this increase being significantly greater than that of firms in other industries. These firms exhibited greater agility, operational continuity, and data-driven decision-making, enabling them to navigate disruptions more effectively and sustain performance during uncertainty. **Conclusions:** Despite store closures and revenue contractions posing severe threats during the pandemic, logistics and distribution industry firms demonstrated superior resilience compared to firms in other industries. By decentralizing logistics operations, leveraging automation, and utilizing predictive analytics, they mitigated risks and signaled long-term growth potential.

Keywords: COVID-19; Tobin's Q; Logistics Industry; Digital Transformation; Supply Chain Resilience

JEL Classification Code: L81, L92, M44

1. Introduction

The COVID-19 pandemic has emerged as one of the most disruptive global crises of the 21st century, producing profound economic and structural consequences across industries and economies worldwide. Unlike previous financial crises that primarily affected demand or capital markets, the pandemic simultaneously destabilized both supply and demand systems through its severe impacts on

global production, transportation, labor mobility, and consumer behavior. Among the sectors most directly exposed to these disruptions, the logistics and distribution industries experienced particularly acute operational challenges as global supply chains were abruptly interrupted, cross-border trade declined, and consumer purchasing patterns shifted dramatically towards digital platforms.

During the initial stages of the pandemic, widespread factory shutdowns, transportation delays, and restrictive

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lockdown measures caused substantial bottlenecks across international supply networks. Retailers struggled to secure inventory, fulfill deliveries, and meet the volatile and unpredictable surges in consumer demand. Moreover, government-mandated shutdowns of non-essential businesses, combined with stringent social distancing protocols, rendered many traditional brick-and-mortar distribution channels inoperative for extended periods. As a result, consumer spending rapidly migrated toward e-commerce and contactless delivery systems, fundamentally accelerating digital transformation trends that had been evolving gradually prior to the pandemic.

This unprecedented disruption has forced firms to confront not only temporary operational breakdowns but also more permanent shifts in industrial organization, business models, and strategic priorities. Many firms that were able to proactively implement digitalization initiatives—including smart supply chain management (SCM) technologies, artificial intelligence (AI), the Internet of Things (IoT), robotics, and big data analytics—demonstrated superior adaptability and resilience, allowing them to maintain operations, meet customer demands, and restore investor confidence more quickly. In contrast, firms that remained heavily dependent on legacy offline systems and lacked digital infrastructure struggled with operational paralysis, financial distress, and declining investor confidence.

These divergent responses to the pandemic illustrate that firms' technological agility, crisis response capabilities, and supply chain resilience have become key differentiators in shaping market valuations during exogenous shocks. As capital markets seek forward-looking signals of firms' long-term growth prospects and risk management competencies, traditional financial indicators alone may not fully capture these complex adaptive strategies. Tobin's *q*, which compares a firm's market value to the replacement cost of its assets, provides a particularly appropriate valuation metric for capturing both tangible financial performance and intangible strategic capabilities under heightened uncertainty.

Accordingly, this study empirically investigates how the COVID-19 pandemic has influenced Tobin's *q* values in the logistics and distribution sectors, emphasizing the role of digital transformation and supply chain adaptation in shaping market perceptions. By comparing firm valuation patterns before and after the pandemic, this research contributes to a more comprehensive understanding of how external shocks interact with corporate strategy, digitalization, and market valuation mechanisms. In doing so, this study also addresses a timely and growing need to understand how firms' digital readiness and supply chain resilience are reflected in investor assessments during systemic disruptions. While previous studies have often

focused on firm fundamentals or short-term performance indicators, this research extends the discussion by emphasizing strategic adaptability as a valuation determinant. These insights remain especially relevant as economic volatility and global crises continue to challenge traditional value assessment frameworks.

Building on this context, the present study examines whether the Tobin's *q* of firms in the logistics and distribution sectors has significantly increased after the COVID-19 pandemic, with particular attention to the role of digital transformation in enhancing supply chain capabilities and influencing firm valuation.

The remainder of this paper is structured as follows. Section 2 develops the theoretical background and research hypothesis. Section 3 outlines the empirical model and research methodology. Section 4 presents the empirical results, followed by a discussion of key findings in Section 5. Finally, Section 6 concludes with implications for both academic research and managerial practice.

2. Theoretical Background and Research Hypothesis

Tobin's *q* has long served as a critical conceptual framework for analyzing the interaction between capital markets and real economic activity. Originally proposed by Tobin (1969), the *q* ratio is defined as the market value of a firm divided by the replacement cost of its assets. A *q* value greater than one suggests that market participants believe the firm's assets will generate returns exceeding their replacement cost, incentivizing new investment and expansion. Conversely, a *q* value below one reflects market skepticism regarding the firm's ability to generate adequate returns, resulting in diminished investment incentives.

Importantly, Tobin's *q* does not merely capture historical financial performance but reflects investors' forward-looking expectations regarding growth potential, technological capabilities, and strategic adaptability. In contrast to conventional accounting indicators such as earnings and book value, Tobin's *q* serves as a hybrid signal that integrates both tangible financial metrics and intangible elements such as market sentiment, managerial quality, innovation capacity, and risk management. As such, it is especially well-suited for evaluating firm value under conditions of heightened uncertainty, such as exogenous crises.

The COVID-19 pandemic created conditions under which firms' ability to adapt to unforeseen disruptions was directly tested in real-time. Queiroz et al. (2021) emphasize that firms with digital infrastructure already in place were better equipped to deploy automated systems, real-time inventory management, predictive analytics, and flexible supply chain

coordination, allowing them to respond quickly to changing market conditions. Ivanov (2020b) further argues that supply chain resilience requires not only short-term crisis mitigation but also structural redesigns that integrate smart technologies to enhance agility and long-term sustainability.

In this context, firms that accelerated digital transformation prior to or during the pandemic could stabilize operations despite severe supply chain interruptions and volatile demand fluctuations. Technologies such as AI, IoT, and blockchain allowed firms to forecast demand more accurately, monitor global logistics in real-time, and rapidly reconfigure sourcing and delivery networks. These operational capabilities helped reduce market uncertainties and positioned digitally agile firms as more attractive investment targets, resulting in higher Tobin's q values.

A growing body of empirical research supports the proposition that digital transformation enhances firm value, particularly during periods of external shock. Hofmann and Rüsçh (2017) argue that digitalization enables firms to simplify complex logistics operations, improve decision-making accuracy, and reduce information asymmetries, all of which contribute to increased operational efficiency and investor confidence. Wamba and Akter (2019) demonstrate that big data analytics became especially crucial during the pandemic in optimizing logistics networks, forecasting customer demand, and improving responsiveness, which strengthened both financial performance and market valuations.

Complementary studies by Kouhizadeh and Sarkis (2018) and Saberi et al. (2019) highlight that blockchain and IoT technologies enhance transparency, trust, and real-time information sharing across supply chain participants, helping firms manage risk and maintain stable earnings even under crisis conditions. These digital capabilities contributed directly to firms' long-term resilience, thereby positively influencing investor expectations reflected in Tobin's q.

The case of Amazon provides a clear empirical illustration of the strategic advantages conferred by digital transformation during the pandemic. Well before the pandemic, Amazon had invested extensively in digital logistics infrastructure, including autonomous warehouse robotics, AI-powered predictive inventory systems, and global IoT-enabled tracking networks. These investments enabled Amazon to maintain relatively stable operations despite widespread global supply chain disruptions. As a result, Amazon's market capitalization expanded during the crisis period, suggesting that capital markets rewarded its digital readiness and operational resilience, consistent with elevated Tobin's q values (Khemakhem & Ben Hamad, 2022; Zhao et al., 2023).

In addition to sector-specific case studies, broader empirical analyses also confirm the growing relevance of Tobin's q as a valuation metric during and after the pandemic. Khemakhem and Ben Hamad (2022) find that higher levels of digital maturity are positively associated with Tobin's q, suggesting that capital markets reward firms' digital transformation by reflecting it in higher market valuations. Similarly, Zhao et al. (2023) find that digital transformation facilitated faster stock price recovery among firms operating in technologically intensive industries, underscoring the importance of technological capabilities in restoring investor trust under uncertain market conditions. More recent studies reinforce these findings. Wu et al. (2025) show that firms leveraging AI and IoT demonstrate superior supply chain resilience and achieve higher Tobin's q valuations during systemic disruptions. Jing and Fan (2024) confirm that digital transformation enhances performance primarily through supply chain integration, while Yu et al. (2025) provide panel-based evidence linking digital maturity to valuation gains in manufacturing and logistics industries.

Building on these theoretical arguments and empirical findings, this study proposes that digital transformation and supply chain resilience have served as key drivers of firm valuation adjustments within the logistics and distribution sector during the COVID-19 pandemic. Accordingly, the following research hypothesis is advanced:

Hypothesis: Tobin's q of firms in the distribution sector has significantly increased after the pandemic.

To summarize the theoretical logic underlying this study, we present the conceptual framework in Figure 1, which visually depicts how the COVID-19 pandemic affects firm valuation (Tobin's q), mediated by digital transformation and supply chain resilience.

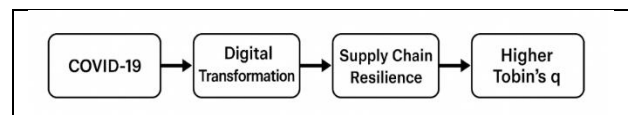


Figure 1: Conceptual Model of COVID-19 Impact on Tobin's q

3. Research Methodology

3.1 Research Design

The primary objective of this study is to empirically assess how the COVID-19 pandemic influenced the market valuation of firms operating in the logistics and distribution sector, with particular attention to the role of digital

transformation and supply chain resilience. Tobin's q is employed as the dependent variable, as it provides a market-based measure that reflects both firms' financial performance and investors' forward-looking expectations regarding growth, adaptability, and technological capabilities.

Unlike traditional accounting indicators that may reflect short-term profitability but fail to fully capture strategic responses to external shocks, Tobin's q integrates both tangible and intangible drivers of firm value, making it especially suitable for evaluating firm performance during periods of crisis-induced uncertainty (Tobin, 1969; Ohlson, 1995). The use of Tobin's q also aligns with prior empirical studies that investigate the impact of innovation, technology adoption, and operational flexibility on firm valuation during disruptive events (Ivanov, 2020a; Queiroz et al., 2021).

The following multivariate regression model is specified to test the research hypothesis:

$$\text{TOBINQ}_{i,t} = \beta_0 + \beta_1 \text{SIZE} + \beta_2 \text{LEV} + \beta_3 \text{ROA} + \beta_4 \text{GROWTH} + \beta_5 \text{RD} + \beta_6 \text{COVID} + \varepsilon_{i,t}$$

This model enables an assessment of the incremental effect of the pandemic (through the COVID dummy) while controlling for firm-specific characteristics that are known to influence firm valuation.

The choice of control variables reflects established determinants of Tobin's q identified in prior empirical research. Firm size (SIZE) and leverage (LEV) typically influence capital structure and investor risk assessments. Profitability (ROA) captures short-term operational performance, while growth (GROWTH) and R&D intensity (RD) reflect longer-term expansion and innovation capacity (Wamba & Akter, 2019; Saberi et al., 2019; Hofmann & Rüschi, 2017). The inclusion of the COVID dummy allows for a direct estimation of pandemic-induced shifts in firm valuation after controlling for these factors.

Table 1: Variable Definitions

Variable	Definitions
TOBINQ	Tobin's q is calculated as the ratio of the firm's market value to the replacement cost of its assets. The market value is derived from stock market capitalization, while total assets are used as a proxy for replacement cost, following the standard approach in financial economics.
SIZE	Natural logarithm of total assets, capturing firm size.
LEV	Financial leverage, measured by the ratio of total liabilities to total assets.
ROA	Return on assets, calculated as net income divided by total assets.
GROWTH	Revenue growth rate, capturing expansion potential.
RD	Research and development intensity, reflecting innovation investment, calculated as R&D expenditure relative to sales.
COVID	A dummy variable capturing the post-pandemic period, assigned a value of 1 for firm-year observations after the pandemic onset and 0 otherwise.

By incorporating both firm-level financial characteristics and exogenous environmental shocks, the empirical model is designed to isolate the unique effects of crisis-driven digital transformation and supply chain adaptation on Tobin's q, thereby testing the central hypothesis of this study.

<Table 1> presents a detailed summary of the variables included in the model along with their definitions and measurement methods.

3.2. Data Collection and Sample Construction

The empirical analysis uses panel data comprising Korean publicly listed firms from 2013 to 2023. The dataset is drawn from financial disclosures and stock exchange filings, supplemented by company reports and regulatory filings to obtain R&D data where necessary. The sample is partitioned into two subsamples: firms operating within the logistics and distribution industries, and firms from other sectors. This structure allows for both intra-sector and inter-sector comparisons in terms of valuation responses to the pandemic.

Descriptive statistics are computed for all variables to examine central tendencies and variability across the full sample and across subperiods (pre- and post-pandemic). Additionally, correlation analysis is conducted to examine the relationships among independent variables and to preliminarily assess associations with Tobin's q.

4. Empirical Analysis

4.1. Descriptive Statistics

<Table 2> presents the descriptive statistics for the full sample of firms analyzed in this study. The mean value of Tobin's q across all observations is 1.355, suggesting that, on average, firms in the sample were valued by the market above their replacement cost of assets. However, the significant difference between the mean (1.355) and the median (0.882) indicates a right-skewed distribution, with several firms exhibiting unusually high market valuations.

Other financial variables also display considerable variability. The average firm size (SIZE), measured as the natural logarithm of total assets, is 20.327, while leverage (LEV) averages 0.487. Profitability (ROA) demonstrates negative skewness, with a mean of -0.004 but a median of 0.017, indicating that while most firms maintained marginal profitability, a portion experienced significant losses. The growth variable (GROWTH) displays substantial dispersion, with a mean of 5.270 and a standard deviation of 26.817, reflecting both contraction and expansion episodes across firms. R&D intensity (RD) remains low overall but varies across firms, while the COVID dummy variable shows that

approximately 28.7% of the total firm-year observations fall within the post-pandemic period.

Table 2: Descriptive Statistics

Panel. A: Full Sample (n=1,060)					
Variable	Mean	Std	Min	Med	Max
TOBINQ	1.355	1.323	0.007	0.882	8.070
SIZE	20.327	1.792	15.777	20.271	24.574
LEV	0.487	0.215	0.017	0.488	1.524
ROA	-0.004	0.132	-1.515	0.017	0.914
GROWTH	5.270	26.817	-64.575	2.390	137.215
RD	0.001	0.005	0.000	0.000	0.060
COVID	0.287	0.452	0.000	0.000	1.000

Pre COVID-19 period vs Post-COVID-19 period

Panel. B: Pre COVID-19 period (n=756)		
Variable	Mean	Med
TOBINQ	1.321	0.890
SIZE	20.244	20.175
LEV	0.488	0.485
ROA	0.001	0.017
GROWTH	2.538	1,640
RD	0.001	0.000
Panel. C: Post-COVID-19 period (n=304)		
Variable	Mean	Med
TOBINQ	1.440	0.859
SIZE	20.499	20.415
LEV	0.483	0.496
ROA	-0.015	0.017
GROWTH	13.629	5.960
RD	0.001	0.000

Note: Variable definitions: refer to <Table 1>

4.2. Correlation Analysis

Correlation analysis reveals meaningful relationships between Tobin’s q and several independent variables. Both GROWTH and RD exhibit positive and statistically significant correlations with Tobin’s q, supporting the notion that firms investing in expansion and innovation are rewarded by capital markets with higher valuations. Interestingly, simple correlations between Tobin’s q and the COVID dummy variable are statistically insignificant, suggesting that bivariate relationships may mask more complex interactions that require multivariate regression to properly assess.

Table 3: Pearson’s correlations (n=1,060)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
TOBINQ	1	-0.108 (0.000)	0.136 (<.0001)	-0.111 (0.001)	0.064 (0.036)	0.128 (<.001)	0.044 (0.150)
SIZE		1	0.356 (<.0001)	0.199 (<.0001)	0.002 (0.937)	0.038 (0.193)	0.067 (0.023)
LEV			1	-0.197 (<.0001)	-0.016 (0.586)	-0.006 (0.838)	-0.013 (0.662)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
ROA				1	0.033 (0.261)	-0.063 (0.033)	-0.056 (0.056)
GROWTH					1	-0.009 (0.761)	0.047 (0.112)
RD						1	-0.032 (0.282)
COVID							1

Note: Variable definitions: refer to <Table 1>. Values in parentheses are p-values.

4.3. Regression Analysis

<Table 4> reports the regression results for firms classified within the logistics and distribution sector. Consistent with the central hypothesis, the coefficient for the COVID dummy variable is positive and statistically significant ($\beta = 0.208, p < 0.05$), indicating that, after controlling for firm characteristics, Tobin’s q significantly increased following the pandemic for firms in this sector. This suggests that investors positively reassessed these firms’ valuations in response to their successful crisis adaptations.

Additional explanatory variables show expected patterns. Growth (GROWTH: $\beta = 0.110, p < 0.05$) and R&D intensity (RD: $\beta = 44.077, p < 0.01$) both have strong positive effects on Tobin’s q, reaffirming the importance of expansion opportunities and technological innovation for firm value. Leverage (LEV: $\beta = 1.434, p < 0.01$) is positively associated with Tobin’s q, suggesting that controlled leverage may signal effective capital management in the sector. In contrast, firm size (SIZE: $\beta = -0.156, p < 0.01$) has a negative association, consistent with findings that smaller firms may offer higher growth potential during periods of market disruption.

Table 4: COVID-19 and Tobin Q in the Distribution and Service Industries

Dependent Variable: TOBINQ		
Variables	Coefficient	t-value
Intercept	3.745	6.88***
SIZE	-0.156	-5.46***
LEV	1.434	5.98***
ROA	-0.312	-0.83
GROWTH	0.11	2.25**
RD	44077	4.58***
COVID	0.208	2.05**
F-value	14.03***	
Adjusted R ²	0.068	
Sample Size	1,060	

Note: ***, **, and * denote statistical significance at the 0.01, 0.05, and 0.10 levels, respectively.

Variable definitions: refer to <Table 1>.

<Table 5> presents regression results for firms operating outside the logistics and distribution sectors. For these firms, the COVID dummy coefficient is statistically insignificant ($\beta = 0.044$, $p > 0.10$), indicating no significant change in Tobin's q following the pandemic. Nevertheless, growth (GROWTH: $\beta = 0.001$, $p < 0.01$), R&D intensity (RD: $\beta = 24.821$, $p < 0.01$), and profitability (ROA: $\beta = 1.151$, $p < 0.01$) remain significant and positively related to Tobin's q, suggesting that firm fundamentals still strongly influence market valuations in non-logistics sectors.

Table 5: COVID-19 and Tobin Q in the Non Distribution and Service Industries

Dependent Variable: TOBINQ		
Variables	coefficient	t-value
Intercept	2.467	7.34***
SIZE	-0.745	-4.39***
LEV	0.253	2.13**
ROA	1.151	6.39***
GROWTH	0.001	4.33***
RD	24.821	17.78***
COVID	0.044	0.83
F-value	62.53***	
Adjusted R ²	0.051	
Sample Size	6,840	

Note: ***, **, and * denote statistical significance at the 0.01, 0.05, and 0.10 levels, respectively.

Variable definitions: refer to <Table 1>.

Collectively, the empirical results provide strong evidence that the logistics and distribution sector experienced a unique and significant revaluation during the pandemic. Unlike firms in other industries, logistics and distribution companies appear to have been rewarded by capital markets for their successful adoption of digital transformation and supply chain resilience strategies. The findings validate the theoretical proposition that digital agility and crisis adaptability serve as important determinants of firm value during external shocks, which are not fully captured by conventional financial metrics alone.

5. Discussion

The empirical findings of this study provide important insights into how capital markets evaluated firm performance during the COVID-19 pandemic, particularly within the logistics and distribution sector. The results demonstrate that firms operating in this sector experienced a significant and positive shift in market valuation, as measured by Tobin's q, following the pandemic. This positive valuation response suggests that investors recognized and rewarded firms' effective crisis management,

technological preparedness, and operational flexibility during an unprecedented global disruption.

The logistics and distribution sector occupies a unique position in the global economy as a critical enabler of trade flows, e-commerce growth, and supply chain continuity. As the pandemic unfolded, firms in this sector faced immediate operational challenges, including disruptions in sourcing, transportation, warehousing, and delivery systems. However, firms that had previously invested in digital transformation — such as predictive inventory management, real-time shipment tracking, AI-based demand forecasting, and automated warehousing — were able to mitigate many of these disruptions more effectively than their peers. These technological investments not only allowed for greater operational continuity but also enabled rapid adaptation to shifting consumer behaviors, such as the surge in online purchasing and demand for contactless delivery options.

From an investor's perspective, such digital resilience sent strong market signals about firms' long-term viability and competitiveness. Consistent with the signaling theory embedded in Tobin's q framework, markets appear to have updated their expectations regarding these firms' future growth prospects, profit-generating capacity, and ability to withstand future shocks. This is particularly relevant during periods of systemic uncertainty, where conventional financial performance indicators (e.g., short-term earnings) may provide limited guidance regarding long-term sustainability.

Furthermore, the results for non-logistics sectors, where the COVID dummy variable was not significant, reinforce the sector-specific nature of this valuation effect. While many industries struggled with declining demand and operational shutdowns, the logistics and distribution sector emerged as one of the rare industries able to not only maintain operations but also benefit from accelerating digital transformation trends.

The consistently significant positive effects of growth (GROWTH), innovation investment (RD), and profitability (ROA) across both industry groups also support broader conclusions regarding the enduring role of firm fundamentals in determining market value. Even under crisis conditions, firms that invested in innovation and pursued growth-oriented strategies attracted higher investor confidence, further validating the complementary roles of financial fundamentals and strategic adaptability in driving Tobin's q outcomes.

While these findings are consistent with the theoretical arguments regarding digital resilience and investor confidence, the analysis is correlational in nature. Although the regression results indicate a significant association, it is important to note that this study does not establish a causal relationship between digital transformation and Tobin's q.

These findings contribute to the growing body of literature that emphasizes the increasing relevance of digital transformation, supply chain resilience, and crisis preparedness as critical determinants of firm value in volatile economic environments. As the global business landscape becomes more interconnected and vulnerable to future disruptions, firms' ability to rapidly adapt to external shocks through technological capability will likely become even more central to how capital markets evaluate firm performance and allocate investment capital.

6. Conclusion

The COVID-19 pandemic has served as an extraordinary test of firms' operational resilience, technological capabilities, and strategic flexibility in the face of a severe global crisis. This study provides empirical evidence that firms in the logistics and distribution sector responded to this challenge with meaningful success, as reflected in the significant post-pandemic increase in their Tobin's q values. The positive market valuation response suggests that capital markets not only acknowledged firms' short-term crisis management but also reassessed their long-term growth potential, competitive positioning, and ability to thrive in a rapidly evolving digital economy.

The findings emphasize that digital transformation extended beyond routine technological upgrades to become a fundamental driver of firm value during systemic disruptions. Firms that had proactively invested in smart supply chain technologies — such as AI-based demand forecasting, real-time inventory monitoring, automated logistics platforms, and blockchain-enabled transparency — demonstrated superior adaptability. These firms maintained operational continuity even under conditions of severe global supply chain breakdowns and shifting consumer behaviors. As a result, they were able to sustain investor confidence and secure favorable revaluations despite the prevailing uncertainty.

Importantly, the sector-specific nature of this valuation effect suggests that the logistics and distribution industry's unique positioning within the pandemic-driven economy offered opportunities not equally available across other sectors. The rapid surge in e-commerce activity and the growing importance of supply chain resilience placed logistics firms at the center of the digital commerce ecosystem, further strengthening their long-term growth narratives.

At the same time, the consistently significant roles of growth opportunities, innovation investment, and financial performance across both logistics and non-logistics sectors reaffirm the enduring relevance of firm fundamentals in shaping market perceptions. Innovation and strategic

adaptability are increasingly viewed as integral components of financial value, particularly during crisis conditions when static financial indicators may fail to fully capture a firm's competitive advantage.

The broader implication of these findings is clear: firms that prioritize continuous innovation, invest in digital supply chain capabilities, and cultivate organizational agility will be better positioned to navigate an increasingly uncertain global environment. Policymakers and corporate leaders should recognize the importance of investing in technological infrastructure not only as a driver of efficiency but also as a hedge against future systemic shocks that are likely to become more frequent and more complex in the decades ahead.

At the same time, this study has several limitations that warrant consideration. First, although digital transformation is central to the theoretical model, the empirical analysis does not include a direct variable capturing this concept due to data limitations. We acknowledge this as a constraint and propose that future research explore measurable indicators of digital readiness, such as IT investment or AI adoption levels. Second, the use of a simple post-pandemic dummy variable may not fully capture the evolving and prolonged nature of the COVID-19 crisis. Future studies could improve robustness by incorporating continuous shock proxies such as infection rates or government policy stringency indices. These limitations notwithstanding, our findings offer actionable implications for firms and policymakers seeking to enhance strategic resilience in times of systemic uncertainty.

This study contributes to the expanding literature on crisis-induced valuation dynamics by empirically demonstrating the interaction between external shocks, digital transformation, and firm valuation. Moreover, the analytical framework employed here reinforces the utility of Tobin's q as a comprehensive valuation metric that effectively captures both financial performance and strategic positioning under uncertainty. Future research may build on these findings by examining additional contextual factors, such as cross-country institutional differences, supply chain interdependencies, and the evolving role of ESG considerations in post-pandemic valuation models.

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