

Three Essays on the Impact of Regulatory Changes on Firms' Operation

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ABSTRACT

This dissertation offers an in-depth exploration of how major and cross-country laws, such as anti-collusion, enhanced by a leniency program and the recently emerging free trade agreement, such as the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP) influence firms' operational efficiencies and strategies across various contexts. Employing rigorous methodologies, including advanced Difference-in-Differences (DiD) estimators and Propensity Score Matching (PSM-DiD), this research spans multiple countries and time periods to furnish a detailed understanding of regulatory impacts.

The first essay investigates the implications of leniency laws on firms' operational efficiency across 64 countries from 1990-2020. Findings reveal that in response to leniency laws, firms adopt a dual strategy: they initially extend credit terms, which pose short-term risks to asset turnover, while also optimizing fixed asset utilization for long-term sustainable growth. The study uncovers considerable heterogeneity in the laws' impact, notably more pronounced in developing economies and within specific cultural frameworks. The study identifies that leniency laws, in particular, affect larger and more profitable firms by leading them to extend more favorable payment terms. Additionally, the laws have a more pronounced impact in developing economies and cultures characterized by specific traits, such as low power distance, collectivism, high uncertainty avoidance, and long-term orientation, as outlined by Hofstede (2011).

The second essay delves into the influence of the CPTPP on Vietnamese firms from 2017-2021, a transformative era where Vietnam pivoted from an agrarian economy to a manufacturing powerhouse where operational efficiency plays a key role (Laiprakobsup & Chorkaew, 2018). This pivotal change, spurred by the “China Plus One” strategy, not only cements Vietnam’s status as a key player in global manufacturing, but also warrants an in-depth analysis as to how its competitive labor and production costs, enhanced by a strategic location, contribute to its increasing economic allure. Our study reveals an initial dip in operational efficiency during the first year of the CPTPP indicating a strategic realignment phase with increased fixed asset investments and trade credit extensions. However, subsequent years saw substantial recovery in operational efficiency marking the successful adaptation of the new trade conditions. The CPTPP's effects were particularly pronounced for high profitability, large-sized firms, those listed on HOSE, and, since 2020, those resilient to the impact of COVID-19. Financially constrained firms

seek to use the CPTPP for revenue gains and stress relief but remain cautious about major investments due to debt management concerns. Our findings underscore the transformative role of major trade agreements, and the strategic shifts firms employ to harness these opportunities.

The third essay explores the influence of the CPTPP on Research and Development (R&D) investment strategies within Japanese firms. The CPTPP's Chapter 18, with its comprehensive intellectual property protections, presents an opportunity for Japan to rejuvenate its innovation sector, especially as the nation seeks to reclaim its status as a technological leader amid a historical decline in patent registrations. The study presents a detailed impact of the CPTPP on R&D activities within Japanese firms. While enhanced intellectual property protections boost R&D investment, this is counterbalanced by opportunities for market expansion. Manufacturing firms aligned with Japan's cultural long-term orientation consistently increase R&D activities, while service-oriented and technology-intensive firms initially scale down, but eventually recover. Financially constrained firms and those with high sales growth exhibit similar, but distinct patterns in R&D investment. All these findings are framed within the Pecking Order Theory and Japan's cultural norms.

Collectively, navigating through the intricacies of international industries and cultures, these essays shed light on the strategic adaptations of firms across the globe. They provide a valuable addition to the scholarly conversation and offer practical guidance for decision-makers worldwide.

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Through trials and drafts, family near,
Upholding me, year after endless year.

DEDICATION

To my beloved grandfather,

Nguyen Van Tong

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LIST OF ABBREVIATIONS

DiD: Difference-in-Differences

PSM: Propensity Matching Score

CPTPP: Comprehensive and Progressive Agreement for Trans-Pacific Partnership

R&D: Research and Development investment

COVID-19: Coronavirus disease 2019

FTA: Free Trade Agreement

TAT: Total Asset Turnover

FAT: Fixed Asset Turnover

OC: Operating Cycle

CCC: Cash Conversion Cycle

ID: Inventory Outstanding Days

IT: Inventory Turnover

RD: Receivables Outstanding Days

RT: Receivable Turnover

WGI: Worldwide Government Index

HOSE: Ho Chi Minh Stock Exchange

PD: Probability of Default

RCT: Randomized Control Trial

DiD: Difference-in-Differences

Chapter One: Introduction

This chapter serves as an introduction and overview of the thesis. Section 1.1 delineates the background highlighting the recent global landscape of evolving regulatory environments and the consequent motivation underpinning this research. Section 1.2 articulates the overarching aim and specific objectives of this research endeavor. Section 1.3 elaborated upon the distinct contributions of this scholarly work. Section 1.4 enumerates the research output resulting from this thesis. Finally, Section 1.5 provides a structural framework that lays the groundwork for the chapters that follow.

1.1. Background and motivation

In the current business landscape characterized by heightened scrutiny over ethical and competitive practices, the role of regulatory oversight is increasingly emphasized. Anti-collusion laws function as a central component in maintaining market integrity seeking to inhibit firms from engaging in price fixing or market manipulation (Dasgupta & Žaldokas, 2019; Osti, 2009). These laws not only contribute to market competitiveness enhancing consumer choices and economic efficiency (Buchana & Lee, 1992; Desrochers et al., 2003; Jin & Wagman, 2021; Petty, 2018; Shapiro, 2018), but also align with the principles of ethical governance—a cornerstone of Environmental, Social, and Governance (ESG) criteria (Clementino & Perkins, 2021). The advent of leniency programs has been pivotal in this regard incentivizing self-regulation by offering immunity to the first firm that reports instances of collusion (Hinloopen & Onderstal, 2014; Miller, 2009). This innovation has led to a marked increase in enforcement actions from the late 20th century through the early 21st century, as illustrated in Figure 1, reinforcing the ethos of integrity within the corporate sector.

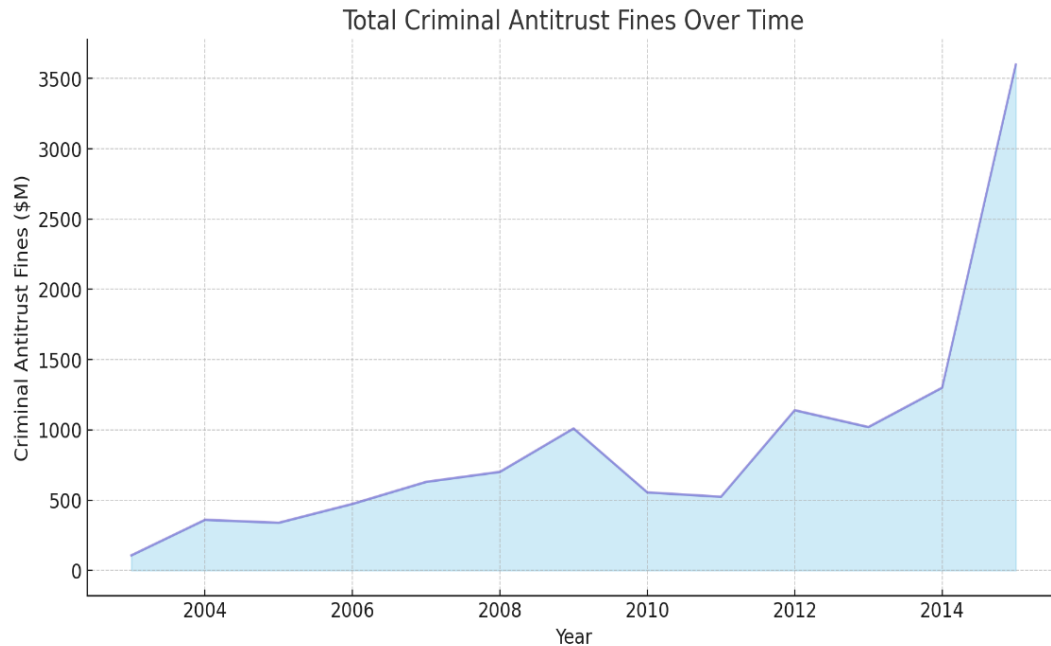


Figure 1: The total criminal antitrust fines over years.

Data from Dasgupta and Žaldokas (2019) and Gibson Dunn (2016)

Following this trajectory, adherence to anti-collusion laws upholds not just market integrity and consumer welfare, but also advances the synergy with sustainability and corporate social responsibility (CSR). By proactively participating in leniency programs, firms demonstrate a commitment to transparent and responsible business operations contributing to social equity and environmental stewardship—key pillars of the sustainability agenda (Dubbink et al., 2008; Matten & Moon, 2004; Ding et al., 2023). The enforcement of these laws extends beyond ensuring market fairness to become an instrumental force in the development of a resilient and sustainable economic ecosystem. The growing emphasis on ESG performance as a measure of long-term value creation further highlights the significance of this relationship as businesses increasingly recognize that ethical practices are fundamental to their success and reputation in the global market (Chams & García-Blandón, 2019).

The efficacy of the leniency programs is evident in the escalating scale of enforcement measures. For instance, antitrust fines globally rose from a modest \$107 million in 2003 to a staggering \$3.6 billion in 2015 as shown in Figure 1 (Dasgupta & Žaldokas, 2019; Gibson Dunn, 2016). In a parallel development, the number of total sentencing days for antitrust violations significantly jumped rising from 3,313 days in the 1990s to 23,398 days in 2012 (Dasgupta & Žaldokas,

2019). These trends underscore the pivotal role of leniency programs in catalyzing self-reporting and amplifying the breadth and depth of regulatory enforcement. This regulatory rigor came to the fore in 2021 marked by landmark actions against corporate monopolies. For example, China's State Administration for Market Regulation imposed a \$2.8 billion fine on Alibaba, while new initiatives in the United States targeted "Big Tech" companies, such as Amazon, Apple, Facebook, and Google, fortifying the country's stance against anti-competitive practices (Au, 2023; Wörsdörfer, 2022).

While domestic mechanisms like anti-collusion laws are aimed at regulating firms within national borders, international trade agreements, such as the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP), seek to extend the scope of regulation across multiple economies. The CPTPP serves as a vital linchpin for economic collaboration among its member nations providing a structured framework to ensure fair competition and market integrity on a transnational scale (Marslev & Staritz, 2023; Saggi, 2006). Vietnam and Japan represent distinct aspects of the CPTPP's economic and strategic significance. Vietnam's rapid economic growth and its transition towards becoming a key player in global manufacturing highlight the transformative potential of the CPTPP for emerging economies. Meanwhile, Japan's established economic prowess and its role in shaping the CPTPP underscore the agreement's relevance for developed nations. The momentum of the CPTPP is evident as more countries express their interest in joining, signaling a growing and significant trend in the international trade landscape. Specifically, toward the close of 2021, both Taiwan and Ecuador took formal steps toward accession by submitting their requests to New Zealand, the CPTPP's official depository. This wave of expansion continued into 2022 with Costa Rica and Uruguay also presenting their formal intentions to join the pact, underscoring the CPTPP's escalating relevance in shaping global trade norms. As the host of the 7th Meeting of the CPTPP Commission in 2023, New Zealand has showcased its leadership role in guiding these international regulatory shifts. The conference, held on July 16th in Auckland, was particularly significant for the inclusion of the United Kingdom, thereby expanding the collective GDP of CPTPP nations to 14.6% and underscoring its rising importance in global trade regulation (New Zealand Ministry of Foreign Affairs and Trade, 2023).

While anti-collusion laws are instrumental in maintaining market competition within national borders, their scope is naturally limited to internal affairs. These laws ensure that companies compete fairly preventing them from making secret deals to fix prices or divide markets among themselves that could harm consumers and stifle innovation. Alternatively, the CPTPP expands the reach of competitive fairness through international cooperation addressing the externalities of trade and commerce among its member states. This dual approach creates a more robust and comprehensive competitive landscape. Domestic laws deter and penalize anti-competitive practices within the country, while the CPTPP provisions seek to encourage competition among its members. Together, these mechanisms work in tandem to promote healthier market competition ensuring that businesses engage in practices that benefit consumers and economies both at home and in the international arena. This balanced framework of internal and external regulatory measures is essential for creating a fair and dynamic global marketplace.

Moving from domestic anti-collusion regulations to the global stage, international trade agreements like the CPTPP also have a significant impact on how firms operate and strategize. For instance, the leniency provisions of anti-collusion laws work to discourage monopolistic behavior, affecting firms' financial structure and profitability (Dasgupta & Žaldokas, 2019; Dong et al., 2019). On the international stage, Free Trade Agreements, such as the CPTPP, add another layer of complexity. These agreements not only facilitate trade creation (Baggs, 2005; Sun & Reed, 2010), but also include specific provisions, like Chapter 18 in the CPTPP, that carefully balance intellectual property rights and public access (Kato, 2018). Understanding the implications of these complex regulatory shifts is essential for both academics and business practitioners. For academics, this research contributes new insight into debates about the effectiveness of these regulations supported by data from multiple countries. For businesses, staying ahead of these regulatory changes is critical for competition, thereby affecting decisions on efficiency and R&D investment.

Although a substantial body of scholarly work exists on the topics of operational efficiency and R&D intensity, there is a tendency in the existing literature to overlook the impact of regulatory changes on these aspects in a cross-country setting. Many studies are constrained to singular jurisdictions or specialized sectors, thereby limiting the generalizability of their findings. Additionally, the prevailing academic focus has been on the immediate outcomes of regulatory

changes with limited focus on the potentially heterogeneous effects on different dimensions of operational efficiency or R&D intensity in the long run. Existing literature commonly treats operational efficiency as a unified metric, seldom dissecting it into its composite layers (Boisjoly et al., 2020; Hill et al., 2010), a gap this study aims to address. Likewise, previous research on the effect of regulations on R&D intensity often concentrates solely on their role as catalysts for innovation and competitiveness (Sánchez-Sellero & Bataineh, 2022; Uyar et al., 2023b) neglecting to explore how R&D intensity and efficiency interact as an operational strategy within specific cultural contexts.

By conducting a rigorous, cross-country analysis that delves into the multi-layered aspects of operational efficiency and examines R&D intensity across multiple industries, this research seeks to address the existing gaps in the scholarly literature. It offers a comprehensive interpretation that meets both academic and practical needs, especially in the context of continually evolving global regulations. The primary impetus behind this study is to cultivate a comprehensive understanding of the far-reaching effects of regulatory shifts, such as anti-collusion laws and international trade agreements like the CPTPP, on firms' operations in various countries. These regulatory mechanisms are not merely bureaucratic formalities; rather, they serve as transformative forces that reshape the business environment compelling firms to adapt to maintain competitiveness. This dual focus not only augments academic discourse, but also delivers actionable guidance for policymakers and industry leaders navigating these complex regulatory frameworks. Each essay within this thesis is designed to make unique contributions presenting a multidimensional perspective that combines intellectual rigor with practical applicability.

1.2. Aim and objectives of the research

The overarching aim of this dissertation is to investigate the multi-dimensional effects of various regulatory mechanisms, from domestic leniency provisions in anti-collusion laws to international Free Trade Agreements like the CPTPP, on corporate strategies, operational efficiency, and strategic decision-making across different geographical and industry contexts. Divided into three interconnected essays, the dissertation delves into specific aspects of these broad regulatory landscapes, targeting gaps in the existing literature, while providing multi-layered, cross-country

empirical analyses that hold significant implications for both academic research and business practice.

The primary objective of the Essay One is twofold. First, it seeks to examine the effects of leniency provisions in anti-collusion laws on firms' operational efficiency with a particular focus on total asset turnover as featured in the DuPont model. The study endeavors to address an existing gap in the extant literature by providing insights into how these regulatory shifts affect both short-term and long-term asset management efficiencies. In addition, the research intends to investigate the strategic role of trade credit extension in the aftermath of leniency law enactments. It seeks to explore how firms utilize trade credit as a multifaceted competitive tool that serves various operational objectives, such as boosting sales and strengthening buyer-seller relationships.

Moreover, the paper investigates the heterogeneity effects of these laws across diverse geographical and firm-specific contexts. It posits that the impact of leniency laws is not monolithic but varies depending on country-specific regulations and the individual characteristics of firms. By addressing these objectives, the research contributes to ongoing debates about regulatory effectiveness and offers new cross-country evidence that is indispensable for both academic discourse and practical implications for businesses.

Amid escalating globalization, significant trade pacts, such as the CPTPP, confer expansive benefits to firms in member nations, such as tariff reductions and access to new markets. Essay Two investigates the impact of Free Trade Agreements, specifically the CPTPP, on the operational efficiency of firms in Vietnam. Unlike the first essay, the second essay distinguishes itself by focusing on the unique market expansion opportunities offered by free trade agreements and the specific characteristics of the Vietnamese market. Vietnam's evolution is not just a transition from agriculture to manufacturing, but a strategic emergence as a pivotal player in international trade. The country's operational efficiency gains new importance amidst this shift supported by its advantageous geographic position as a gateway to ASEAN markets and its well-regarded competitive labor costs. These elements place Vietnam in a unique position to capitalize on the opportunities presented by pivotal trade agreements, such as the CPTPP. These pacts open doors to tariff reductions and broader market access that are especially beneficial for

Vietnam whose growing significance in global trade is marked by its increasing integration into global supply chains. The research specifically delves into total asset turnover, as featured in the DuPont model, to provide insights into both short-term and long-term asset management efficiencies. In addition, the study examines the strategic role of trade credit extensions in the aftermath of CPTPP and explores the heterogeneous impacts of the CPTPP across various types of firms.

The primary objective of Essay Three is to explore the underexamined impact of Free Trade Agreements, specifically the CPTPP, on firm-level Research and Development (R&D) investment in Japan. This essay is set against the backdrop of Japan's economic history and its evolution as a technological leader, focusing particularly on the challenges the nation faced in adapting to the digital age from the 1990s onward. Central to our investigation is Chapter 18 of the CPTPP, a comprehensive framework for intellectual property rights protection among member countries. The study seeks to uncover the intricate relationships between the CPTPP and the R&D strategies of Japanese firms. Moreover, it explores the heterogeneous impacts of the CPTPP scrutinizing how its effects vary across firms with different characteristics.

1.3. Contributions of the research

Across three separate, but interrelated essays, this research strives to make pioneering contributions to the existing literature in finance and economics. The first essay scrutinizes the effects of leniency provisions in anti-collusion laws on firms' operational efficiency offering novel insight into how these laws force companies to adopt asset management strategies both in the short-term and long-term. The second essay focuses on the CPTPP by dissecting its impact on the operational efficiency of firms in emerging economies, Vietnam, while identifying the types of firms that stand to gain the most. The third essay turns to Japan, exploring the uncharted territory of how the CPTPP affects firm-level R&D investment further detailed by sector and firm-specific characteristics. Collectively, these essays provide a comprehensive understanding of how legal and international frameworks influence firms' strategic decisions and operational efficiency.

1.3.1. Essay 1

The first essay makes a substantial contribution to the understanding of how leniency laws in anti-collusion impact firms' asset management strategies, both in the short-term and long-term. It unveils a dual strategy where firms initially extend credit to compete for increasing market share while optimizing fixed asset utilization for long-term efficiency. The essay also pioneers in examining the heterogeneity of these effects across countries and firm characteristics. It reveals that these laws significantly influence firms in developing economies and those in cultures with specific traits like low power distance and high uncertainty avoidance. Furthermore, the essay finds that larger and more profitable firms are more likely to adjust their credit policies following the introduction of leniency laws, thereby enriching the academic dialogue on regulatory impacts on operational efficiency and strategic decision-making in varying contexts.

1.3.2. Essay 2

The second essay presents a comprehensive understanding of the impact of the CPTPP on firms' operational efficiency in emerging economies, specifically Vietnam. It uncovers a temporal shift where firms initially experience a dip in operational efficiency perceived as an adjustment phase followed by marked improvement from the second year onward. The essay distinguishes itself by identifying the subsets of firms that benefit the most, such as those with high profitability, larger size, and listing on Ho Chi Minh Stock Exchange (HOSE), as well as those less impacted by the COVID-19 pandemic. It also shows that financially constrained firms leverage the CPTPP to boost revenues and alleviate financial pressures though they may remain cautious in undertaking major investments or strategic shifts. This contribution adds depth to the academic dialogue on the efficacy of international trade agreements and provides actionable insights for strategic decision-making among stakeholders.

1.3.3. Essay 3

The third essay provides a comprehensive analysis of the CPTPP's impact on R&D operations in Japanese firms revealing a complex landscape where the heightened intellectual property protections under the agreement initially boost R&D investments, yet are counterbalanced by market expansion. The study distinguishes its contributions by incorporating metrics like R&D intensity and efficiency and conducting sector-specific evaluations. It finds that manufacturing

firms ramp up R&D activities in line with Japan's historical emphasis on technological innovation, whereas service-oriented and technology firms exhibit an initial decline in R&D spending—a trend that attenuates over time due to strategic resource reallocation. Moreover, the essay offers new insights into how financially constrained and high sales growth firms uniquely respond to the CPTPP, thereby enriching the theoretical and empirical understanding of how free trade agreements influence firm-level R&D activities.

1.3.4. Main findings

This dissertation presents a comprehensive analysis of how regulatory and economic integrations impact firms' strategies across different contexts. In Essay 1, the findings reveal that firms adopt a strategic dual approach in response to leniency laws: they extend credit to temporarily boost market share, a move that reflects a strategic adaptation to competitive pressures but results in a dip in short-term operational efficiency. This strategy is balanced by efforts to enhance long-term efficiency through the optimization of fixed asset utilization, indicating a sophisticated balance between immediate market objectives and sustained operational goals. Essay 2 focuses into the effects of CPTPP on Vietnamese firms, indicating a significant period of adjustment. Initially, firms face a decrease in operational efficiency, a phase seen as an adaptation to the new trade environment. However, this initial challenge is followed by a notable improvement in efficiency starting from the second year, illustrating the dynamic nature of firms' responses to international trade agreements and the resilience of their operational strategies over time. Essay 3 shifts the focus to Japan, examining the CPTPP's impact on R&D operations within Japanese firms. This analysis uncovers a strategic increase in R&D activities among manufacturing firms, aligning with Japan's long-standing emphasis on technological advancement. Conversely, service-oriented and technology sectors initially show a decrease in R&D investment. This trend gradually shifts as these firms strategically reallocate resources. Collectively, these studies illuminate the diverse ways firms respond to international policy changes emphasizing the importance of strategic agility, cultural, and economic understanding in shaping corporate and academic approaches to international business and finance.

This dissertation enriches the methodological landscape by employing advanced econometric techniques, notably the Difference-in-Differences (DiD) approach, including PSM-DiD and DiD imputation estimator. It offers an extensive exploration into the history and evolution of DiD,

providing readers with a deep understanding of its origins and contemporary applications. By tracing the development of DiD, this work highlights its significance as a robust tool for causal inference, detailing through the appendix stories and examples that have shaped its use in research. This methodological backdrop supports the empirical analyses across the dissertation's essays, underlining the precision and reliability of the findings presented.

1.4. Outline of the research

The remainder of this dissertation is structured as follows. Chapters Two, Three, and Four are the three empirical essays included in this dissertation. Chapter Two examines the impact of staggered implementation of anti-collusion across countries on firms' operational efficiency. Chapter Three investigates how joining CPTPP affects the operational efficiency of firms in Vietnam. Chapter Four provides evidence regarding the impact of CPTPP on R&D intensity and efficiency across industries in Japan. Chapter Five concludes the thesis by summarizing the hypotheses and main findings.

Appendix: Further information for Difference-in-Differences methodology

This appendix serves as an in-depth exploration of the DiD methodology, a cornerstone in the analysis of causal relationships in policy impact studies. The DiD approach has undergone significant evolution since its inception broadening its applicability across diverse research landscapes. Herein, we trace the historical underpinnings of DiD delineating its roots and seminal examples. Our objective is to provide a comprehensive story of the DiD methodology, thereby contextualizing its application in the essays that comprise this dissertation.

1. Introduction to policy impact study

The meticulous examination of policy impacts on a micro and macro scale is paramount in contemporary economic research (Angrist & Pischke, 2009; Cunningham, 2021; Imbens & Rubin, 2015). Policies serve as dynamic levers that influence a plethora of economic variables and actors manifesting implications that reverberate across social, environmental, and financial dimensions. In today's interconnected global economy, even minor policy changes can have significant ripple effects (Cheng & McDonald, 1996; Thomas, 2023; Valizadeh et al., 2017). Therefore, it is crucial to examine the outcomes of policy implementations carefully. This

investigation not only furnishes empirical evidence to gauge policy efficacy, but also provides the refinement and innovation of regulatory frameworks.

Policy impact assessment has historically been a multidisciplinary endeavor employing an array of methodologies ranging from qualitative discourse analysis to advanced econometric techniques. Among these, statistical methods have garnered substantial academic acclaim for their rigor in isolating the causal imprints of policies from an array of confounding influences. Econometric approaches, such as Regression Analysis, Propensity Score Matching (PSM), and DiD, provide robust paradigms for causal inference. Their application has become particularly salient in economic and financial research where the enactment or modification of a policy can entail ramifications amounting to billions of dollars and impact social welfare at a substantial scale (Dasgupta & Žaldokas, 2019; Gibson Dunn, 2016; Hendren & Sprung-Keyser, 2020).

2. A brief story of Difference-in-Differences

Evaluating the causal ramifications of policy initiatives or specific events presents a challenging endeavor for both researchers and policymakers. The gold standard for these causality investigations is the Randomized Control Trial (RCT) wherein subjects are randomly allocated to either a treatment or control group to mitigate selection bias (Cook & Campbell, 1979; Meldrum, 2000). The 2019 Nobel Prize in Economics was awarded to Abhijit Banerjee, Esther Duflo, and Michael Kremer for their innovative work in development economics utilizing RCTs to test the effectiveness of various policy interventions to alleviate poverty. Their extensive research through RCTs has significantly improved our understanding of the best strategies to address global poverty offering a rigorous framework for evaluating the impact of development projects.

The random allocation approach significantly enhances the reliability of outcomes comparison between the groups. However, it is crucial to acknowledge that RCTs are not universally applicable due to ethical considerations or practical constraints, such as cost and time (London & Kimmelman, 2020). In instances where RCTs are not feasible, alternative approaches come into play. Non-experimental designs serve as one such alternative offering insights by measuring outcomes before and after the program exclusively for participants, but these designs struggle to adequately control for selection bias and other confounding variables (Craig et al., 2012; Leatherdale, 2018).

To overcome these limitations, researchers often turn to robust quasi-experimental designs like the DiD approach (Fong et al., 2006). In contrast to non-experimental designs, DiD examines both program participants and non-participants. It tracks changes in outcomes over time between a treatment group exposed to an intervention and a control group, which is not. The subsequent “difference of differences” is attributed to the intervention's impact providing a more reliable causal inference (Abadie, 2005). Hence, the DiD estimator has risen to prominence as an invaluable tool for applied economics research, especially when evaluating the outcomes of public intervention and other relevant variables. Its broad applicability and ability to isolate the causal impacts of an intervention make it a popular choice among researchers, particularly when RCTs are not a viable option.

Chapter Two - Essay One: Ratting out the cartel: How do corporations operationally react to leniency laws?

Abstract

This study conducts a comprehensive investigation into the effects of leniency laws on firms' operational efficiency using a DiD imputation estimator across 64 countries from 1990-2020. Guided by an advanced DiD estimator, as proposed by Borusyak et al. (2024), the research employs a longitudinal year-by-year analysis to offer dynamic insights into firms' operational strategies. The adoption of the DiD imputation estimator is particularly apt for our analysis due to its enhanced suitability in handling the staggered implementation timings inherent in our study's expansive international scope offering a more accurate representation of the effects over traditional two-way fixed effects DiD methods. The central finding of our study is that leniency laws effectively drive firms toward more vigorous competition as evidenced by their strategic responses in both the short and long term. Initially, firms extend credit terms, a move that while presenting short-term risks to asset turnover, signifies an immediate competitive reaction. Over the longer term, firms adjust by optimizing fixed asset utilization indicating a sustainable approach to maintaining their competitive edge in the market. These strategies collectively demonstrate how leniency laws shape firm behavior aligning with the overarching goal of these laws to encourage active competition across various economic landscapes. This approach highlights the laws' role in actively shaping firm behavior and operational strategies in diverse economic contexts. The study uncovers considerable heterogeneity in the laws' impact, notably more pronounced in developing economies and within specific cultural frameworks including low power distance, collectivistic, high uncertainty avoidance, and long-term orientation, as identified by Hofstede (2011). Larger and more profitable firms strategically extend more favorable payment terms post-lenieny.

Keywords: operational efficiency, anti-collusion, leniency programs, difference-in-differences, staggered implementation, domestic competition.

2.1. Introduction

Collusion occurs when firms work together to form a cartel for their advantage, influencing markets and prices. Anti-collusion laws investigate and break cartels to protect consumers from high price fixing practices and ensure fair competition (Marslev & Staritz, 2023; Saggi, 2006). Leniency passages have been recognized as an efficient tool for antitrust boosting to address the consternation of cartels (Charistos & Papadopoulos, 2022; Haucap & Heldman, 2023; Isogai & Shen, 2023; Marvão & Spagnolo, 2018). Leniency policies allow market regulators to grant full or partial amnesty to those firms that are parts of a collusive agreement but cooperate in providing information about it (Immordino et al., 2020; Marshall, 2017; Martyniszyn, 2015). A typical leniency law stipulates that the first confessor will receive automatic amnesty.

Globally, governments have enacted leniency provisions to strengthen antitrust laws and address mounting concerns about cartels. This policy shift has increasingly become the focal point for researchers examining its impact on firms' behavior and performance. Firms, in response, have increased asset growth primarily funded through the issuance of more equity (Dasgupta & Žaldokas, 2019) and experience a contraction in gross margins (Dong et al., 2019). The DuPont model, a crucial tool in financial analysis, helps disentangle the various factors that contribute to a firm's return on equity.¹ It is comprised of three main components: profit margin, equity multiplier, and total asset turnover. Understanding the dynamics of these components is vital for both investors and managers to assess a firm's financial health and inform growth strategies. Despite its importance, the existing literature has largely overlooked how total asset turnover (i.e., operational efficiency), a critical determinant of shareholders' wealth (Aktas et al., 2015), is impacted when cartels are dismantled. In light of this gap, our study seeks to illuminate the changes in firms' operational efficiency following the adoption of leniency laws and explores the differing trajectories of short-term and long-term asset management efficiencies.

Prior research has indicated that firms can leverage trade credit as a subtle, yet effective competitive tool. This not only acts as a form of price discrimination, but also offers firms the capacity to circumvent legal constraints on explicit price changes (Brennan et al., 1988; Mian &

¹ Dupont model: Return on Equity = Profit margin * Total asset turnover * Financial leverage

$$= \frac{\text{Net Income}}{\text{Sales}} * \frac{\text{Sales}}{\text{Total Assets}} * \frac{\text{Total Assets}}{\text{Total Equity}}$$

Smith, Jr., 1992). Moreover, extending trade credit serves multiple operational goals including boosting sales, bolstering the seller-buyer relationship, advertising, and certifying product quality (Deloof & Jegers, 1996; Kim & Atkins, 1978; Martínez-Sola et al., 2014). As competition intensifies, particularly in consumer credit markets, firms are more likely to offer credit to riskier clientele (Gissler et al., 2020). Thus, our study seeks to explore these complex dimensions focusing on the strategic role of trade credit extension in the wake of leniency laws.

In an era marked by rigorous anti-collusion regulations and leniency programs, the Fixed Asset Turnover (FAT) ratio also emerges as a critical metric for long-term corporate strategy. While other operational measures have typically garnered more attention in research, the FAT ratio remains an important, yet underexplored metric that evaluates how efficiently firms convert their fixed assets into revenue (Bauman, 2013). A high FAT ratio is not only a hallmark of operational efficiency, but also a key indicator of long-term viability offering firms enhanced liquidity, improved credit ratings, and less reliance on external financing (Dvouletý et al., 2021; Lee, 2023; Miller, 1986; Zambrano Farías et al., 2022). This shift in focus toward FAT represents a pivotal adaptation in managerial strategy providing firms with the financial flexibility to navigate today's complex, highly regulated, and competitive markets. The FAT ratio serves as a linchpin in both short-term adjustments and long-term planning facilitating sustainable growth.

We adopt a novel design in a DiD setting informed by the staggered implementation of laws across 64 countries from 1990-2020. This methodological approach builds upon traditional two-way fixed-effect regression models commonly used in the prior literature. The recently developed Difference-in-Differences imputation estimator we utilize is specifically tailored for staggered law implementations as established by Borusyak et al. (2024)². In this context, “staggered law implementation” refers to the varying timelines across countries in which leniency laws were enacted and enforced at different points in time allowing us to observe and analyze their differential impacts over time. This enables us to provide a more unbiased and finite-sample efficient estimation. The efficiency gain from this approach comes from its ability to handle the heterogeneity inherent in staggered implementations, offering a refined and precise

² The DiD imputation estimator by Borusyak et al. (2024) significantly refines the analysis of staggered law implementations by accurately capturing the effects of laws enacted at different times across countries. Its strength lies in addressing the heterogeneity of treatment effects more precisely than traditional DiD methods, ensuring the robustness of our findings and enhancing the understanding of leniency laws' operational impacts.

estimation method that improves upon traditional DiD estimators. Our approach is aligned with emerging methodologies that are robust to heterogeneous treatment effects as demonstrated in works by Callaway and Sant'Anna (2020) and de Chaisemartin and D'Haultfœuille (2020).

Unlike the extant literature, which commonly utilizes a DiD approach to measure the average treatment effect after policy changes (Bertrand & Mullainathan, 2003; Howell, 2016; Yang et al., 2012), our study employs a detailed longitudinal analysis. We unpack the effects of leniency programs on firms' operational performance by examining the average outcomes for each year after the laws' implementation. This granular analysis is pivotal for several reasons. First, it enables us to observe the dynamic adaptations firms undertake in the wake of new regulatory landscapes. In addition, it offers valuable insights into the timing and phasing of strategic adjustments, which that have implications for both policy makers and industry leaders. Finally, by adopting a timeline-based approach, we can better isolate the effects of leniency programs from external variables providing a more robust and accurate measure of its true impact. This pioneering approach enhances our understanding of how leniency programs influence various dimensions of operational efficiency across different time horizons and international contexts, thereby filling a crucial gap in the existing literature.

Our findings unravel the intricate effects of leniency laws on firms' asset management strategies revealing a complex interplay of short-term and long-term adaptations. Initially, firms extend their credit terms to enhance market share, yet this move risks slightly diluting asset turnover. Concurrently, firms concentrate on optimizing fixed asset utilization, a long-term endeavor aimed at sustainable growth and operational efficiency. This dual strategy creates an indeterminate net impact on total asset turnover highlighting the intricate balance firms maintain between immediate gains and long-term sustainability. Over time, we observe a dynamic shift. Firms adapt their credit policies to sustain customer relationships, uphold competitiveness, and optimize product management. These strategic adjustments point to an evolving landscape where firms recalibrate their asset management strategies in response to the changing regulatory environment.

After exploring the vertical impact of leniency law enactment over time, we turn our attention to the heterogeneous effects along horizontal dimensions, specifically across countries and

individual firm characteristics. We find that the ramifications of leniency laws on operational efficiency are more salient in developing economies where informational asymmetry between buyers and sellers is more pronounced (Demirgüç-Kunt & Maksimovic, 1998; Van Horen, 2007). Additionally, anti-competitive behavior is easier to observe in developed markets due to the higher degree of financial transparency these markets typically exhibit (Huang et al., 2019). According to Bourveau et al., (2020), this transparency can unintentionally facilitate anti-competitive practices by making it easier for firms to collaborate on pricing and market strategies through financial disclosures and shared strategic discussions, thereby easing collusion in product markets.. Our results also indicate that the influence of leniency laws is especially strong for firms operating in cultures characterized by low power distance, high uncertainty avoidance, long-term orientation, and collectivism, as delineated in the seminal work of Hofstede (2011). Driven by bargaining power and specific cultural characteristics, these firms are more inclined to relax their credit policies compared to their counterparts in different cultural milieus. Regarding firm-level variations, our data indicates that larger and more profitable firms are more likely to offer better payment terms following the introduction of leniency laws, a behavior we attribute to strategic motives.

The recent emergence and gradual spread of leniency laws, particularly notable in the international business regulatory landscape, underscore a pivotal shift in how competitive practices are managed globally. Originating in the early 1990s, these laws have seen a staggered, yet strategic adoption across various nations with a notable absence in key emerging markets. This study's comprehensive dataset reveals that while these laws have been effective in stimulating competition, particularly in developing economies, their slow global dissemination points to a cautious approach by nations in reforming anti-competitive practices. The effectiveness of leniency laws, as demonstrated in our findings, suggests that they could serve as a vital policy tool in emerging economies offering a robust mechanism to enhance market competition. The adoption of these laws in these markets could be especially impactful considering our findings that emphasize their significant role in enhancing operational efficiency and encouraging competitive behavior in a diverse range of economic and cultural contexts.

The structure of the paper is outlined as follows. Section 2 reviews the relevant literature providing the theoretical and empirical background to our study. In Section 3, we articulate our

research hypotheses drawing upon existing theories and findings. Section 4 delineates our data sources and describes the methodology. Section 5 presents our empirical results discussing both the main findings and additional heterogeneous checks. Finally, Section 6 concludes the paper summarizing the key insights.

2.2. Literature review

2.2.1. Impact of leniency laws on firms' behavior and performance

Breaking up cartels and universally enhancing domestic competition offer manifold benefits that extend beyond mere regulatory compliance (Golombek et al., 1998; Peinert, 2021; Wie, 2002). Foremost, disrupting these collusive practices revitalizes market competition, thereby driving down prices and improving the quality of goods and services for consumers (Golodner, 2001). It also opens avenues for smaller businesses to compete more effectively fostering innovation and entrepreneurial spirit within the domestic market (Berk & Saxenian, 2023; Golodner, 2001; Hart, 2001). Enhanced competition can stimulate firms to become more efficient encouraging them to allocate resources more optimally, thereby contributing to economic growth (Leibenstein, 1966). Consequently, the push for stronger anti-collusion measures is not merely a punitive action against corporate malpractice, but a strategic initiative aimed at fortifying the foundations of a free and competitive market economy.

In theory, Landeo and Spier (2020) prove that the ordered-leniency passage can efficiently detect and prevent harmful short-term activities conducted by a group of two or more injurers.³ In practice, the leniency passage was earliest implemented in 1993 in the United States (U.S.), effectively destabilized existing cartels and dissuaded the emergence of new ones (Miller, 2009) inspiring other countries to pass similar laws (Hammond, 2005). The total antitrust fines increased around 30 times after a decade from \$107 million in 2003 to \$3.6 billion in 2015 (Antitrust Division, 2023), while total sentence fines surged from 3,313 days in the 1990s to 23,398 days in 2012 (Dasgupta & Žaldokas, 2019). Overall, the worldwide adoption of leniency laws has significantly undermined collusion (Dong et al., 2019).

³ Under a structured leniency program, the level of leniency extended to an individual who self-reports is contingent upon their rank in the order of those reporting.

The recognition of the detrimental effects of domestic monopolistic behavior and collusive practices on market competition and consumer welfare has led to a global surge in regulatory scrutiny. Over the past few decades, countries around the world have taken remarkable strides to strengthen anti-monopoly and anti-collusion laws. The global commitment to antitrust enforcement is evident in a series of high-profile actions against tech giants. For instance, in 2012, the U.S. Department of Justice accused Apple and five major book publishers of colluding to increase e-book prices from \$9.99 to \$14.99. This trend gained further momentum with China's 2021 imposition of a \$2.8 billion fine on Alibaba for anti-monopoly violations. This comes alongside the United States' intensified focus on antitrust enforcement aimed at “Big Tech” companies including Amazon, Apple, Facebook, and Google. Moreover, multi-regional trade agreements like the CPTPP also embed clauses aimed at fostering competitive markets. These global and multi-regional efforts highlight the universal recognition of the necessity to curb monopolistic tendencies for the greater economic good. Against this backdrop, the concept of leniency in anti-collusion laws has attracted significant scholarly and practical attention.

Recently, there has been a growing scholarly focus on the effects of leniency policies on corporate behavior and financial performance. Prior studies suggest that firms adapt their financing strategies and experience reductions in gross margins following the disruption of cartels (Dasgupta & Žaldokas, 2019; Dong et al., 2019). Additionally, some firms attempt to re-establish collusion through conference calls (Bourveau et al., 2020) or engage in strategic mergers to regain market power (Dong et al., 2019). However, the current body of literature has not yet explored the impact of these leniency policies on firms' operational efficiency in a more competitive market environment after the laws take effect.

2.2.2. Firms' asset utilization after leniency passages

Organizational capability is the ability of firms to perform an activity more effectively than their competitors based on similar resources. In the extant literature, Leibenstein (1966) theoretically documents that under competitive pressure, firms become more efficient, under the term “X-efficient.” Frantz (1992) states that almost all of the empirical research reported results consistent with Leibenstein's theory. Recently, Dasgupta et al. (2018) also finds that when the U.S. market becomes more competitive, better CEOs are hired and boards no longer tolerate slack and

inefficiency leading to less organizational slack.⁴ In principle, organizational capabilities can be a competitive advantage and are immune to the market threats of imitation, substitution, dissipation, and appropriation (Collis, 1994). Progressive companies tend to build organizational capacity by which managers empower all employees to think and act as leaders in their domain in an increased competitive market (Ulrich & Lake, 2011). These studies imply that the organizational capacity of firms is improved due to more rigid boards and employers' encouragement policies as a reaction to enhanced market competition.

In addition to enhancing organizational capabilities, firms also modify their financial strategies to navigate a more competitive landscape. While existing research demonstrates that firms tend to bolster their cash holdings through an increase in cash and cash equivalents (Dasgupta & Žaldokas, 2019), it's crucial to distinguish these short-term liquidity measures from more cyclical and sustainable aspects of financial management, such as the Cash Conversion Cycle (CCC) and the Operating Cycle (OC). Cash and cash equivalents are one-time, short-term assets that can be quickly converted to cash within three months. In contrast, CCC and OC represent recurring and sustainable processes where cash is continually reinvested to generate more cash in subsequent cycles. These cyclical processes, over the long term, should theoretically produce more cash than one-time sales or liquidations. These repeatable returns from operations are vital for a firm's long-term sustainability and are more indicative of a company's health than a mere stockpile of cash (Groth, 1992). In this light, our study seeks a more comprehensive understanding examining not just cash holdings, but also the cyclical financial activities that contribute to a firm's long-term viability.

Following Hill et al. (2010) and Boisjoly et al. (2020), we study the working capital requirement in combination. Operating Cycle has long been presented for working capital in the extant literature. This measure equals the total of account inventory outstanding days (ID) and receivables outstanding days (RD), where these are the number of days that firms need to sell the products and collect the receivables. The common alternatives of ID and RD are Inventory Turnover (IT) and Receivable Turnover (RT). This proxy is commonly used to measure working capital management (Jalal & Khaksari, 2020) and cash-holding strategies (Wang et al., 2014) in some research. Regarding cash holdings, Dasgupta & Žaldokas (2019) use cash and cash

⁴ In this case, increased competitive markets are caused by major industry-level tariff cuts.

equivalent/assets as cash holding measures, which is different from the Operating Cycle (Groth, 1992). Operating Cycle provides insight into the operating efficiency of firms. A shorter cycle is preferred by most companies indicating a more efficient business progression (Groth, 1992). The operating cycle, which indicates the speed and turnover of corporate cash flow, also influences the corporate cash-holding strategy (Wang et al. 2014).

Cash Conversion Cycle accounts for the cash outflow (Outstanding Payable Days) in combination with the Operating Cycle. Moussa (2019) also lists various papers using the CCC as a proxy for working capital management efficiency. Following Boisjoly et al. (2020) and Hill et al. (2010), we use CCC to represent working capital management. In the extant empirical studies, shortening the CCC without affecting the operating margin of sales increases profits, frees cash flow to equity, share price (Zeidan & Shapir, 2017), and refining firms' operations (Dass et al., 2014). In addition, Shin and Soenen (1998), Soenen (1993), and Deloof (2003) prove that profitability and risk-adjusted return are negatively related to the CCC.

Like any investment, increases in working capital require additional financing that involves financing and opportunity costs (Kieschnick et al., 2013) leading to potential high interest expenses and bankruptcy risk (Shin & Soenen, 1998). Moreover, cash tied up in net working capital also impedes firms from implementing other value-enhancing investment projects in the short run (Ek & Guerin, 2011). Groth (1992) states that the understanding and attention of many individuals in the firm will help garner the operating cycle's benefits more effectively. As such, the board will be more stringent and the employees are encouraged to think and act as leaders (Ulrich & Lake, 2011), which benefits firms in managing working capital.

2.2.3. Short-term strategies in response to antitrust enhancement

In the wake of antitrust enforcement actions, especially following the introduction of leniency programs, firms make strategic adjustments to their capital structures to survive in an increasingly scrutinized competitive environment. Dasgupta & Žaldokas (2019) have empirically demonstrated that these firms tend to increase their equity issuance resulting in a decrease in their debt-to-equity ratios. This shift toward a more equity-heavy capital structure is not merely a reactive measure, but a strategic move aimed at enhancing financial flexibility. With fewer

burden of debt obligations, firms gain the leeway to be more agile and adaptive in their market strategies.

Banner (1958) documented that the “ability to provide credit is a more effective competitive weapon than an attractive product price.” Since then, a body of empirical and theoretical models has been studied further by linking trade credit to price discrimination and implicit warranties. Regarding price discrimination, Brennan et al. (1988) theoretically proves that the highest price that credit customers are willing to pay is lower than that of cash customers. Thus, firms can think of reducing the price to attract both credit and cash buyers. However, in several countries, sellers face practical or legal constraints regarding price discrimination (Mian & Smith Jr, 1992) and anti-collusion laws generally prohibit firms from price discrimination (e.g., in the U.S, Canada, and the European Community cases). Therefore, after leniency programs, sellers would be prone to extend trade credit at subsidized rates to circumvent these constraints, lowering the effective price that credit customers pay.

From a theoretical standpoint, works by Kim and Atkins (1978), Copeland and Khoury (1980), and Martínez-Sola et al. (2014) suggest a strong link between trade credit policies and firm performance. Specifically, these studies demonstrate that the extent of trade credit granted to customers serves as a strategic mechanism to boost sales and profitability. In periods of fluctuating demand, Abuhommous (2017) notes that trade credit can enhance operational efficiency by decoupling the delivery of goods from the receipt of payment from customers. Firms also achieve operational efficiencies by separating the delivery of goods from the collection of payment at predetermined dates, particularly when multiple sales to the same customer occur in a short timeframe, thereby reducing collection costs, a practice supported by Cheng and Pike (2003) as a motivation for extending trade credit. Furthermore, Nadiri (1969) posits that trade credit functions as an advertising tool to boost sales and this policy often aligns with industry norms. To remain competitive, firms must match the trade credit policies of their peers. Diverging from these norms could lead to decreased sales, a point underscored by Paul and Boden (2008).

In addition, sellers also can use trade credit to certify product quality (Deloof & Jegers, 1996; Lee & Stowe, 1993; Long et al., 1993; Ng et al., 1999; Pike et al., 2005; Smith, 1987). To the

extent that consumers cannot observe product quality at the time of purchase, the trade credit grants them time to verify the quality before making the full payment. In particular, when the product quality falls short of expectations, buyers can withhold payment and return the product to the seller. Skeptics may argue that sellers may alternatively certify product quality through money-back guarantees and product warranties. However, these mechanisms are imperfect substitutes for trade credit from the consumers' perspective. These approaches are only meaningful if the sellers can survive and are especially questionable in increasingly competitive markets (El Ghouli & Zheng, 2016). Moreover, Gissler et al. (2020) finds that due to increased competition in consumer credit markets because of regulatory changes, nonbanks expand credit to riskier and marginalized borrowers at extensive margins.

2.2.4. Long-term strategies in response to antitrust enhancement

While immediate responses to the implementation of laws often focus on short-term measures or reaction adjustments (Dasgupta et al., 2018; Dasgupta & Žaldokas, 2019), long-term competitiveness demands a broader perspective. Here, the importance of the FAT ratio cannot be overstated. Despite the extensive research on operational metrics, the FAT ratio, a key measure of how efficiently a firm turns its fixed assets into revenue, has been notably overlooked. Serving as more than just a snapshot, the FAT ratio dynamically captures the firm's ability to convert fixed assets efficiently, including property, plant, and equipment, into revenue (Bauman, 2013). High FAT ratios signal effective use of capital investments and a readiness to compete in an increasingly competitive market. In contrast, a lower FAT ratio may be a warning sign indicating operational inefficiency that leaves firms vulnerable to aggressive competitors (Miller, 1986).

In a business landscape increasingly influenced by rigorous anti-collusion regulations and leniency programs, the FAT ratio evolves from being merely an operational metric to a strategic cornerstone that informs an array of managerial decisions. Its robustness offers cascading financial benefits, notably in enhanced liquidity and improved credit ratings, which, in turn, significantly shape the firm's strategic planning from capital allocation to long-term market positioning (Chauhan, 2023; Lee, 2023). An increase in the FAT ratio not only signals operational efficiency, but also serves as an indicator of the firm's long-term viability and growth potential (Dvouletý et al., 2021). This can attract favorable credit terms and equity investments

instilling greater confidence among investors and creditors alike. Moreover, a strong FAT ratio indicates less dependency on external financing (Zambrano et al., 2022) making the firm less risky to lend to and thereby enhancing its creditworthiness (Lee, 2023). Such solid financial footing offers firms the flexibility and resilience needed to navigate the complexities of today's highly regulated and competitive markets. In essence, the FAT ratio becomes an indispensable tool for managers aiding in both short-term operational adjustments and long-term strategic initiatives aimed at achieving sustainable growth.

2.3. Hypothesis development

2.3.1. Total assets utilization after amnesty policy

The significance of asset turnover in determining future profitability is not only empirically well-established (Copeland & Khoury, 1980; Fairfield & Yohn, 2001; Nissim & Penman, 2001), but it also serves versatile roles in financial analysis. For instance, it is used as a diagnostic indicator for assessing bankruptcy risk (Eisdorfer & Hsu, 2011), thereby aiding stakeholders in making informed investment decisions. Furthermore, asset turnover sheds light on corporate overinvestment behavior that can have critical consequences for shareholder value and long-term firm sustainability (Aktas et al., 2015; Chhaochharia et al., 2017). In this multi-faceted context, asset turnover emerges not merely as an isolated metric, but as an integrated component within a broader financial performance evaluation framework.

Firms facing intensified market competition following the implementation of leniency laws are compelled to reevaluate and adjust both their short-term and long-term strategic priorities. In the short term, firms may extend more lenient credit terms to maintain or gain market share. Conversely, for long-term sustainability and growth, firms increasingly focus on optimizing fixed asset utilization. Improved efficiency in using fixed assets may offset the dilution in asset turnover brought about by the extended credit sales policy. Given these offsetting dynamics, relaxed credit terms and improved fixed asset utilization, it becomes difficult to predict a priori the net impact of leniency laws on total asset turnover. Therefore, we posit the following hypothesis:

H1: The net impact of leniency laws on total assets turnover is indeterminate due to offsetting factors in fixed asset utilization and credit policy.

2.3.2. Long-term assets operational efficiency after leniency laws

After investigating shifts in total asset management efficiency following the introduction of leniency programs, our study aims to disentangle which aspect, short-term or long-term asset management, stands as the critical driver behind these changes. Fixed assets represent a cornerstone for long-term growth in firms (Birhanu et al., 2016) and alterations in this category often signal strategic capital budgeting decisions (Groth, 1992). Despite its significant role as a gauge of operational efficiency in corporate finance, as acknowledged in numerous textbooks, empirical research exploring FAT remains conspicuously sparse.

In light of the proliferation of stringent anti-collusion regulations and the implementation of leniency programs, optimizing FAT becomes an imperative strategic initiative for firms. The rationale behind this expectation is manifold. First, a robust FAT ratio offers an array of cascading financial benefits including enhanced liquidity and credit ratings (Chauhan, 2023; Lee, 2023). Additionally, the results indicate that the higher the level of cash holdings and fixed assets, the greater the level of profitability (Masri & Abdulla, 2018). This solid financial standing can partially mitigate the adverse effects on asset turnover resulting from other operational strategic choices. In addition, an elevated FAT ratio serves as a reliable proxy for both operational efficiency and long-term viability (Dvouletý et al., 2021), factors that can attract favorable financial terms and equity investment aligning with the results from Dasgupta & Žaldokas (2019). This leads to a stronger financial position providing the firm with the adaptability and robustness needed to thrive in a market now shaped by stringent anti-collusion measures. Therefore, we present our second hypothesis:

H2: Fixed assets turnover increases after leniency laws.

2.3.3. Short-term assets operational efficiency after leniency laws

While the realm of fixed asset management remains comparatively underexplored in empirical studies, working capital management has been a cornerstone of financial research for decades. Seminal works by Deakin (1976) and So (1994) have underscored the utility of working capital

ratios, either in isolation or in combination, as predictive models for various financial outcomes, such as bankruptcy risk, bond ratings, and credit scores, as well as payment rates for progress collections. Both scholars and practitioners concur on the pivotal role of efficient working capital management, not only during periods of economic expansion, but also in volatile economic climates (Abuzayed, 2012). This management is viewed as a strategic lever for enhancing both competitive positioning and profitability. Hence, while fixed asset management may still be emerging as a subject of rigorous empirical investigation, the established importance of working capital management underscores the necessity for a holistic approach to asset utilization for firms navigating through fluctuating economic terrain.

a> Cash Conversion Cycle and Operating Cycle after leniency laws:

Two key metrics, the Operating Cycle and the Cash Conversion Cycle (CCC), serve as vital indicators of a firm's short-term operational efficiency. In a regulatory landscape reshaped by the introduction of antitrust leniency programs, these measures take on increased importance. One plausible strategy a firm might employ to stay competitive in this setting is extending credit sales. While this approach could broaden a firm's customer base, it has the consequential effect of potentially lengthening the operating cycle given that accounts receivable would take more time to convert into cash. This strategic choice comes with its own set of trade-offs. While it might attract more customers, it could also tie up working capital for extended periods, thereby affecting short-term liquidity metrics. Given this strategic calculus, we posit the hypothesis that:

H3: Operating Cycle and Cash Conversion Cycle increase after leniency laws.

After evaluating shifts in working capital management in response to amnesty policies, we extend our analysis to explore the dynamics of individual components of working capital. A substantial body of research examines the individual components of working capital in isolation. For example, accounts receivable have been viewed as indicators of product quality (Lee & Stowe, 1993; Ng et al., 1999) and have been linked directly to a firm's profitability and access to capital markets (Rajan & Petersen, 1997). Aktas et al. (2015) suggests that the carrying costs of inventory have an adverse effect on shareholder wealth, while maintaining a larger inventory can mitigate the risk of stock-outs (Deloof, 2003).

b> Inventory operational efficiency after leniency laws

In the realm of antitrust economics, market power holds a central role defined as a firm's or a collection of firms' ability to sustain prices above what would prevail under full competition (Schmalensee, 1982). A surge in market power has been linked with increased equity premiums, expected returns, and macroeconomic uncertainty making it an essential facet of contemporary financial scholarship (Corhay et al., 2020). Post-lenieny policy, this market power experiences a dilution leading to a more competitive market landscape. This change correlates with a historical relationship between market power and price rigidity where firms with significant market power tend to stockpile inventory to buffer against supply and demand shocks (Amihud & Medenelson, 1989; Galbraith, 1936).

However, the post-lenieny period also sees firms ramping up investments in patents and machinery as they strive to innovate or introduce superior products (Dasgupta & Žaldokas, 2019). Such strategic shifts could necessitate an increase in inventory levels, thereby counterbalancing the inventory reduction driven by diminished market power. This complex interplay of factors following leniency laws introduces an intricate dynamic that muddles the straightforward relationship between market power and inventory levels. Given these diverging influences, we propose the following hypothesis:

H4: The net impact of leniency laws on inventory operational efficiency is indeterminate.

c> Receivables operational efficiency after leniency laws

In the wake of leniency programs, firms find their scope for price discrimination constricted by legal constraints. As a tactical response, they may increasingly resort to extending trade credit to maintain competitive positioning. This approach not only sidesteps legal bottlenecks, but also serves as a de facto quality assurance mechanism reinforcing brand value and customer trust.

However, this strategy is not without its pitfalls. Academic research, including contributions from El Ghouli & Zheng (2016) and Gissler et al. (2020), warns that extending trade credit can expose firms to heightened credit risk and potentially compromise the efficacy of trade credit as a quality assurance signal. Consequently, this trade-off raises concerns about the operational efficiency of receivables in a post-lenieny environment. Therefore, we have the next hypothesis:

H5: Receivable operational efficiency of firms decreases after the leniency program.

2.3.4. Heterogeneous impacts across markets, cultures, and firm types

a> Heterogeneous impact across markets:

In developed markets, the association between strong governance structures and firm performance is well-established as highlighted by Doidge et al. (2007) and La Porta et al. (1997). Conversely, the informational asymmetry between buyers and sellers is more pronounced in less developed economies making trust-building efforts essential for firms operating in these environments (Demirgüç-Kunt & Maksimovic, 1998; Van Horen, 2007). Moreover, greater financial transparency, as evidenced in developed markets, can inadvertently foster anti-competitive behavior by easing collusion in the product markets (Bourveau et al., 2020). Given these contrasting market dynamics, heightened asymmetric information in developing markets and increased anti-competitive effects in developed ones, we propose the following hypothesis:

H6: The negative impact of leniency laws on operational efficiency is more pronounced in developing countries compared to developed ones.

b> Heterogeneous impacts across cultures

Hofstede's cultural dimensions have been a cornerstone in interdisciplinary research across areas such as management, marketing, and finance for decades (Hofstede, 2011). These indices were originally developed from surveys conducted among IBM employees from 1967-1973 across more than 70 countries. By incorporating Hofstede's cultural dimensions to examine cross-country variations at the firm level, researchers have the opportunity to introduce a comprehensive lens to the understanding of firm behavior. This approach stands in contrast to relying solely on generic macroeconomic indices. Hofstede's dimensions are engineered to encapsulate cultural norms and practices that play a pivotal role in illuminating firm-level strategies like negotiation tactics, decision-making frameworks, and rapport cultivation. While macroeconomic indices might reveal the quantitative context about “what” (things happening in an economy, such as growth trends or financial stability), Hofstede's cultural metrics provide invaluable insights into the qualitative factors about “why” (firms in different cultures may opt for varied strategic approaches). This method enhances the external validity of research findings contributing to a richer, more context-specific understanding of firm behavior.

i> Power distance dimension

The cultural framework provided by Hofstede's dimensions has been instrumental in understanding business behavior across different societies with power distance (PDI) being one of the most extensively studied factors (Hofstede, 2011; Hofstede et al., 2005). In societies with high power distance, people are more accepting of authority and the inequality that often comes with it including disparities in skills and wealth (Harrison, 1992; Kabasakal & Boder, 2002). These societies are more tolerant of injustice and inequality (Williams & Zinkin, 2008). Alternatively, in low power distance societies, there is less acceptance of these inequities (Hofstede et al., 2005). Therefore, in countries characterized by low PDI, businesses and consumers operate on a more equitable footing.

In low PDI countries, characterized by flatter societal hierarchies and a greater emphasis on equality, people are generally more inclined to question supremacy (Kokkinos et al., 2023; Ngo et al., 2023a), which may lead them to engage critically with changes in the law. This propensity for scrutiny and debate stems from a culture that encourages questioning authority and values individual input in decision-making processes. As a result, legal changes in these societies might undergo rigorous public discussion leading to a more participatory, but potentially contentious adaptation process. Conversely, in high PDI societies, where there is a strong acceptance of hierarchical order and authority, the reaction to law changes can be quite different. In such contexts, people are more likely to accept new laws and regulations without significant public debate or resistance reflecting a culture of deference to those in power.

This responsiveness in low PDI societies is also reflected in the marketplace where transparency and cooperation are more prevalent, and consumers exert greater influence. Firms, attuned to this reality, may find it necessary to extend more lenient credit terms to remain competitive. While this strategy could enhance customer loyalty, it also means capital is tied up in receivables for extended periods affecting operational efficiency. Hence, the negative impact of leniency laws on firms' operational efficiency is likely to be more acute in low PDI countries. Therefore, we formulate the following hypothesis:

H7: The impact of leniency laws on operational efficiency is more pronounced in low power distance countries.

ii> Uncertainty avoidance dimension

In high Uncertainty Avoidance Index (UAI) cultures, consumers are typically more cautious, show a strong resistance to change, requiring more time to assess and qualify products before purchase (Hermeking, 2005; Hudson et al., 2016). This heightened scrutiny exerts pressure on firms to relax their credit terms, granting consumers the time they need for evaluation without financial penalty. Firms, sensitive to this cultural preference for caution, are compelled to adapt their credit policies accordingly.

The situation parallels the dynamics observed in low Power Distance Index (PDI) countries, where the focus is also on trust and relationship building, albeit for different cultural reasons. In both high UAI and low PDI settings, the consumer's enhanced bargaining power—either born from a need for thorough product evaluation or from an equitable power distribution—forces firms to adjust their credit policies. These adjustments generally extend the time it takes to convert receivables into cash, thereby affecting operational efficiency negatively. As such, leniency laws might amplify this negative impact in countries characterized by either high UAI or low PDI, as these cultural contexts make the firms more sensitive to shifts in consumer bargaining power. Therefore, we postulate the following hypothesis:

H8: The impact of leniency laws on operational efficiency is more pronounced in high avoidance uncertainty countries.

iii> Long-term versus Short-term orientation

In countries characterized by a high Long-Term Orientation (LTO) index, the business culture gravitates towards valuing future rewards and building enduring, symbiotic relationships between consumers and firms (Williams & Zinkin, 2008). This lends itself to strategic decisions that prioritize long-term sustainability and relationship-building over immediate profitability. In such an environment, the onset of leniency laws introduces an additional layer of complexity to firms' competitive strategies. Firms are then inclined to recalibrate their credit policies, not just

as a reactionary measure to the changing legal landscape but also to conform to culturally induced long-term strategic goals.

Furthermore, this setting provides a unique window into understanding the interplay of bargaining power. In countries where long-term orientation is the cultural norm, consumers may wield significant influence over credit terms. Their bargaining power, rooted in the prospect of long-term loyalty, compels firms to offer more generous credit terms as a competitive strategy. This implies longer account receivables and, consequently, a decrease in operational efficiency, albeit potentially fostering greater customer loyalty and long-term gains. Therefore, based on these insights, we propose the following hypothesis:

H9: The impact of leniency laws on operational efficiency is more pronounced in long-term orientation countries.

iv> Individualistic and Collectivistic:

In countries with high levels of individualism, the cultural milieu fosters an emphasis on personal autonomy and self-reliance, which extends to the marketplace. Firms in such environments may find that consumers are less influenced by extended credit terms, as their buying decisions are more likely to be rooted in immediate needs and personal preferences rather than long-term relationships with sellers (Lee & Kacen, 2008; Sosik & Jung, 2002). The prevalence of individualism could hence mitigate the influence that leniency laws might otherwise have on extending trade credit as a competitive strategy.

Additionally, it is worth examining the role of bargaining power in these individualistic cultures. Consumers, driven by a strong sense of autonomy, might be less inclined to negotiate for favorable credit terms, thus reducing the need for firms to adopt a relaxed credit policy as a bargaining tool. The relatively reduced impact on account receivables suggests that operational efficiency might not decline as sharply in individualistic countries following the enactment of leniency laws.

H10: The impact of leniency laws on operational efficiency is less pronounced in individualistic countries.

c> Heterogeneous impacts across firm types:

i> Additional effect of leniency programs on large firms:

Leniency programs stand as crucial regulatory instruments, but their influence on firm behavior and operational mechanisms can be multifaceted and complex. In particular, large firms, defined by their outsized resources and market presence warrant special attention in this context. Existing literature suggests that large firms are better positioned to adapt their operational strategies in response to regulatory changes, owing to their resource-rich environments and capabilities for strategic maneuvering (Mittelstaedt et al., 2003). As these firms often wield considerable bargaining power in their respective markets, their strategic responses to leniency laws might deviate from those of smaller counterparts.

After leniency programs, large firms may deliberately opt to extend more generous credit terms as part of a broader business strategy. Given their substantial resources and bargaining power, large firms are well-positioned to offer these more lenient credit terms (Rajan & Petersen, 1997). While these decisions may induce short-term inefficiencies, such moves are often part of a planned strategy aimed at accruing long-term benefits (Rajan & Petersen, 1997). Therefore, we propose the following hypothesis:

H11: The impact of leniency laws on operational efficiency is more pronounced in large firms.

ii> Additional effect of leniency programs on high profitability firms:

In light of the institution of leniency programs, firms across the profitability spectrum are forced to reassess their operational strategies to adapt to a new regulatory landscape. Among these, high-profitability firms stand out as particularly agile in this transition. At this juncture, the theory of competitive advantage (Porter, 1985) indicates that sustaining an edge necessitates ongoing strategic innovation. High-profitability firms, underpinned by their financial resilience, may find it strategic to relax credit policies. This strategic choice is consistent with the Dorfman-Steiner model as applied by Nadiri (1969), which considers trade credit as an investment in long-term customer relationships (Dorfman & Steiner, 1954). Also, empirical studies such as those by Abuhommous (2017) suggest that greater investments in accounts receivable could correlate with higher future profitability. Given these theoretical and empirical considerations, high-profitability firms may be more inclined to relax their credit policies post-lenieny programs as

part of a broader strategy to sustain and potentially extend their competitive advantage. This leads us to propose Hypothesis 12:

H12: The impact of leniency laws on operational efficiency is more pronounced in high profitability firms.

2.4. Data and methodology:

2.4.1. Methodology justification:

We investigate the repercussions of enacting leniency laws on operational efficiency at the firm level, using a comprehensive dataset that spans 64 countries from 1990 to 2020. This research employs a DiD estimator, specifically adapted for staggered law implementations, in line with the methodology advanced by Borusyak et al. (2024). Conducting the study within an international framework, wherein regulatory changes manifest across multiple countries at diverse time intervals, minimizes the risk of confounding influences from unrelated economic shocks. This is consistent with the argument made by Leuz & Wysocki (2016), who contend that any extraneous shocks would have to correlate with the dates of regulation implementation across these multiple jurisdictions to bias the study's findings.

The notion of breaking down the Average Treatment Effects (ATE) in a DiD framework into weighted averages has a long history in econometrics, initially proposed by Imbens & Angrist (1994). Their use of monotonicity conditions (either non-increasing or non-decreasing) ensures only positive weights in the ATE calculation but localizes their estimated effects. Vytlačil (2002) later showed this monotonicity could be equated to a selection model, paving the way for a richer exploration of treatment effect heterogeneity, as evidenced in work by Heckman et al. (2005). More recently, an emerging line of research has questioned the validity of the traditional two-way fixed effect DiD approach. These studies demonstrate that this method assumes linear additive effects, an assumption that does not hold in cases of staggered law implementations (see (Baker et al., 2022; Callaway & Sant'Anna, 2020; de Chaisemartin & D'Haultfœuille, 2020; Goodman-Bacon, 2021; Imai & Kim, 2021; Sun & Abraham, 2020)).

Negative weights in the DiD estimation can arise when already-treated units serve as controls and their changing treatment effects over time are subtracted from the estimation (Goodman-Bacon, 2021). This negative weighting phenomenon emerges when treatment effects fluctuate over time,

generally biasing regression DiD estimates away from the true treatment effect's sign. If one group receives treatment across multiple periods while another remains untreated, the treated group may enter as a control. This introduces treatment effect heterogeneity and consequently biases the results (Cunningham, 2021; Goodman-Bacon, 2021)

The presence of heterogeneous treatment effects, particularly when units in the panel are exposed to treatments at different times, poses a limitation for event studies using traditional two-way fixed-effect regression (Goodman-Bacon, 2021). The imputation estimator proposed by Borusyak et al. (2024) addresses this limitation and stands as a finite-sample efficient and unbiased estimator. This is in line with a growing body of DiD estimators that are robust to unrestricted heterogeneous treatment effects (Callaway & Sant'Anna, 2020; de Chaisemartin & D'Haultfœuille, 2020).

In general, the DiD imputation estimator as outlined by Borusyak et al. (2024) is more suitable for analyses involving staggered timing of implementation compared to the traditional two-way fixed-effect DiD approach. Additionally, it proves to be more robust and efficient than other recently adopted DiD estimators, such as those proposed by de Chaisemartin & D'Haultfœuille (2020) and Sun & Abraham (2020). This methodology has gained traction in recent academic literature, evidenced by its application in studies such as Alvarez et al. (2022), Biasi & Sarsons (2021), and Von Bismarck-Osten et al. (2022). Notably, Alvarez et al. (2022) confirms the robustness of the Borusyak et al. (2024) estimator against that of de Chaisemartin and D'Haultfœuille (2020). Given its simplicity and distinct advantages, Cunningham (2021) suggests that this estimator offers a promising and popular future solution for addressing the issues of negative weighting inherent in standard DiD approaches.

In this study, I extend the application of the Difference-in-Differences (DiD) methodology beyond the conventional binary treatment framework, incorporating the complexities of staggered policy adoptions. Traditional DiD models presuppose a dichotomy of treatment across a singular event horizon, enabling a straightforward comparison of pre- and post-treatment outcomes between treated and control groups. This paradigm is challenged by the intricacies of staggered policy implementations, characterized by multiple treatment groups (early-treated, late-treated) and non-treated entities, each subjected to policy enactments at disparate temporal intervals. This

heterogeneity introduces a nuanced dynamic to the causal inference process, necessitating a methodological pivot to accurately capture the differential treatment effects across varied implementation timelines.

Acknowledging the inherent biases posed by staggered adoption, Goodman-Bacon (2021) critically focus on the distortion effects on the DiD estimator arising from the temporal overlap in treatment exposure among the early and late-treated groups. Such overlap can potentially confound the treatment effect, attributing biased causal inferences to the policy intervention. Goodman-Bacon's exposition lays the groundwork for addressing these complexities, highlighting the need for methodological refinements in handling staggered treatment designs.

In response to these challenges, Borusyak et al. (2024) introduce an innovative DiD imputation estimator that facilitates a nuanced analysis of staggered policy implementations. Distinct from conventional approaches that presuppose uniformity in treatment effects, this methodology embraces the heterogeneity of treatment impacts across time and entities. The imputation estimator employs a novel procedure that leverages only observations from untreated units to impute untreated potential outcomes, thereby circumventing the biases associated with traditional DiD analyses. This approach marks a significant advancement in the empirical toolkit for causal inference, offering a robust framework for dissecting the intricate dynamics of staggered policy implementations and their resultant effects on the targeted outcomes. Through this lens, my study endeavors to elucidate the causal pathways by which staggered leniency law adoptions influence the relevant legal and economic landscapes, contributing to a more refined understanding of policy efficacy in complex regulatory environments.

2.4.2. Identification

The imputation estimation process is constructed based on three steps. i) unit (firms) and period (year) effects are fitted by regression on never-treated and not-yet-treated observations only, ii) firms and years effects are used to impute the untreated potential outcomes and retrieve estimated treatment effects, and iii) a weighted average of these treatment effect estimates is taken with average weights.

Specifically, first, we estimate a model for untreated (i.e., never-treated and not-yet-treated) potential outcomes using untreated observations only in a two-way fixed effects regression:

$$Y_{it} = X_{i,c} + \gamma_i + \lambda_t + \epsilon_{i,t} \tag{1}$$

where i , c , and t index firms, countries, and years, respectively. The dependent variables Y_{it} correspond to total asset turnover, fixed assets turnover, cash conversion cycle, operating cycle, receivable outstanding days, receivables turnover, inventory outstanding days, and payable outstanding days. $X_{i,c}$ is a vector of the different firm and country-level controls, while γ and λ are firm and year fixed effects, respectively. In Equation (1), $X_{i,c}$ contains firm-level and country-level covariates standing for firm size, sales growth, leverage, tangibility, free cash flow, GDP, unemployment, and imports as a percentage of GDP following Cheng, Goh, & Kim (2018) and Dasgupta & Žaldokas (2019). In addition, when examining the regulatory effects on working capital management (proxied by Cash Conversion Cycle and Operating Cycle) and their components, we also control for capital intensity, real interest rate, profit, leverage, investment, dividend following Gaur, Fisher, & Raman (2005) and Jalal & Khaksari (2020). We describe the graph of dependent variable in Figure 1. The description and calculation of all variables in this study is in Appendix Table A1.

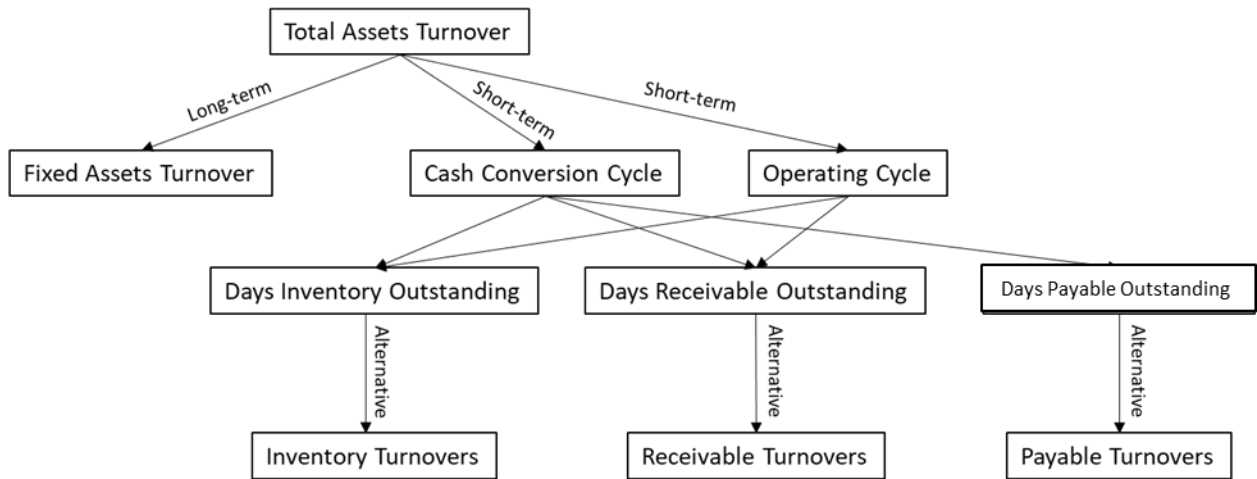


Figure 1: Three tiers of dependent variables

Note: This figure describes the three layers of dependent variables in this study representing the operational efficiency of firms.

In the generalized DiD setting with the staggered implementation of laws following Giroud & Mueller (2010), Borusyak et al. (2024) and Wing et al., (2018), the *treated* group comprises all firms headquartered in countries that have passed a leniency law by year t . The control group is not restricted to all firms in countries that never pass a law, but even the countries will pass one later on. The standard error is clustered at the country-industry level following Dasgupta & Zaldokas (2019).

Next, we extrapolate the equation (1) to treated observations, imputing untreated potential outcomes $Y_{it}(0)$,⁵ and calculate treatment effects τ_{it} .

$$\tau_{it} = Y_{it} - Y_{it}(0) \tag{2}$$

Finally, we take the averages of these individually imputation-based treatment effects, called τ_w , which shows how the operational efficiency change after the imposition of leniency passages. Herein, τ_w is our variable of interest. To bolster the robustness of our findings, we first undertake a parallel trend assumption test, as proposed by Borusyak et al. (2024), specific to the DiD framework. This preliminary step allows us to verify the insignificance of any pre-existing differences between the treatment and control groups prior to the event dates, thereby strengthening the validity of subsequent DiD analyses. Additionally, we carry out sensitivity tests to examine the temporal effects of legal changes. Specifically, we assess the average impact on firms' operational efficiency at intervals of one, two, three, and four years following the enforcement year of the respective laws.

2.4.3. Data

In our study, we collect data from Datastream to analyze firms across 64 countries from 1990-2020. Guided by the caveats from Ince and Porter (2006), we adhere to a rigorous data filtering process outlined in Appendix Table A2. Specifically, our sample excludes non-common equity firms, as well as financial and utility companies and we only consider stocks listed on major exchanges. We also eliminate non-local firms and those whose stocks are not listed in the currency of the country in which they operate. Firms with specific cross-country names or negative metrics, such as stock price, sales, book values, and total assets are likewise removed.

⁵ The period- t potential outcome of unit i if it is never treated.

Further refining our dataset, we exclude firms with cash conversion cycles (CCC) or operating cycles (OC) exceeding 365 days and firms with market-to-book ratios outside the range of 0.01- to 3⁶. Companies classified under “unspecified” or “other” industry categories are also omitted to enhance analytical precision. Post-filtering, we winsorize all firm-level variables at the 1% level except for firm age. Descriptive statistics for the refined sample are presented in Table 1 and the correlation matrix is presented in Appendix Figure A1.

Table 1: Summary statistics

| Variables | Obs | Mean | Std. dev. | Min | Max |
|--------------------------|------------|-------------|------------------|------------|------------|
| Total Assets Turnover | 310,737 | 1.106 | 0.702 | 0.113 | 4.074 |
| Fixed Assets Turnover | 310,434 | 10.304 | 22.949 | 0.211 | 171.593 |
| Operating Cycle | 310,737 | 150.184 | 82.597 | 4.000 | 556.000 |
| Cash Conversion Cycle | 310,737 | 87.840 | 78.911 | -111.460 | 321.308 |
| Inventory Days | 310,737 | 74.885 | 61.160 | 1.000 | 289.000 |
| Inventory Turnover | 310,737 | 25.172 | 79.800 | 1.260 | 643.530 |
| Account Receivables Days | 310,737 | 75.299 | 48.977 | 3.000 | 267.000 |
| Receivable Turnover | 310,341 | 9.830 | 16.504 | 1.367 | 121.667 |
| Firm size | 310,737 | 19.286 | 1.942 | 14.525 | 24.270 |
| Ln (GDP) | 310,737 | 28.191 | 1.535 | 23.284 | 30.538 |
| Unemployment | 310,737 | 0.057 | 0.035 | 0.002 | 0.333 |
| Tangibility | 310,737 | 0.320 | 0.217 | 0.006 | 0.887 |
| Lag (sale growth) | 310,737 | 0.139 | 0.440 | -0.553 | 2.958 |
| Free cash flow | 310,737 | 0.615 | 0.487 | 0.000 | 1.000 |
| Capital Intensity | 290,851 | 0.776 | 0.196 | 0.137 | 0.999 |
| Real Interest rate | 252,530 | 0.034 | 0.039 | -0.353 | 0.776 |
| Profit | 310,250 | 0.037 | 0.117 | -0.640 | 0.290 |
| Leverage | 305,283 | 1.390 | 0.472 | 1.000 | 3.826 |
| Investment | 310,654 | 0.058 | 0.070 | 0.000 | 0.463 |
| Dividend | 310,736 | 0.013 | 0.021 | 0.000 | 0.122 |
| Import (%GDP) | 310,737 | 0.390 | 0.418 | 0.046 | 2.210 |

⁶ Our large sample is suitable for filtering rather than winsorizing, which has some limitations related to changing the value of data. In addition, we obtain similar results when regressing the winsorized sample instead of the filtered sample.

Note: This table demonstrates the statistics for the main variables. All firm-level variables are winsorized at 1%.

We conduct an in-depth comparison of our data summary statistics with those found in key existing studies, such as Dasgupta and Žaldokas (2019), Dong et al. (2019), and Ma et al. (2019). This comparison is detailed in Appendix Table A3. Remarkably, our statistical indicators closely align with those in the aforementioned literature attesting to the robustness and comparability of our dataset. For instance, the mean total assets in our sample are commensurate with the mean total assets reported in Dong et al. (2019) and Dasgupta and Žaldokas (2019). The slight divergence can be attributed to differences in data sources and screening methodologies. While we utilize Datastream, these studies rely on Compustat Global and North America Compustat. Further corroborating the consistency across studies, we note that the statistical measures of tangibility are also remarkably similar. Specifically, our mean tangibility measure is 0.32, almost identical to the 0.316 reported in Dasgupta and Žaldokas (2019). Such parallels lend credence to the reliability of our empirical approach and the generalizability of our findings.

We extend our comparative analysis to evaluate the number of unique stocks and firm-year observations in our study relative to those in Ma et al. (2019) and Dong et al. (2019). The outcomes, detailed in Appendix Tables A4 and A5, affirm the consistent statistical characteristics of our filtered dataset in comparison to existing studies. Appendix Table A4, in particular, shows a high degree of similarity in the number of unique firms, as well as firm-year observations across countries between our sample and that of Dong et al. (2019). Notable exceptions are observed for specific countries including Bulgaria, Canada, Croatia, Hong Kong, Romania, Russia, Turkey, Ukraine, and the United States. These discrepancies are documented separately to maintain clarity.

Moving to Appendix Table A5, the differential counts of unique stocks and firm-year observations between our study and Dong et al. (2019) can be largely attributed to the divergent data sources employed. For instance, while Dong et al. (2019) reports 22,498 unique firms in the United States our dataset contains 7,365 unique firms, a count that interestingly exceeds the 4,067 unique U.S. firms reported by Ma et al. (2019) who also rely on Datastream for cross-country analyses. Similarly, our dataset includes 141 unique stocks in Bulgaria, a figure nearly nine times larger than the 17 reported by Dong et al. (2019). In conclusion, the consistency in

key statistical characteristics between our dataset and those of existing studies lends considerable credibility to our empirical approach and findings. Given the minor variations that do exist, our data remain broadly aligned with the extant literature underscoring its reliability and robustness.

To seamlessly transition from our discussion of summary statistics, we now turn to the regulatory landscape that forms the backbone of this study. We have meticulously collected data pertaining to the passage of leniency laws across 64 countries. This information is primarily sourced from Dasgupta and Žaldokas (2019), “Getting the Deal Through,” and corroborated with official local documents. Details concerning the years of leniency law passages are systematically presented in Table 2 and pictorially represented in Figure 2 for an intuitive understanding. Table 2 extends the work of Dasgupta and Žaldokas (2019), which originally documented leniency passages by countries based on Cartel Regulation 2013. Our contribution uniquely updates and enriches this dataset by incorporating the most recent information from Cartel Regulation 2018, published in “Getting the Deal Through,” as well as from local official laws. Specifically, we provide updated years for leniency laws in Hong Kong, Indonesia, and Kenya, thereby offering a more current and comprehensive view of the global leniency landscape.

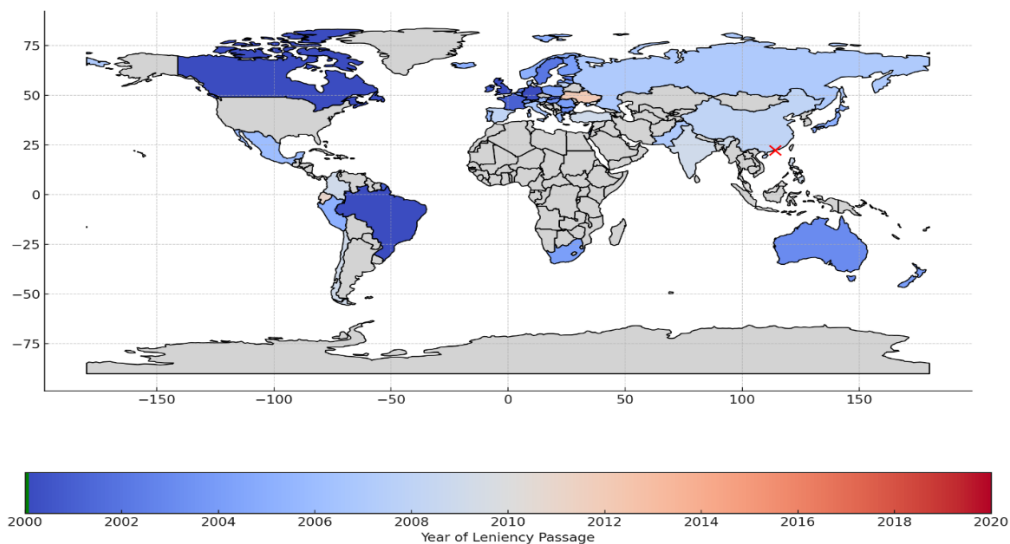


Figure 2: Leniency passage globally

Note: This figure presents a world map illustrating the years in which various countries have implemented leniency laws. The color scheme ranges from blue to red with blue representing earlier implementations and red denoting later implementations. The data ranges from the year 1993-2017.

Table 2: Leniency passages

| Country | Year | Country | Year |
|----------------|------|----------------|------|
| Argentina | None | Lithuania | 2008 |
| Australia | 2003 | Luxembourg | 2004 |
| Austria | 2006 | Malaysia | 2010 |
| Belgium | 2004 | Mexico | 2006 |
| Brazil | 2000 | Netherlands | 2002 |
| Bulgaria | 2003 | New Zealand | 2004 |
| Canada | 2000 | Nigeria | None |
| Chile | 2009 | Norway | 2005 |
| China | 2008 | Oman | None |
| Colombia | 2009 | Pakistan | 2007 |
| Croatia | 2010 | Peru | 2005 |
| Cyprus | 2011 | Philippines | 2009 |
| Czech Republic | 2001 | Poland | 2004 |
| Denmark | 2007 | Portugal | 2006 |
| Ecuador | 2011 | Romania | 2004 |
| Estonia | 2002 | Russia | 2007 |
| Finland | 2004 | Singapore | 2006 |
| France | 2001 | Slovakia | 2001 |
| Germany | 2000 | Slovenia | 2010 |
| Greece | 2006 | South Africa | 2004 |
| Hong Kong | 2015 | Spain | 2008 |
| Hungary | 2003 | Sweden | 2002 |
| Iceland | 2005 | Switzerland | 2004 |
| India | 2009 | Thailand | None |
| Indonesia | None | Turkey | 2009 |
| Ireland | 2001 | Ukraine | 2012 |
| Israel | 2005 | United Kingdom | 1998 |
| Italy | 2007 | U.S. | 1993 |
| Japan | 2005 | Venezuela | None |
| Jordan | None | Zambia | None |
| Korea | 1997 | Kenya | 2017 |
| Latvia | 2004 | Viet Nam | None |

Note: This table builds upon the leniency passages by countries as presented by Dasgupta and Žaldokas (2019) that drew from Cartel Regulation 2013. Our analysis augments this foundational data with the latest updates from Cartel Regulation 2018, published by Getting the Deal Through, as well as from local official statutes. Notably, we furnish revised years for the implementation of leniency laws in Hong Kong, Indonesia, and Kenya.

2.5. Results

2.5.1. Parallel trend test

The DiD imputation estimator developed by Borusyak et al. (2024) offers an unbiased and efficient estimator of the estimand of interest. In addition, the parallel trend test based on such a method is more advanced than the current existing parallel trend testing approaches. The traditionally joint test of coefficients on leads in OLS is contaminated by treatment effect heterogeneity, which is proved by Sun and Abraham (2020). Moreover, the recently proposed placebo test based on robust estimators does not distinguish between estimation and testing. The approach proposed by Borusyak et al. (2024) regarding parallel assumption testing outperforms these two approaches as it only deals with the pre-treatment observation. By leveraging this method, our analysis isolates parallel trend tests to focus solely on pre-treatment and never-treated observations, thereby separating them from treated observations and sidestepping the biases inherent in traditional joint tests of coefficients during lead periods.

We run the regression below on the untreated sample to falsify the parallel trend violation:

$$Y_{it} = X_{i,c} + \gamma_i + \tau_t + D_{it} * \mu + \varepsilon_{it} \quad (3)$$

where D_{it} is the set of indicators for observations during many periods before treatment ($t < 0$) with the periods before t serving as the reference group. For example, observations at t^{th} periods before the treatment date will receive the value of $D_{it} = 0$ and 1 otherwise. $X_{i,c}$ is a vector of the different firm and country controls as in the main specification, while γ and τ are firm and year fixed effects, respectively, clustering at country-industry level following Dasgupta et al. (2018). In particular, similar to the baseline regression model, $X_{i,c}$ contains firm-level and country-level covariates representing firm size, sales growth, leverage, tangibility, free cash flow, GDP, unemployment, and imports as a percentage of GDP following Cheng et al. (2018) and Dasgupta and Žaldokas (2019). In addition, when examining the regulatory effects on working capital management (proxied by Cash Conversion Cycle and Operating Cycle) and their components, we also control for capital intensity, real interest rate, profit, leverage, investment, and dividends following Gaur et al. (2005) and Jalal and Khaksari (2020).

We estimate μ by using OLS on untreated observations only, followed by a joint null test that $\mu = 0$ by using the Chi-squared test. That the Prob > chi2 of the joint null test is higher than 0.05 supports that the parallel trend assumption is not violated at the 5% significant level. In other words, there is an insignificant difference between the treatment and control groups before the event date at the associated significance level. Although there is no universal optimal choice of k (Borusyak et al., 2024), we follow Dasgupta and Žaldokas (2019) and Nguyen et al. (2022) to choose $k = 2$. Apart from that, we also go further to test the parallel trend assumption at $k = 3$ to solidify our results. Based on the findings presented in Appendix Table A6, we find that the parallel trend assumption holds true in the majority of cases with the notable exceptions of Days Payable Outstanding (DPO). Owing to the violation of the parallel trend assumption for DPO, we have chosen to exclude this variable from our analyses.

2.5.2. Leniency laws and operational efficiency

In this section, we delve into the empirical impact of the enactment of leniency laws on corporate operational efficiency. Initially, we shed light on the general trends indicating whether firms experience a decline in operational efficiency following the introduction of amnesty policies. Subsequently, we disaggregate this effect to ascertain whether it emanates from long-term or short-term asset management efficiency. Finally, we explore the specific components driving the observed dynamics in working capital efficiency post-implementation of leniency laws.

2.5.2.1. Impact of leniency passages on total assets turnover

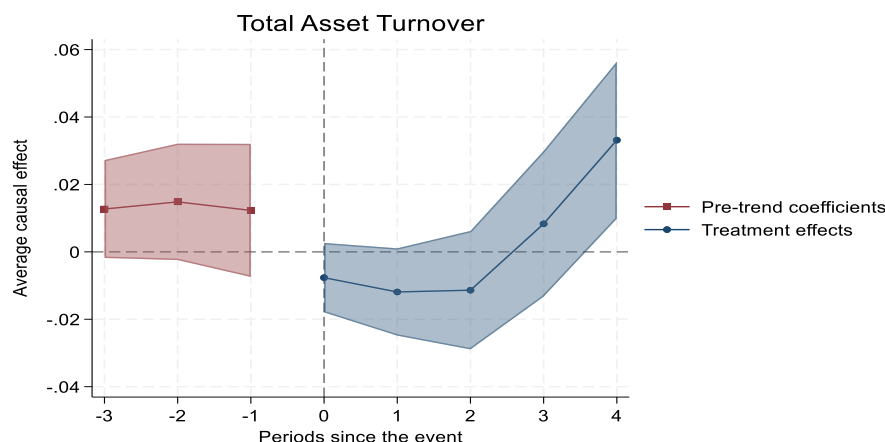


Figure 3: The effects of leniency passages on total assets turnover

Note: The graph utilizes shaded areas to represent the disparity in total asset turnover between the treatment and control groups. Red shaded areas illustrate the trend prior to the implementation of the leniency laws serving as a visual representation of our parallel trend assumptions. Post-event, the blue shaded areas capture the shifts in total asset turnover disparities between the two groups attributed to the enactment of the leniency policies. In essence, the red shaded areas set the baseline for parallel trends, while the blue shaded areas reveal the treatment effect on asset turnover after the introduction of leniency laws.

Table 3: The effects of leniency passages on total assets turnover

| | (1) | (2) | (3) | (4) |
|-----------------------------|---------|---------|---------|---------|
| | 1 year | 2 years | 3 years | 4 years |
| τ_w | -0.009* | -0.010 | -0.006 | 0.001 |
| | (0.085) | (0.110) | (0.391) | (0.855) |
| Firm fixed effects | Y | Y | Y | Y |
| Year fixed effects | Y | Y | Y | Y |
| Cluster by country-industry | Y | Y | Y | Y |
| Controls | Y | Y | Y | Y |
| N | 109,781 | 120,739 | 132,688 | 146,216 |

*Note: The dependent variable is total asset turnover. We control for firm and year fixed effects and clustering by country-industry following Dasgupta & Žaldokas (2019). The firm-level and country-level covariates standing for firm size, sales growth, leverage, tangibility, free cash flow, GDP, unemployment, and imports as a percentage of GDP following Cheng et al. (2018) and Dasgupta & Žaldokas (2019). The coefficient of interest here is τ_w , which denotes the impact of leniency programs on firms' total assets turnover. Significance levels are denoted as follows: *** signifies 1%, ** indicates 5%, and * represents 10%.*

In line with our first hypothesis (H1), the empirical evidence presented in Table 3 and visually illustrated in Figure 3 corroborates the indeterminate net impact of leniency laws on total asset turnover. Specifically, we assess the average impact on firms' total assets turnover at intervals of one, two, three, and four years following the enforcement year of the respective laws. The insignificant coefficients associated with τ_w across the four years after leniency enactment imply the indeterminate effect of leniency passages on total assets turnover. Our results supports the conceptual framework that contends for offsetting dynamics in firms' operational behavior following the enactment of leniency policies. Specifically, firms appear to engage in a complex interplay of short-term and long-term strategic adjustments. The extended credit terms, a short-term strategy to maintain or capture market share, have the potential to prolong the operating cycle, thereby diluting asset turnover. Alternatively, firms seem to invest concurrently when optimizing their fixed asset utilization, a long-term strategy aimed at sustainable growth. This increased efficiency in fixed assets utilization acts as a countervailing force mitigating the dilutive impact of more lenient credit policies on asset turnover. Our findings corroborate Bardazzi & Ghezzi's (2018) empirical evidence that increased investment in fixed assets enhances firms' trade competitiveness through improved price and non-price measures. Chheng and Pike (2003) suggest that relaxing credit periods to improve customer relations, especially for buyers with seasonal products or hard-to-verify product quality, supports the idea that such credit relaxation can enhance firms' long-term competitiveness by bolstering loyalty and encouraging repeat business.

The duality of these effects, clearly highlighted through our empirical findings, makes it challenging to pinpoint a uniform directionality for the impact of leniency laws on asset turnover. Thus, the results substantiate our initial hypothesis that the net impact on total asset turnover is indeed indeterminate due to these offsetting operational adjustments.

2.5.2.2. Impact of leniency passages on long-term and short-term asset management efficiency

Table 4: The effects of leniency passages on long-term and short-term asset management efficiency

| Panel A: The effects of leniency passages on fixed assets turnover | | | | |
|---|---------|---------|---------|---------|
| | (1) | (2) | (3) | (4) |
| | 1 year | 2 years | 3 years | 4 years |
| τ_w | 0.26** | 0.227* | 0.292** | 0.373** |
| | (0.04) | (0.096) | (0.044) | (0.02) |
| Firm fixed effects | Y | Y | Y | Y |
| Year fixed effects | Y | Y | Y | Y |
| Cluster by country-industry | Y | Y | Y | Y |
| Controls | Y | Y | Y | Y |
| N | 109,732 | 120,684 | 132,626 | 146,145 |
| Panel B: Short-term asset management | | | | |
| Panel B.1: Operating Cycle | | | | |
| | (1) | (2) | (3) | (4) |
| | 1 year | 2 years | 3 years | 4 years |
| τ_w | 1.669** | 1.875** | 1.75* | 1.25 |
| | (0.044) | (0.038) | (0.067) | (0.202) |
| Firm fixed effects | Y | Y | Y | Y |
| Year fixed effects | Y | Y | Y | Y |
| Cluster by country-industry | Y | Y | Y | Y |
| Controls | Y | Y | Y | Y |
| N | 85,030 | 93,691 | 103,391 | 114,584 |
| Panel B.2: Cash Conversion Cycle | | | | |
| | (1) | (2) | (3) | (4) |
| | 1 year | 2 years | 3 years | 4 years |
| τ_w | -1.42 | -0.91 | -0.117 | 0.136 |
| | (0.126) | (0.367) | (0.91) | (0.898) |
| Firm fixed effects | Y | Y | Y | Y |
| Year fixed effects | Y | Y | Y | Y |
| Cluster by country-industry | Y | Y | Y | Y |
| Controls | Y | Y | Y | Y |
| N | 85,030 | 93,691 | 103,391 | 114,584 |

*Note: The dependent variables are FAT, OC, and CCC. We control for firm and year fixed effects and clustering by country-industry following Dasgupta (2019). The firm-level and country-level covariates standing for firm size, sales growth, leverage, tangibility, free cash flow, GDP, unemployment, and imports as a percentage of GDP follow Cheng et al. (2018) and Dasgupta & Žaldokas (2019). In addition, when examining the regulatory effects on working capital management (proxied by CCC and OC) and their components, we also control for capital intensity, real interest rate, profit, investment, and dividends following Gaur et al. (2005) and Jalal & Khaksari (2020). The coefficient of interest here is τ_w , which denotes the impact of leniency programs on firms' long-term and short-term asset management efficiency. Significance levels are denoted as follows: *** signifies 1%, ** indicates 5%, and * represents 10%.*

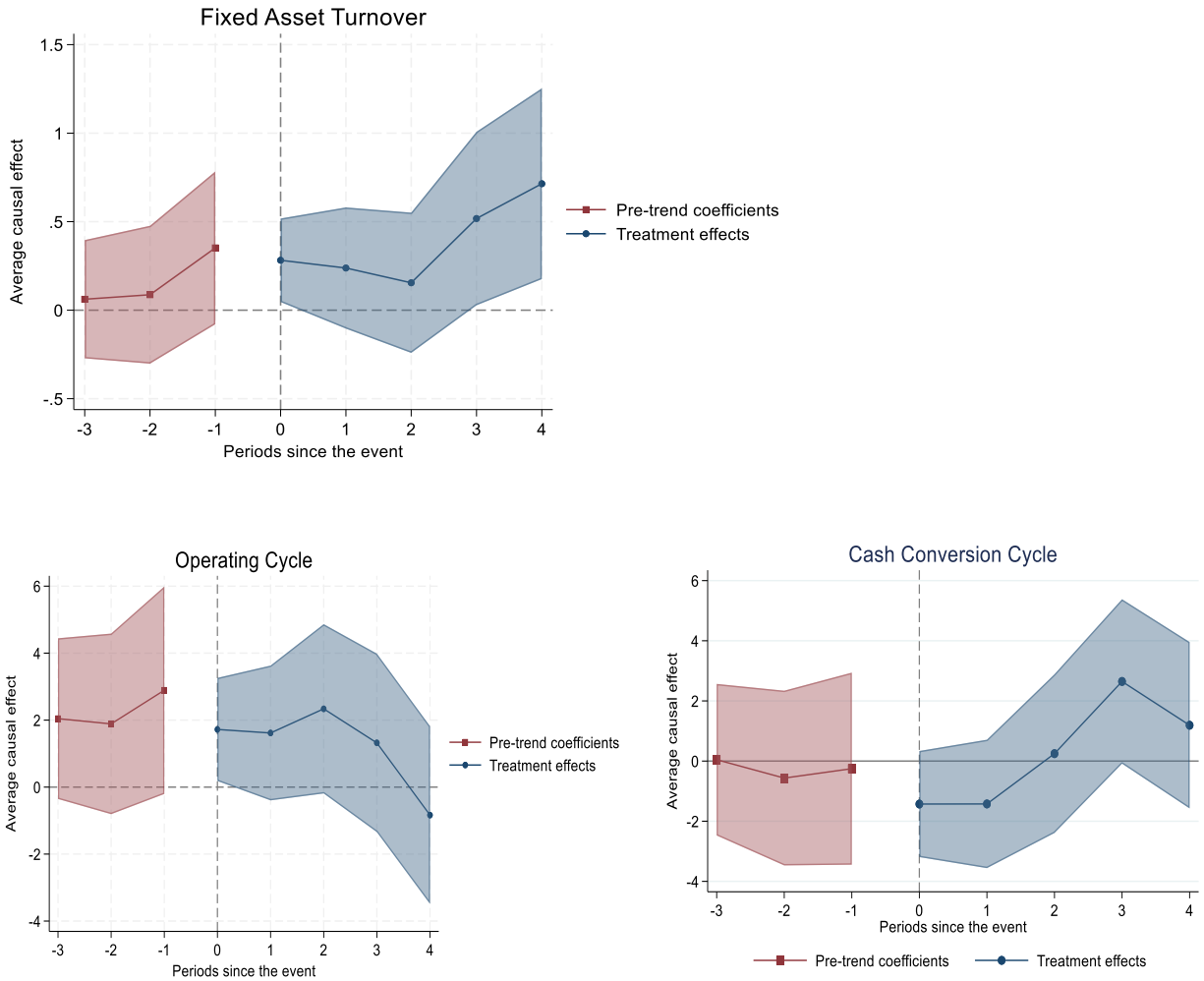


Figure 4: The effects of leniency passages on long-term and short-term asset management efficiency

Note: The graph utilizes dots to represent the disparity in long-term and short-term asset management efficiency between the treatment and control groups. Red shaded areas illustrate the trend prior to the implementation of the leniency laws serving as a visual representation of our parallel trend assumptions. Post-event, the blue shaded areas capture the shifts in long-term and short-term asset management efficiency disparities between the two-group attributed to the enactment of the leniency policies. In essence, the red shaded areas set the baseline for parallel trends, while the blue shaded areas reveal the treatment effect on long-term and short-term asset management efficiency after the introduction of leniency laws.

The empirical results delineated in Panel A of Table 4 and graphically represented in Figure 4 offer a strong validation of our second hypothesis (H2), positing an increase in FAT following the enactment of leniency laws. The data clearly shows a discernible uptick in FAT ratios for

firms operating in jurisdictions where such leniency policies have been implemented. Our findings can be viewed as a strategic response by firms to the challenging regulatory landscape shaped by anti-collusion measures. As theorized, firms appear to pivot towards optimizing their fixed asset utilization, a move that yields multiple financial benefits. Elevated FAT ratios not only ameliorate firms' liquidity and credit ratings, consistent with research by Chauhan (2023) and Lee (2023), but also serve as a robust indicator of long-term sustainability (Dvouletý et al., 2021).

In essence, the rise in FAT ratios can be construed as a tactical adaptation enabling firms to mitigate some of the adverse consequences of a more stringent regulatory environment. This operational shift translates into firmer financial footing endowing firms with the resilience and flexibility needed to compete effectively in markets now characterized by stringent compliance requirements. Furthermore, the sustained improvement in FAT for a four-year period following the implementation of leniency laws underscores the enduring nature of this strategic shift and its long-term implications for operational efficiency.

Pivoting from FAT's long-term significance, our attention shifts to short-term asset management as seen in Panel B of Table 4 and Figure 3. The data clearly validates our third hypothesis (H3) pointing to an extended Operating Cycle following the adoption of leniency laws. This suggests a decline in short-term operational efficiency. In consonance with our theoretical framework, this observed shift in short-term asset management can be interpreted as a strategic adjustment made by firms in response to a challenging regulatory environment. Notably, the lengthening of these cycles is suggestive of firms possibly extending credit sales terms as a tactic to either preserve or gain market share. Such an approach brings its own set of trade-offs. It may effectively expand the customer base, but at the expense of tying up working capital for more extended periods, thereby negatively affecting short-term liquidity metrics. However, the phenomenon decreases over time in both magnitude and significance levels indicating that the initial adverse effects on short-term operational efficiency may be mitigated as firms adapt to the new regulatory landscape. This diminishing impact suggests that firms could be fine-tuning their credit policies, collection efforts, and inventory management over time to regain some of the efficiency lost due to the initial shift in strategic focus.

This behavior is in line with a well-recognized understanding of the role of working capital management in corporate finance, especially under changing economic conditions. The elongation of the Operating Cycle and CCC resonates with traditional financial wisdom and corroborates findings in the established literature emphasizing the critical role of working capital management in balancing profitability and liquidity risks (Abuzayed, 2012; Deakin, 1976; So, 1994).

2.5.2.3. Impact of leniency passages on inventory and receivables operational efficiency

Table 5: Impact of leniency passages on inventory and receivables operational efficiency around leniency passages

Panel A: Inventory

Panel A.1: Inventory Days

| | (1) | (2) | (3) | (4) |
|-----------------------------|---------|---------|---------|---------|
| | 1 year | 2 years | 3 years | 4 years |
| τ_w | 0.616 | 0.783 | 0.649 | 0.374 |
| | (0.347) | (0.275) | (0.388) | (0.637) |
| Firm fixed effects | Y | Y | Y | Y |
| Year fixed effects | Y | Y | Y | Y |
| Cluster by country-industry | Y | Y | Y | Y |
| Controls | Y | Y | Y | Y |
| N | 85,030 | 93,691 | 103,391 | 114,584 |

Panel A.2: Inventory Turnover

| | (1) | (2) | (3) | (4) |
|-----------------------------|---------|---------|---------|---------|
| | 1 year | 2 years | 3 years | 4 years |
| τ_w | -0.432 | 0.013 | 0.268 | 1.009 |
| | (0.517) | (0.983) | (0.659) | (0.108) |
| Firm fixed effects | Y | Y | Y | Y |
| Year fixed effects | Y | Y | Y | Y |
| Cluster by country-industry | Y | Y | Y | Y |
| Controls | Y | Y | Y | Y |
| N | 85,030 | 93,691 | 103,391 | 114,584 |

Table 5: Impact of leniency passages on inventory and receivables operational efficiency around leniency passages (continued)

Panel B: Receivables

Panel B.1: Receivable Days

| | (1) | (2) | (3) | (4) |
|---------------------------------|---------|---------|---------|---------|
| | 1 year | 2 years | 3 years | 4 years |
| τ_w | 1.053* | 1.092* | 1.103 | 0.876 |
| | (0.057) | (0.078) | (0.109) | (0.22) |
| Firm fixed effects | Y | Y | Y | Y |
| Year fixed effects | Y | Y | Y | Y |
| Cluster by country- industry | Y | Y | Y | Y |
| Controls | Y | Y | Y | Y |
| N | 85,030 | 93,691 | 103,391 | 114,584 |

Panel B.2: Receivable Turnover

| | (1) | (2) | (3) | (4) |
|---------------------------------|----------|----------|-----------|---------|
| | 1 year | 2 years | 3 years | 4 years |
| τ_w | -0.247** | -0.302** | -0.2961** | -0.229 |
| | (0.033) | (0.016) | (0.032) | (0.129) |
| Firm fixed effects | Y | Y | Y | Y |
| Year fixed effects | Y | Y | Y | Y |
| Cluster by country- industry | Y | Y | Y | Y |
| Controls | Y | Y | Y | Y |
| N | 84,903 | 93,537 | 103,211 | 114,375 |

*Note: The dependent variables are Inventory Days Outstanding, Inventory Turnover, Account Receivable Days, and receivable turnover. We control for firm and year fixed effects and clustering by country-industry following Dasgupta (2019). The firm-level and country-level covariates standing for firm size, sales growth, leverage, tangibility, free cash flow, GDP, unemployment, and imports as a percentage of GDP follow Cheng et al. (2018) and Dasgupta & Žaldokas (2019). In addition, when examining the regulatory effects on working capital management (proxied by Cash Conversion Cycle and Operating Cycle) and their components, we also control for capital intensity, real interest rate, profit, investment, and dividends following Gaur et al. (2005) and Jalal & Khaksari (2020). The coefficient of interest here is τ_w , which denotes the impact of leniency programs on firms' operational efficiency. Significance levels are denoted as follows: *** signifies 1%, ** indicates 5%, and * represents 10%.*

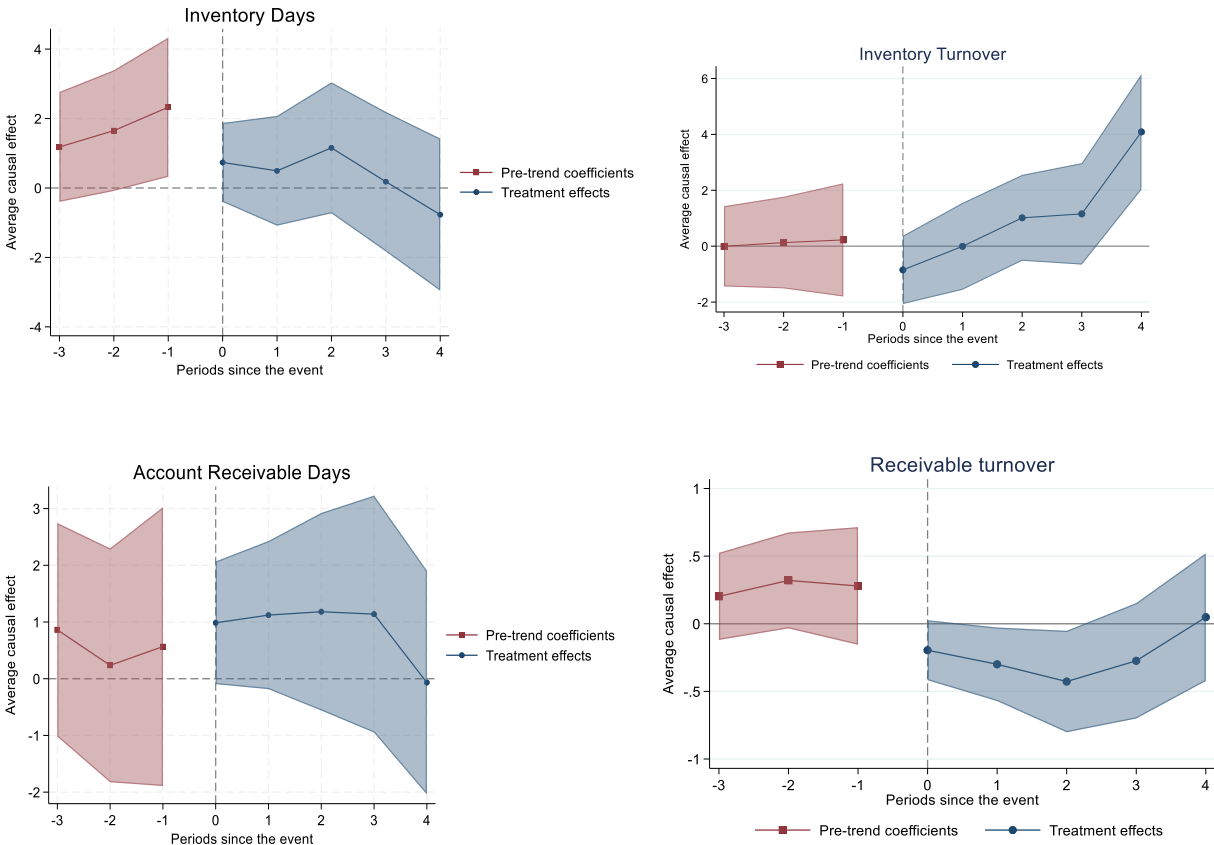


Figure 5: Impact of leniency passages on inventory and receivables management efficiency around leniency passages

Note: The graph utilizes dots to represent the disparity in inventory and receivables management efficiency between the treatment and control groups. Red shaded areas illustrate the trend prior to the implementation of the leniency laws, serving as a visual representation of our parallel trend assumptions. Post-event, the blue shaded areas capture the shifts in inventory and receivables management efficiency disparities between the two groups attributed to the enactment of the leniency policies. In essence, the red shaded areas set the baseline for parallel trends, while the blue shaded areas reveal the treatment effect in inventory and receivables management efficiency after the introduction of leniency laws.

In light of the empirical results presented in Panel A of Table 5 and visually illustrated in Figure 5, we find compelling evidence to affirm our fourth hypothesis (H4). As postulated, the net impact of leniency laws on inventory operational efficiency proves to be indeterminate. This ambiguity arises from a complex interplay of factors that manifest post-lenieny. The dilution of market power, a central tenet of antitrust economics, engenders a competitive landscape that could logically lead to decreased inventory levels as firms relinquish the buffer they once maintained. Alternatively, our findings indicate a counterbalancing effect stemming from

increased investments in innovation evidenced by an uptick in patents and machinery (Dasgupta & Žaldokas, 2019). Such strategic reorientation could necessitate higher inventory levels muddying the straightforward inverse relationship between market power and inventory.

Building upon our empirical findings presented in Panel B of Table 5 and the graphical representations showcased in Figure 5, we ascertain that Hypothesis 5 finds substantial validation. The hypothesis posited that in the aftermath of leniency programs, the operational efficiency of firms' receivables would witness a decline. Our findings corroborate this claim, manifesting a statistically significant decrease in metrics pertaining to the efficiency of account receivables management. Nevertheless, the data shows a diminishing trend in both the magnitude and statistical significance of this impact over time implying a possible mitigation of the initial detrimental effects on receivable operational efficiency as firms acclimatize to the altered regulatory milieu. Such temporal changes may be indicative of firms gradually optimizing their credit extension strategies, thereby recovering some of the operational efficiency initially compromised by the regulatory shift.

The multi-faceted relationship between leniency programs and operational efficiency is substantiated in the corpus of the financial literature. Our study's results echo the theoretical frameworks laid out by El Ghouli and Zheng (2016), which indicated a surge in credit risk upon the extension of trade credit, particularly under intensified competitive conditions. Similarly, our results also resonate with Gissler et al. (2020) who demonstrated that due to increased competition in consumer credit markets following regulatory changes, firms expand credit to a riskier clientele exacerbating the already intricate dynamics of receivables management.

Our findings, therefore, present a critical extension to the literature concerning the unintended consequences of antitrust regulations on firms' short-term financial policies. The observed decline in receivable operational efficiency can be viewed as a repercussion of the legal constraints that prevent firms from utilizing price discrimination as a competitive tool. To circumvent this, firms resort to extending trade credit which, while effective in attracting a broader customer base, hampers the efficient management of receivables. This finding is particularly poignant given that trade credit is often used as an implicit quality assurance mechanism adding a further layer of complexity to its management in a post-leniency landscape.

In addition, payment terms relaxation offers firms the capacity to circumvent legal constraints on explicit price changes (Brennan et al., 1988; Mian & Smith, Jr., 1992). Moreover, extending trade credit serves multiple operational goals, such as boosting sales, bolstering seller-buyer relationships, advertising, and certifying product quality (Deloof & Jegers, 1996; Kim & Atkins, 1978; Martínez-Sola et al., 2014). We conclude that receivable operational efficiency declines post-implementation of leniency programs affirming Hypothesis 5 as a robust contribution to the existing discourse on the multifaceted implications of antitrust laws on firms' financial strategies.

Overall, our empirical findings underscore a multifaceted impact of leniency laws on firms' asset management strategies. It is evident that firms demonstrate a sustained increase in FAT for the entire four-year period following the enactment of leniency laws. This could be perceived as a long-term strategic adaptation aimed at enhancing operational efficiency and financial stability, particularly in a regulatory environment that has grown increasingly stringent. Conversely, the immediate aftermath of leniency law introduction witnesses an extension of the Operating Cycle driven mainly by the extension of credit sales terms. While this has the downside of tying up working capital and reducing short-term liquidity, the magnitude and significance of this impact attenuate over time. This suggests that firms are likely adjusting their credit policies to mitigate the initial effects on short-term operational efficiency. Therefore, while leniency passages initially appear to tax short-term efficiency, firms adapt over time to minimize this impact even as they continue to realize gains in long-term asset utilization.

2.5.2.4. Results on other determinants

Table 6: Coefficients of control variables in regressions

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|---------------------|----------------------------------|----------------------------------|------------------------|----------------------------------|---------------------------|-------------------------------|-------------------------------------|---------------------------------|
| | <i>Total Assets Turnover</i> | <i>Fixed Assets Turnover</i> | <i>Operating Cycle</i> | <i>Cash Conversion Cycle</i> | <i>Inventory days</i> | <i>Inventory Turnover</i> | <i>Account Receivables Days</i> | <i>Receivables Turnover</i> |
| Firm size | -0.1817*** (0.000) | -2.328*** (0.000) | 7.85*** (0.000) | 4.83*** (0.005) | 2.329* (0.076) | -2.833** (0.019) | 5.52*** (0.000) | -0.827*** (0.000) |
| Ln(GDP) | 0.2887*** (0.000) | 1.25 (0.289) | -9.6 (0.373) | -21.2*** (0.03) | -2.71 (0.714) | 5.442 (0.219) | -6.893 (0.321) | 1.471 (0.126) |
| Unemployment | -0.219 (0.232) | -5.89 (0.112) | -3.71 (0.916) | -65.81 (0.107) | 21.74 (0.368) | -13.601 (0.593) | -25.45 (0.246) | 6.685* (0.074) |
| Import (%GDP) | -0.175*** (0.000) | 2.91*** (0.006) | 8.657 (0.119) | 18.825*** (0.001) | 8.088 (0.128) | 3.5923 (0.379) | 0.568 (0.832) | 0.6202 (0.229) |
| Tangibility | -0.1917*** (0.000) | -24.73*** (0.000) | -7.505 (0.187) | -18.914*** (0.002) | 41.86*** (0.000) | -45.173*** (0.000) | -49.37*** (0.000) | 5.845*** (0.000) |
| Lag(sale growth) | 0.094*** (0.000) | 0.898*** (0.000) | -7.825*** (0.000) | -6.27*** (0.000) | -5.191*** (0.000) | 1.98*** (0.007) | -2.634*** (0.000) | 0.3264*** (0.001) |
| Free cash flow | 0.059*** (0.000) | 0.5449*** (0.000) | -6.35*** (0.000) | -4.38*** (0.000) | -2.55*** (0.000) | -0.40009 (0.386) | -3.794*** (0.000) | 0.1914** (0.022) |

Table 6: Coefficients of control variables in regressions (continued)

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|---------------------------------|----------------------------------|----------------------------------|----------------------------|----------------------------------|---------------------------|-------------------------------|-------------------------------------|---------------------------------|
| | <i>Total Assets Turnover</i> | <i>Fixed Assets Turnover</i> | <i>Operating Cycle</i> | <i>Cash Conversion Cycle</i> | <i>Inventory days</i> | <i>Inventory Turnover</i> | <i>Account Receivables Days</i> | <i>Receivables Turnover</i> |
| Leverage | -0.0818*** (0.000) | -0.0729 (0.794) | 4.946*** (0.000) | 5.02*** (0.000) | 4.023*** (0.000) | -0.196 (0.827) | 0.9223 (0.244) | -0.426** (0.012) |
| Capital Intensity | | | -109.04*** (0.000) | -111.56*** (0.000) | -159.978*** (0.000) | 93.15*** (0.000) | 50.93*** (0.000) | -2.817*** (0.001) |
| Real Interest rate | | | 23.79*** (0.013) | 36.63*** (0.000) | 7.344 (0.299) | -0.1141 (0.987) | 16.446*** (0.005) | -2.278*** (0.034) |
| Profit | | | -118.267*** (0.000) | -90.42*** (0.000) | -51.771*** (0.000) | 19.49*** (0.008) | -66.495*** (0.000) | 9.374*** (0.000) |
| Investment | | | -40.58*** (0.000) | -29.56*** (0.000) | -17.59*** (0.000) | 4.697 (0.203) | -22.992*** (0.000) | 0.012 (0.227) |
| Dividend | | | -51.75*** (0.004) | -18.84 (0.353) | -1.32 (0.907) | 4.856 (0.717) | -50.42*** (0.000) | 8.879*** (0.001) |
| Firm fixed effects | Y | Y | Y | Y | Y | Y | Y | Y |
| Year fixed effects | Y | Y | Y | Y | Y | Y | Y | Y |
| Cluster by country- industry | Y | Y | Y | Y | Y | Y | Y | Y |
| Controls | Y | Y | Y | Y | Y | Y | Y | Y |
| N | 141,142 | 142,652 | 110,660 | 110,660 | 110,660 | 110,660 | 110,660 | 110,468 |
| adj. R-sq | 0.87 | 0.75 | 0.8 | 0.78 | 0.82 | 0.74 | 0.77 | 0.85 |

*Note: The dependent variables are all variables standing for operational efficiency in our study. We control for firm and year fixed effects and clustering by country-industry following Dasgupta & Zaldokas (2019). The firm-level and country-level covariates standing for firm size, sales growth, leverage, tangibility, free cash flow, GDP, unemployment, and imports as a percentage of GDP follow Cheng et al. (2018) and Dasgupta & Žaldokas (2019). In addition, when examining the regulatory effects on working capital management (proxied by Cash Conversion Cycle and Operating Cycle) and their components, we also control for capital intensity, real interest rate, profit, investment, and dividends following Gaur et al. (2005) and Jalal & Khaksari (2020). Significance levels are denoted as follows: *** signifies 1%, ** indicates 5%, and * represents 10%.*

In Table 6, we present the regression coefficients table that clarifies the impact of independent variables on the dependent variables in question. This multivariate regression table offers a comprehensive view of the relationships providing coefficients, standard errors, and other pertinent statistics. Given the incorporation of both firm and country-level variables in our analysis, we will initially direct our attention to the firm-level variables to isolate their specific impact on the dependent variables. In our analysis of the impact of leniency passage on operational efficiency, employing the DiD imputation approach as outlined by Borusyak (2024), we focus on the pre-implementation period for all control variables to ensure the purity and accuracy of our findings. Leniency laws, by design, influence not only the operational efficiency of firms but also other dimensions of their performance and behavior, which could inadvertently affect the independent variables. Running the regression on the pre-implementation sample allows us to establish a clear, uncontaminated baseline against which the post-implementation effects can be measured, which aligns with the argument from Borusyak (2024) in his novel DiD imputation estimator.

The negative association between firm size and operational efficiency may stem from a complex interplay of factors. Larger firms often experience bureaucratic inertia (Acs et al., 1997) resulting in slower decision-making processes and may reach a point where the complexity of management leads to diseconomies of scale (Zhang et al., 2023). Additionally, the heterogeneity in business operations and monitoring difficulties can also impede efficiency improvements (Akın Ateş et al., 2022). High tangibility, representing substantial investments in physical assets like machinery and equipment, might hinder efficiency in revenue generation leading to lower total and fixed asset turnover. This investment in tangible assets can also slow down the overall liquidity process negatively impacting the cash conversion cycle and inventory management (Yılmaz & Nobanee, 2023). Alternatively, the tangible nature of these assets can sometimes expedite the collection process positively affecting receivable turnover (Lee, 2023).

Sales growth, an essential gauge of market achievement, is intrinsically linked to a firm's operational efficiency. Increasing sales often catalyze economies of scale (Fetz & Filippini, 2010) diminishing the per-unit production cost. Such growth paves the way for strategic resource optimization as evidenced in improved inventory management and more efficient supply chain systems (Kuei et al., 2001) which, in turn, boosts total asset turnover. Additionally, a rise in sales

often triggers investment in new technologies and systems that uplift both short-term and long-term asset management elevating FAT (Coad et al., 2021). This harmonious relationship between sales growth and operational efficacy underscores a firm's adeptness in balancing resource allocation and strategy to meet rising market demand. Moreover, substantial free cash flow offers firms the latitude to pursue strategic initiatives aimed at enhancing operational efficiency (Jeffrey et al., 2010; Xin et al., 2019). This financial cushion enables targeted investments in areas like cutting-edge technology, equipment modernization, or R&D projects that align with long-term goals for growth and efficiency (Li & Zhan, 2019). A robust free cash flow is also indicative of well-managed accounts for receivables, inventory, and payables signaling an efficiently run operating cycle that bolsters overall productivity. In summary, free cash flow serves as a driving force that enables firms to focus on optimizing both long-term assets and short-term operational effectiveness contributing to a competitive advantage and stronger financial outcomes.

Leverage, or the ratio of a company's debt to its equity, can indicate the extent to which a firm relies on borrowed funds to finance its operations. While leverage can provide the necessary capital for growth and investment, it also brings about obligations for interest payments and principal repayments. These financial commitments can constrain a firm's operational flexibility and ability to invest in areas that may enhance efficiency, such as technology upgrades, process improvements, or talent development (Bancel & Mittoo, 2011). Firms with high leverage may find themselves prioritizing debt servicing over operational optimization leading to potential inefficiencies in inventory management, accounts receivable, or overall asset utilization (Shi et al., 2020; Xie et al., 2023). Moreover, higher leverage can signal financial risk that might restrict a firm's access to further credit and, thus, limit its agility in responding to market opportunities or challenges (Beltrame et al., 2018).

When it comes to the determinants for short-term operational efficiency, capital intensity, indicative of a substantial investment in fixed assets like machinery and buildings, can foster an improvement in short-term operational efficiency as demonstrated by its positive association with measures like OC, CCC, and Inventory days. Capital-intensive firms, by virtue of their significant investment in production and automation technologies, may have more streamlined processes (Lu et al., 2023b). This could lead to a quicker conversion of inventory into sales and, subsequently, into cash thereby enhancing short-term operational efficiency. However, the relationship with

receivable days presents an intriguing exception. In firms with a high degree of capital intensity, the extension of payment terms to customers becomes a particularly detailed strategic decision. One contributing factor is the high fixed cost structure common to capital-intensive firms that creates a critical need for consistent and predictable revenue streams. Offering longer credit terms can serve as a customer retention strategy, thereby ensuring a more stable revenue base over time (Vittas & Cho, 1995). Furthermore, for capital-intensive firms, the practice of extending payment terms can often be tied to long-term contracts or strategic alliances (von Hirschhausen & Neumann, 2008). For example, offering longer receivable periods may be part of a broader negotiation strategy that includes volume discounts or other trade-offs that could be mutually beneficial in a long-term contract.

Profitable firms often demonstrate robust managerial practices that are conducive to efficient operations, especially in the short term (Jin et al., 2021; Narayan, 2018; Vuong et al., 2024). High profits endow these firms with the liquidity and capital necessary for various types of investments, be it in capacity expansion, technology upgrades, or market diversification. Such investments, while primarily growth-oriented, have a collateral positive impact on operational efficiency. They provide the financial flexibility to optimize various operational facets from inventory management to supply chain coordination and accounts receivable practices. As a result, firms are better positioned to optimize key efficiency indicators, thereby converting assets into revenue with heightened efficiency. Furthermore, the profits themselves are an indication of successful strategic decisions and market positioning that often naturally align with more efficient production, sales, and collection processes (Buzzell et al., 1975; Jackson, 2007). Therefore, both profitability and targeted investments contribute to a virtuous cycle that reinforces the firm's operational efficiency, while also promoting strategic alignment and effective resource utilization in the short term. Firms that regularly pay dividends are often viewed as financially stable and disciplined, a perception that can extend to supplier relationships and result in more favorable terms for raw material acquisition (Partington, 1989). This financial stability can lead to a more efficient Operating Cycle (OC) by reducing the lag time between acquiring raw materials and generating revenue from finished goods. In addition, the commitment to regular dividend payouts necessitates meticulous cash flow management. This heightened focus on cash flow often translates into stricter credit policies and more proactive collection efforts, thereby enhancing accounts receivable turnover and optimizing short-term operational efficiency.

A rising GDP often signals a robust economy marked by elevated consumer spending, greater business investment, and increased government outlays. This environment not only boosts demand for goods and services, but also encourages firms to optimize operations, scale up production, and tap into economies of scale (Almfraji & Almsafir, 2014). Concurrently, a strong economy frequently spurs technological innovation further amplifying operational efficiencies (Sweet & Eterovic Maggio, 2015). Conversely, a high imports-to-GDP ratio suggests significant reliance on foreign products that may reveal deficiencies in domestic operational efficiency. This dependency can shift the focus away from honing domestic production as importing often becomes a more convenient and cost-effective option. Moreover, increased import reliance may point to intense competition from abroad potentially limiting domestic firms' market share and, by extension, their capacity to achieve economies of scale or invest in efficiency-enhancing technologies.

In light of the other macroeconomic variables discussed, it is worth noting that elevated real interest rates present their own set of challenges for firms. When borrowing costs escalate, addressing short-term financial imperatives like working capital or inventory management becomes more taxing. Such monetary tightness often leads firms to adopt a more conservative operational stance (Dunbar & Owusu-Amoako, 2021). This hesitancy to invest in technological and procedural improvements can detract from the firm's ability to manage short-term operations efficiently. The impact is often observed in compromised responsiveness to market fluctuations and suboptimal performance in key metrics like the Operating Cycle (OC) and Cash Conversion Cycle (CCC).

2.5.2.5. Robust to industry concentration

Furthermore, we test whether the results are still robust when adding the HHI Index. Inclusion of the Herfindahl-Hirschman Index (HHI) adds another layer of robustness to our examination of the leniency program's impact on operational efficiency across countries. HHI is a well-established metric used to assess market concentration calculated by squaring the market share of each firm in the industry and then summing the resulting numbers. Specifically, $HHI = \sum_{i=1}^N s_i^2$, where s_i represents the market share of firm i in the industry and N is the number of firms (Dasgupta &

Žaldokas, 2019). A higher HHI value generally indicates less competition and greater market power for existing firms, while a lower value suggests a more competitive market landscape.

Control for market concentration via the HHI is pivotal for several reasons. First, it accounts for the influence of market structure on operational efficiency that can otherwise confound the observed effects of the leniency program. Firms operating in concentrated markets may react differently to leniency programs compared to those in more competitive settings. Additionally, the HHI serves to control for variations in market dynamics that could be country-specific or sector-specific, thereby isolating the impact of the leniency program itself. By introducing the HHI into our analyses, we sharpen the focus on the role of leniency programs while accounting for potentially confounding market factors thus enriching the validity and reliability of our findings. In general, the outcomes after accounting for the Herfindahl-Hirschman Index (HHI) remain consistent with our primary findings. Although the introduction of leniency programs initially imposes a strain on short-term operational efficiency, firms demonstrate adaptability by mitigating these effects over time. Simultaneously, they sustain improvements in the utilization of long-term assets. The inclusion of the HHI control substantiates the robustness of these conclusions reaffirming that the observed impacts are principally attributed to the leniency programs rather than market concentration factors.

Table 7: The impact of leniency programs after controlling further for HHI**Panel A: The effects of leniency passages on total assets turnover with HHI**

| | (1) | (2) | (3) | (4) |
|-----------------------------|----------|---------|---------|---------|
| | 1 year | 2 years | 3 years | 4 years |
| τ_w | -0.0096* | -0.0101 | -0.006 | 0.0015 |
| | (0.087) | (0.112) | (0.395) | (0.843) |
| Firm fixed effects | Y | Y | Y | Y |
| Year fixed effects | Y | Y | Y | Y |
| Cluster by country-industry | Y | Y | Y | Y |
| Controls | Y | Y | Y | Y |
| N | 106,264 | 114,359 | 121,852 | 129,892 |

Panel B: The effects of leniency passages on fixed assets turnover with HHI

| | (1) | (2) | (3) | (4) |
|-----------------------------|----------|---------|---------|---------|
| | 1 year | 2 years | 3 years | 4 years |
| τ_w | 0.2609** | 0.229* | 0.293** | 0.375** |
| | (0.038) | (0.093) | (0.042) | (0.019) |
| Firm fixed effects | Y | Y | Y | Y |
| Year fixed effects | Y | Y | Y | Y |
| Cluster by country-industry | Y | Y | Y | Y |
| Controls | Y | Y | Y | Y |
| N | 106,223 | 114,316 | 121,805 | 129,842 |

Panel C: The effects of leniency passages on OC with HHI

| | (1) | (2) | (3) | (4) |
|-----------------------------|---------|---------|---------|---------|
| | 1 year | 2 years | 3 years | 4 years |
| τ_w | 1.673** | 1.878** | 1.753* | 1.25 |
| | (0.044) | (0.038) | (0.066) | (0.202) |
| Firm fixed effects | Y | Y | Y | Y |
| Year fixed effects | Y | Y | Y | Y |
| Cluster by country-industry | Y | Y | Y | Y |
| Controls | Y | Y | Y | Y |
| N | 82,307 | 88,948 | 95,128 | 101,798 |

Table 7: The impact of leniency programs after controlling further for HHI (continued)**Panel D: The effects of leniency passages on Inventory Days with HHI**

| | (1) | (2) | (3) | (4) |
|-----------------------------|---------|---------|---------|---------|
| | 1 year | 2 years | 3 years | 4 years |
| τ_w | 0.6178 | 0.7839 | 0.6496 | 0.374 |
| | (0.346) | (0.274) | (0.387) | (0.637) |
| Firm fixed effects | Y | Y | Y | Y |
| Year fixed effects | Y | Y | Y | Y |
| Cluster by country-industry | Y | Y | Y | Y |
| Controls | Y | Y | Y | Y |
| N | 82,307 | 88,948 | 95,128 | 101,798 |

Panel E: The effects of leniency passages on Inventory Turnover with HHI

| | (1) | (2) | (3) | (4) |
|-----------------------------|---------|---------|---------|---------|
| | 1 year | 2 years | 3 years | 4 years |
| τ_w | -0.436 | 0.0105 | 0.266 | 1.0091 |
| | (0.503) | (0.987) | (0.662) | (0.108) |
| Firm fixed effects | Y | Y | Y | Y |
| Year fixed effects | Y | Y | Y | Y |
| Cluster by country-industry | Y | Y | Y | Y |
| Controls | Y | Y | Y | Y |
| N | 82,307 | 88,948 | 95,128 | 101,798 |

Panel F: The effects of leniency passages on Account Receivable Days with HHI

| | (1) | (2) | (3) | (4) |
|-----------------------------|---------|---------|---------|---------|
| | 1 year | 2 years | 3 years | 4 years |
| τ_w | 1.055* | 1.094* | 1.103 | 0.876 |
| | (0.057) | (0.078) | (0.109) | (0.22) |
| Firm fixed effects | Y | Y | Y | Y |
| Year fixed effects | Y | Y | Y | Y |
| Cluster by country-industry | Y | Y | Y | Y |
| Controls | Y | Y | Y | Y |
| N | 82,307 | 88,948 | 95,128 | 101,798 |

Table 7: The impact of leniency programs after controlling further for HHI (continued)

| Panel G: The effects of leniency passages on Receivable Turnover with HHI | | | | |
|--|----------|-----------|----------|---------|
| | (1) | (2) | (3) | (4) |
| | 1 year | 2 years | 3 years | 4 years |
| τ_w | -0.247** | -0.3029** | -0.296** | -0.229 |
| | (0.033) | (0.016) | (0.032) | (0.13) |
| Firm fixed effects | Y | Y | Y | Y |
| Year fixed effects | Y | Y | Y | Y |
| Cluster by country-industry | Y | Y | Y | Y |
| Controls | Y | Y | Y | Y |
| N | 82,180 | 88,796 | 94,953 | 101,598 |

*Note: The dependent variable is total asset turnover. We control for firm and year fixed effects and clustering by country-industry following Dasgupta & Zaldokas (2019). The firm-level and country-level covariates standing for firm size, sales growth, leverage, tangibility, free cash flow, GDP, unemployment, and imports as a percentage of GDP follow Cheng et al. (2018) and Dasgupta & Žaldokas (2019). In addition, we also control for the HHI index in this case. Moreover, when examining the regulatory effects on working capital management (proxied by Cash Conversion Cycle and Operating Cycle) and their components, we also control for capital intensity, real interest rate, profit, investment, and dividends following Gaur et al. (2005) and Jalal & Khaksari (2020). The coefficient of interest here is τ_w , which denotes the impact of leniency programs on firms' operational efficiency. Significance levels are denoted as follows: *** signifies 1%, ** indicates 5%, and * represents 10%.*

2.5.3. Heterogeneous impacts across markets and cultures

For triple differences following Borusyak et al. (2024), we group the firm identifier with a chosen dimension (firm- or country-level). After that, we measure the τ_w for the specific new identifier and not for the firm only as the baseline Model (1). The desired results are called $\mu_{i,g}$ following Borusyak et al. (2024). Essentially, $\mu_{i,g}$ show the additional effect of leniency programs on specific group of firms based on chosen dimensions. For example, if the chosen dimension is comparing the impact of a leniency program on firms in developing and developed markets, $\mu_{i,g}$ stands for the additional impact of the leniency program on firms in developing markets compared to firms in developed ones. We also follow Dasgupta and Žaldokas (2019) in examining the additional effects to control for firm and year fixed effects while still clustering by country-industry.

2.5.3.1. Heterogeneous impact across markets

Table 8: Interaction test to assess leniency programs' additional effects on operational efficiency in developing markets.

| | (1) 1 year | (2) 2 years | (3) 3 years | (4) 4 years |
|-----------------------------|-------------------|--------------------|--------------------|---------------------|
| $\mu_{i,g}$ (TAT) | -0.006 (0.531) | -0.0101 (0.287) | -0.008 (0.407) | -0.0004 (0.968) |
| Firm fixed effects | Y | Y | Y | Y |
| Year fixed effects | Y | Y | Y | Y |
| Cluster by country-industry | Y | Y | Y | Y |
| Controls | Y | Y | Y | Y |
| N | 108,812 | 119,167 | 129,457 | 141,142 |
| $\mu_{i,g}$ (FAT) | -0.046 (0.854) | 0.06 (0.795) | 0.039 (0.872) | 0.0892 (0.718) |
| Firm fixed effects | Y | Y | Y | Y |
| Year fixed effects | Y | Y | Y | Y |
| Cluster by country-industry | Y | Y | Y | Y |
| Controls | Y | Y | Y | Y |
| N | 108,766 | 119,117 | 129,399 | 141,077 |
| $\mu_{i,g}$ (OC) | 2.815* (0.062) | 1.185 (0.42) | -0.91 (0.556) | -2.095 (0.200) |
| Firm fixed effects | Y | Y | Y | Y |
| Year fixed effects | Y | Y | Y | Y |
| Cluster by country-industry | Y | Y | Y | Y |
| Controls | Y | Y | Y | Y |
| N | 84,160 | 92,484 | 100,883 | 110,660 |
| $\mu_{i,g}$ (CCC) | -0.023 (0.986) | -1.151 (0.384) | -2.565* (0.069) | -3.447** (0.022) |
| Firm fixed effects | Y | Y | Y | Y |
| Year fixed effects | Y | Y | Y | Y |
| Cluster by country-industry | Y | Y | Y | Y |
| Controls | Y | Y | Y | Y |
| N | 84,160 | 92,484 | 100,883 | 110,660 |

Table 8: Interaction test to assess leniency programs' additional effects on operational efficiency in developing markets (continued)

| | (1) | (2) | (3) | (4) |
|-----------------------------|---------------------|-------------------|-------------------|--------------------|
| | 1 year | 2 years | 3 years | 4 years |
| $\mu_{i,g}$ (ID) | -0.259 (0.811) | -0.201 (0.842) | -0.87 (0.397) | -1.833* (0.092) |
| Firm fixed effects | Y | Y | Y | Y |
| Year fixed effects | Y | Y | Y | Y |
| Cluster by country-industry | Y | Y | Y | Y |
| Controls | Y | Y | Y | Y |
| N | 84,160 | 92,484 | 100,883 | 110,660 |
| $\mu_{i,g}$ (IT) | -0.837 (0.416) | -0.256 (0.799) | -0.347 (0.739) | -0.031 (0.977) |
| Firm fixed effects | Y | Y | Y | Y |
| Year fixed effects | Y | Y | Y | Y |
| Cluster by country-industry | Y | Y | Y | Y |
| Controls | Y | Y | Y | Y |
| N | 84,160 | 92,484 | 100,883 | 110,660 |
| $\mu_{i,g}$ (RD) | 3.075*** (0.001) | 1.386 (0.142) | -0.045 (0.964) | -0.262 (0.795) |
| Firm fixed effects | Y | Y | Y | Y |
| Year fixed effects | Y | Y | Y | Y |
| Cluster by country-industry | Y | Y | Y | Y |
| Controls | Y | Y | Y | Y |
| N | 84,160 | 92,484 | 100,883 | 110,660 |
| $\mu_{i,g}$ (RT) | -0.329 (0.203) | -0.34 (0.171) | -0.282 (0.247) | -0.415 (0.112) |
| Firm fixed effects | Y | Y | Y | Y |
| Year fixed effects | Y | Y | Y | Y |
| Cluster by country-industry | Y | Y | Y | Y |
| Controls | Y | Y | Y | Y |
| N | 84,037 | 92,337 | 100,715 | 110,468 |

Note: The dependent variables are variables standing for operational efficiency in this study. We control for firm and year fixed effects and clustering by country-industry following Dasgupta & Zaldokas (2019).

*The firm-level and country-level covariates standing for firm size, sales growth, leverage, tangibility, free cash flow, GDP, unemployment, and imports as a percentage of GDP follow Cheng et al. (2018) and Dasgupta & Žaldokas (2019). In addition, when examining the regulatory effects on working capital management (proxied by Cash Conversion Cycle and Operating Cycle) and their components, we also further control for capital intensity, real interest rate, profit, investment, and dividends following Gaur et al. (2005) and Jalal & Khaksari (2020). Following Borusyak et al., (2024), we group the firm's identifier and the identifier of the chosen dimension and test the additional effect of leniency programs on firms in a chosen dimension. The coefficient of interest is $\mu_{i,g}$, which denotes the additional impact of leniency programs on firms in developing markets. Significance levels are denoted as follows: *** signifies 1%, ** indicates 5%, and * represents 10%.*

We adopt the market classification framework as delineated by Bekaert et al. (2023), Pandey et al. (2023), Ngo et al. (2023b) and Tajaddini & Gholipour (2023) utilizing Morgan Stanley Capital Investment (MSCI) criteria to categorize the nations in our sample into developed and developing markets. In examining the additional impact of leniency programs on firms in developing versus developed markets, a complex interplay between market development, governance, transparency, and asymmetric information emerges. In the nascent stages, following the leniency program's initiation, firms in developing markets strategically relax credit sales resulting in a transient increase in accounts receivable days. This move, far from being a random anomaly, resonates with the unique business environment of developing economies where asymmetric information problems between buyers and sellers necessitate innovative approaches to attract consumers (Demirgüç-Kunt & Maksimovic, 1998; Van Horen, 2007).

The developed business environment's greater transparency may also play a role in shaping these strategic adaptations. In more transparent markets, anti-competitive effects may arise from increased collaboration in product markets aided by financial disclosures and shared strategy discussions (Bourveau et al., 2020). Conversely, the less transparent markets in developing countries may resist such collusion further emphasizing the importance of flexible and adaptive strategies in response to the leniency program.

As time unfolds, firms in developing countries not only adapt to, but also thrive within the competitive dynamics introduced by the leniency program. By the third year, they not only align with their developed country counterparts, but begin to surpass them in specific aspects of short-term asset management. The mastery over the Cash Conversion Cycle (CCC) and reductions in Inventory Days by Year 4 underscores a growing competence in working capital management, a

vital aspect of financial health in developing economies. The results confirm our Hypothesis 5 that leniency passage have more impact on developing markets.

The confluence of these factors, from regulatory change and entrepreneurial resilience to the unique challenges posed by asymmetric information and market transparency, crafts a compelling and coherent narrative. Firms in developing markets, through strategic credit relaxation followed by the refinement of short-term asset management, not only respond to the competitive thrust of the leniency program, but carve a path toward heightened operational efficiency.

2.5.3.2. Heterogeneous impacts across cultures

i> Power Distance Index

Table 9: Interaction test to assess leniency programs' additional effects on operational efficiency in low power distance countries

| | (1) | (2) | (3) | (4) |
|-----------------------------|-----------------------|----------------------|---------------------|---------------------|
| | 1 year | 2 years | 3 years | 4 years |
| $\mu_{i,g}$ (TAT) | -0.0184*** (0.003) | -0.0137** (0.039) | -0.0048 (0.508) | 0.0116 (0.142) |
| Firm fixed effects | Y | Y | Y | Y |
| Year fixed effects | Y | Y | Y | Y |
| Cluster by country-industry | Y | Y | Y | Y |
| Controls | Y | Y | Y | Y |
| N | 106,677 | 115,860 | 125,695 | 136,285 |
| $\mu_{i,g}$ (FAT) | 0.234 (0.131) | 0.25 (0.133) | 0.317* (0.056) | 0.441** (0.012) |
| Firm fixed effects | Y | Y | Y | Y |
| Year fixed effects | Y | Y | Y | Y |
| Cluster by country-industry | Y | Y | Y | Y |
| Controls | Y | Y | Y | Y |
| N | 106,636 | 115,816 | 125,645 | 136,231 |
| $\mu_{i,g}$ (OC) | 1.0718 (0.343) | 0.828 (0.482) | 0.091 (0.939) | -0.51 (0.686) |
| Firm fixed effects | Y | Y | Y | Y |
| Year fixed effects | Y | Y | Y | Y |
| Cluster by country-industry | Y | Y | Y | Y |
| Controls | Y | Y | Y | Y |
| N | 82,657 | 89,888 | 97,990 | 106,749 |
| $\mu_{i,g}$ (CCC) | -2.487** (0.042) | -2.083 (0.103) | -1.256 (0.320) | -0.509 (0.702) |
| Firm fixed effects | Y | Y | Y | Y |
| Year fixed effects | Y | Y | Y | Y |
| Cluster by country-industry | Y | Y | Y | Y |
| Controls | Y | Y | Y | Y |
| N | 82,657 | 89,888 | 97,990 | 106,749 |
| $\mu_{i,g}$ (ID) | -0.6330 (0.425) | -1.253 (0.135) | -1.692** (0.048) | -2.61*** (0.005) |
| Firm fixed effects | Y | Y | Y | Y |
| Year fixed effects | Y | Y | Y | Y |
| Cluster by country-industry | Y | Y | Y | Y |
| Controls | Y | Y | Y | Y |
| N | 82,657 | 89,888 | 97,990 | 106,749 |

Table 9: Interaction test to assess leniency programs 's additional effects on operational efficiency in low power distance countries (continued)

| | (1) | (2) | (3) | (4) |
|-----------------------------|----------------------|----------------------|----------------------|---------------------|
| | 1 year | 2 years | 3 years | 4 years |
| $\mu_{i,g}$ (IT) | 0.019 (0.978) | 0.458 (0.499) | 1.059 (0.107) | 2.152*** (0.001) |
| Firm fixed effects | Y | Y | Y | Y |
| Year fixed effects | Y | Y | Y | Y |
| Cluster by country-industry | Y | Y | Y | Y |
| Controls | Y | Y | Y | Y |
| N | 82,657 | 89,888 | 97,990 | 106,749 |
| $\mu_{i,g}$ (RD) | 1.705** (0.011) | 2.080*** (0.005) | 1.783** (0.029) | 2.103** (0.022) |
| Firm fixed effects | Y | Y | Y | Y |
| Year fixed effects | Y | Y | Y | Y |
| Cluster by country-industry | Y | Y | Y | Y |
| Controls | Y | Y | Y | Y |
| N | 82,657 | 89,888 | 97,990 | 106,749 |
| $\mu_{i,g}$ (RT) | -0.588*** (0.000) | -0.534*** (0.002) | -0.536*** (0.006) | -0.676** (0.019) |
| Firm fixed effects | Y | Y | Y | Y |
| Year fixed effects | Y | Y | Y | Y |
| Cluster by country-industry | Y | Y | Y | Y |
| Controls | Y | Y | Y | Y |
| N | 89,736 | 89,888 | 97,814 | 106,547 |

*Note: The dependent variables are variables standing for operational efficiency in this study. We control for firm and year fixed effects and clustering by country-industry following Dasgupta & Zaldokas (2019). The firm-level and country-level covariates standing for firm size, sales growth, leverage, tangibility, free cash flow, GDP, unemployment, and imports as a percentage of GDP follow Cheng et al. (2018) and Dasgupta & Žaldokas (2019). In addition, when examining the regulatory effects on working capital management (proxied by Cash Conversion Cycle and Operating Cycle) and their components, we also control for capital intensity, real interest rate, profit, investment, and dividends following Gaur et al. (2005) and Jalal & Khaksari (2020). Following Borusyak et al. (2024), we group the firm's identifier and the identifier of the chosen dimension and test the additional effect of leniency programs on firms in a chosen dimension. The coefficient of interest is $\mu_{i,g}$, which denotes the additional impact of leniency programs on firms in low power distance index. Significance levels are denoted as follows: *** signifies 1%, ** indicates 5%, and * represents 10%.*

In low PDI countries, where power is more equally disseminated and collaboration is integral, the introduction of the leniency program prompts a notable shift in operational efficiency. Upon its

enactment, firms in these countries ease their credit policies resulting in a temporary decline in total asset turnover, confirming our Hypothesis 7. This initial maneuver is emblematic of the low PDI culture, where inclusivity reigns and firms strive to foster trust and loyalty by offering more accessible credit terms. Though this leads to a transient decrease in asset turnover, it lays the groundwork for lasting relationships reflecting the low PDI values of equality and cooperation. In addition, the notion that customers have higher bargaining power in low PDI (Power Distance Index) societies is consistent with the underlying cultural traits. Enhanced customer knowledge, fostered by a transparent business environment, augments buyers' power (Chan & Cheung, 2012; Sambharya & Rasheed, 2015). The cultural valuation of equality and open competition also enhances this customer influence further (Roozmand et al., 2011). Empirical evidence, such as the negative relationship between PDI and reliability (Donthu & Yoo, 1998), as well as satisfaction priority in low PDI settings (Huang & Crotts, 2019) reinforces the idea that customers put more pressure on firms in low PDI societies. In addition, consumers in low Power Distance Index (PDI) societies often seek assurance from businesses (Gupta et al., 2018), which contributes to a relaxed credit sales policy as a means of qualifying products.

The initial impact on the Operating Cycle is negligible with the observed improvements in the Cash Conversion Cycle (CCC) likely attributed to an uptick in DPO. In a low PDI society, the relatively high bargaining power of consumers may prompt firms to extend credit terms. However, this could be offset by strategically delaying payments to suppliers (higher DPO) again aiming to balance the CCC effectively. In low PDI cultures, the social fabric values balance and fairness (Hofstede, 2011). Therefore, firms are inclined to find a harmonious equilibrium between their accounts payable and receivable. This reflects the culture's preference for equitable transactions, meaning neither the supplier nor the customer should feel taken advantage of, thereby reinforcing the decreased CCC.

As firms in low PDI countries adapt to the evolving leniency program, they often liberalize their credit policies, a shift that becomes particularly evident in subsequent years. This progression reflects the intrinsic values of these societies that emphasize equity, cooperation, and a drive for continual refinement supporting a trend toward improved operational metrics like inventory and fixed asset turnover over time (Sambharya & Rasheed, 2015; Zhang & Begley, 2011). The rationale here is twofold. First, the cultural context in low PDI countries fosters an environment

where ongoing policy optimization is a natural endeavor for firms seeking to enhance performance. In addition, with the maturation of the leniency program, firms are likely to become more adept at navigating the new regulatory landscape identifying and correcting inefficiencies as part of their cultural commitment to improvement (Rinne et al., 2012). Consequently, this long-term channel of cultural adaptation and policy refinement is expected to yield sustained improvements in turnover metrics aligning with the broader objectives of the leniency program.

ii> Uncertainty Avoidance Index

Table 10: Interaction test to assess leniency programs' additional effects on operational efficiency in high uncertainty avoidance countries.

| | (1) | (2) | (3) | (4) |
|-----------------------------|----------------------|---------------------|-------------------|---------------------|
| | 1 year | 2 years | 3 years | 4 years |
| $\mu_{i,g}$ (TAT) | -0.027*** (0.001) | -0.015* (0.078) | 0.005 (0.596) | 0.024** (0.012) |
| Firm fixed effects | Y | Y | Y | Y |
| Year fixed effects | Y | Y | Y | Y |
| Cluster by country-industry | Y | Y | Y | Y |
| Controls | Y | Y | Y | Y |
| N | 107,131 | 116,738 | 127,505 | 139,239 |
| $\mu_{i,g}$ (FAT) | -0.086 (0.670) | -0.116 (0.591) | -0.161 (0.457) | -0.026 (0.910) |
| Firm fixed effects | Y | Y | Y | Y |
| Year fixed effects | Y | Y | Y | Y |
| Cluster by country-industry | Y | Y | Y | Y |
| Controls | Y | Y | Y | Y |
| N | 107,086 | 116,689 | 127,449 | 139,179 |
| $\mu_{i,g}$ (OC) | 5.369*** (0.000) | 4.583*** (0.003) | 2.793* (0.076) | 1.531 (0.368) |
| Firm fixed effects | Y | Y | Y | Y |
| Year fixed effects | Y | Y | Y | Y |
| Cluster by country-industry | Y | Y | Y | Y |
| Controls | Y | Y | Y | Y |
| N | 83,397 | 91,260 | 100,392 | 110,474 |
| $\mu_{i,g}$ (CCC) | -1.624 (0.300) | -1.742 (0.285) | -1.609 (0.334) | -1.003 (0.566) |
| Firm fixed effects | Y | Y | Y | Y |
| Year fixed effects | Y | Y | Y | Y |
| Cluster by country-industry | Y | Y | Y | Y |
| Controls | Y | Y | Y | Y |
| N | 83,397 | 91,260 | 100,392 | 110,474 |
| $\mu_{i,g}$ (ID) | 0.508 (0.604) | -0.527 (0.619) | -1.224 (0.251) | -2.440** (0.035) |
| Firm fixed effects | Y | Y | Y | Y |
| Year fixed effects | Y | Y | Y | Y |
| Cluster by country-industry | Y | Y | Y | Y |
| Controls | Y | Y | Y | Y |
| N | 83,397 | 91,260 | 100,392 | 110,474 |

Table 10: Interaction test to assess leniency programs' additional effects on operational efficiency in high uncertainty avoidance countries (continued)

| | (1) | (2) | (3) | (4) |
|-----------------------------|----------------------|----------------------|----------------------|----------------------|
| | 1 year | 2 years | 3 years | 4 years |
| $\mu_{i,g}$ (IT) | -0.572 (0.572) | 0.394 (0.684) | 0.084 (0.934) | 0.839 (0.489) |
| Firm fixed effects | Y | Y | Y | Y |
| Year fixed effects | Y | Y | Y | Y |
| Cluster by country-industry | Y | Y | Y | Y |
| Controls | Y | Y | Y | Y |
| N | 83,397 | 91,260 | 100,392 | 110,474 |
| $\mu_{i,g}$ (RD) | 4.860*** (0.000) | 5.109*** (0.000) | 4.019*** (0.000) | 3.973*** (0.002) |
| Firm fixed effects | Y | Y | Y | Y |
| Year fixed effects | Y | Y | Y | Y |
| Cluster by country-industry | Y | Y | Y | Y |
| Controls | Y | Y | Y | Y |
| N | 83,397 | 91,260 | 100,392 | 110,474 |
| $\mu_{i,g}$ (RT) | -0.752*** (0.000) | -0.848*** (0.000) | -0.792*** (0.001) | -0.884*** (0.001) |
| Firm fixed effects | Y | Y | Y | Y |
| Year fixed effects | Y | Y | Y | Y |
| Cluster by country-industry | Y | Y | Y | Y |
| Controls | Y | Y | Y | Y |
| N | 83,270 | 91,107 | 100,214 | 110,266 |

*Note: The dependent variables are variables standing for operational efficiency in this study. We control for firm and year fixed effects and clustering by country-industry following Dasgupta & Zaldokas (2019). The firm-level and country-level covariates standing for firm size, sales growth, leverage, tangibility, free cash flow, GDP, unemployment, and imports as a percentage of GDP follow Cheng et al. (2018) and Dasgupta & Žaldokas (2019). In addition, when examining the regulatory effects on working capital management (proxied by Cash Conversion Cycle and Operating Cycle) and their components, we also control for capital intensity, real interest rate, profit, investment, and dividends following Gaur et al. (2005) and Jalal & Khaksari (2020). Following Borusyak et al. (2024), we group the firm's identifier and the identifier of the chosen dimension and test the additional effect of leniency programs on firms in a chosen dimension. The coefficient of interest is $\mu_{i,g}$, which denotes the additional impact of leniency programs on firms in high uncertainty avoidance countries. Significance levels are denoted as follows: *** signifies 1%, ** indicates 5%, and * represents 10%.*

In our examination of the effects of the leniency program across different cultural dimensions, we uncover striking parallels between countries characterized by a low Power Distance Index (PDI)

and a high Uncertainty Avoidance Index (UAI). Both these cultural features appear to inform a set of financial behaviors and strategic responses that emphasize consumer bargaining power, flexibility, and trust-building. Firms in countries with a high Uncertainty Avoidance Index (UAI) present a distinct response to the leniency program informed by cultural characteristics that emphasize the bargaining power of consumers. In these societies, the pervasive need for stability and a risk-averse outlook compels consumers to seek various forms of assurance, such as warranties, return policies, or service guarantees. Responding to this consumer expectation, firms strategically loosen their credit policies as a mechanism to provide such assurances, thereby aligning with the broader objective of expanding credit sales for product validation (Lee & Stowe, 1993; Ng et al., 1999; Smith, 1987). The results also confirm our Hypothesis 8.

These traits become evident in the initial years following the program's implementation, where firms in high UAI countries choose to relax their credit sales policies. This strategy, although leading to an increase in the Operating Cycle (OC) and a decrease in total asset turnover (TAT), aligns with a culturally driven inclination to foster trust and secure client relationships in a time of regulatory change. This initial response might be seen as a strategic buffer allowing firms to navigate the uncharted terrain introduced by the leniency program, while staying true to the cultural preference for stability and predictability. The subsequent catch-up with low PDI countries suggests a process of adaptation, whereby firms in high UAI countries learn and adjust, enhancing their competitiveness.

iii> Long-term versus short-term orientation

Table 11: Interaction test to assess leniency programs' additional effects on operational efficiency in long-term orientation countries.

| | (1) | (2) | (3) | (4) |
|-----------------------------|----------------------|---------------------|-------------------|-------------------|
| | 1 year | 2 years | 3 years | 4 years |
| $\mu_{i,g}$ (TAT) | -0.017*** (0.007) | -0.016** (0.028) | -0.008 (0.273) | 0.003 (0.668) |
| Firm fixed effects | Y | Y | Y | Y |
| Year fixed effects | Y | Y | Y | Y |
| Cluster by country-industry | Y | Y | Y | Y |
| Controls | Y | Y | Y | Y |
| N | 106,623 | 115,993 | 125,332 | 135,531 |
| $\mu_{i,g}$ (FAT) | 0.191 (0.233) | 0.140 (0.412) | 0.171 (0.304) | 0.238 (0.180) |
| Firm fixed effects | Y | Y | Y | Y |
| Year fixed effects | Y | Y | Y | Y |
| Cluster by country-industry | Y | Y | Y | Y |
| Controls | Y | Y | Y | Y |
| N | 106,578 | 115,943 | 125,276 | 135,470 |
| $\mu_{i,g}$ (OC) | 2.981*** (0.004) | 2.919*** (0.007) | 2.172* (0.053) | 0.929 (0.428) |
| Firm fixed effects | Y | Y | Y | Y |
| Year fixed effects | Y | Y | Y | Y |
| Cluster by country-industry | Y | Y | Y | Y |
| Controls | Y | Y | Y | Y |
| N | 82,797 | 90,339 | 97,931 | 106,274 |
| $\mu_{i,g}$ (CCC) | -2.103* (0.066) | -1.297 (0.280) | -0.625 (0.615) | -0.834 (0.501) |
| Firm fixed effects | Y | Y | Y | Y |
| Year fixed effects | Y | Y | Y | Y |
| Cluster by country-industry | Y | Y | Y | Y |
| Controls | Y | Y | Y | Y |
| N | 82,797 | 90,339 | 97,931 | 106,274 |
| $\mu_{i,g}$ (ID) | 1.169 (0.120) | 1.150 (0.141) | 0.764 (0.328) | 0.158 (0.843) |
| Firm fixed effects | Y | Y | Y | Y |
| Year fixed effects | Y | Y | Y | Y |
| Cluster by country-industry | Y | Y | Y | Y |
| Controls | Y | Y | Y | Y |
| N | 82,797 | 90,339 | 97,931 | 106,274 |

Table 11: Interaction test to assess leniency programs' additional effects on operational efficiency in long-term orientation countries (continued)

| | (1) | (2) | (3) | (4) |
|-----------------------------|--------------------|--------------------|-------------------|--------------------|
| | 1 year | 2 years | 3 years | 4 years |
| $\mu_{i,g}$ (IT) | 0.074 (0.922) | 0.684 (0.375) | 0.919 (0.215) | 1.950** (0.010) |
| Firm fixed effects | Y | Y | Y | Y |
| Year fixed effects | Y | Y | Y | Y |
| Cluster by country-industry | Y | Y | Y | Y |
| Controls | Y | Y | Y | Y |
| N | 82,797 | 90,339 | 97,931 | 106,274 |
| $\mu_{i,g}$ (RD) | 1.811** (0.011) | 1.768** (0.021) | 1.408* (0.093) | 0.771 (0.381) |
| Firm fixed effects | Y | Y | Y | Y |
| Year fixed effects | Y | Y | Y | Y |
| Cluster by country-industry | Y | Y | Y | Y |
| Controls | Y | Y | Y | Y |
| N | 82,797 | 90,339 | 97,931 | 106,274 |
| $\mu_{i,g}$ (RT) | -0.173 (0.235) | -0.180 (0.249) | -0.168 (0.302) | -0.111 (0.523) |
| Firm fixed effects | Y | Y | Y | Y |
| Year fixed effects | Y | Y | Y | Y |
| Cluster by country-industry | Y | Y | Y | Y |
| Controls | Y | Y | Y | Y |
| N | 82,670 | 90,186 | 97,754 | 106,069 |

*Note: The dependent variables are variables standing for operational efficiency in this study. We control for firm and year fixed effects and clustering by country-industry following Dasgupta & Zaldokas (2019). The firm-level and country-level covariates standing for firm size, sales growth, leverage, tangibility, free cash flow, GDP, unemployment, and imports as a percentage of GDP follow Cheng et al. (2018) and Dasgupta & Žaldokas (2019). In addition, when examining the regulatory effects on working capital management (proxied by Cash Conversion Cycle and Operating Cycle) and their components, we also control for capital intensity, real interest rate, profit, investment, and dividends following Gaur et al. (2005) and Jalal & Khaksari (2020). Following Borusyak et al. (2024), we group the firm's identifier and the identifier of the chosen dimension and test the additional effect of leniency programs on firms in a chosen dimension. The coefficient of interest is $\mu_{i,g}$, which denotes the additional impact of leniency programs long-term orientation countries. Significance levels are denoted as follows: *** signifies 1%, ** indicates 5%, and * represents 10%.*

In countries characterized by Long-term Orientation (LTO), the leniency program elicits an initial response from firms that aligns with the cultural premium on long-term relationships and strategic

foresight (Hofstede, 2011; Hofstede et al., 2005). Rather than tightening credit policies, firms in these countries opt for an immediate relaxation of credit terms. This is evident in the extension of Receivable Days (RD) and a subsequent elongation of the Operating Cycle (OC) leading to a temporary dip in Total Asset Turnover, confirming our Hypothesis 9. This strategy could be perceived as a thoughtful planned action to fortify consumer trust and loyalty in the newly uncertain environment introduced by the leniency program.

The relaxed credit terms serve as a trust-building measure embodying a cultural preference for long-term stability over short-term gains (Manfredi & Capik, 2022). As time progresses, we observe a gradual contraction in RD and OC, ultimately synchronizing with the metrics from Short-term Orientation (STO) countries by the fourth year. This pattern suggests a deliberate recalibration by firms in LTO countries, who seem to be navigating the terrain between immediate market dynamics and long-term strategic considerations. The rise in Inventory Days in the final year may also point to a safeguarding strategy for future market uncertainties, further attesting to the LTO focus on long-term planning and operational resilience (Hofstede, 2011). This trend implies a heightened consumer bargaining power in LTO countries where firms feel compelled to relax credit terms to sustain consumer trust and loyalty in the face of regulatory changes.

iv> Individualistic versus Collectivistic

Table 12: Interaction test to assess leniency programs' additional effects on operational efficiency in individualistic countries.

| | (1) | (2) | (3) | (4) |
|-----------------------------|---------------------|---------------------|---------------------|----------------------|
| | 1 year | 2 years | 3 years | 4 years |
| $\mu_{i,g}$ (TAT) | 0.002 (0.793) | -0.004 (0.498) | -0.007 (0.321) | -0.012 (0.138) |
| Firm fixed effects | Y | Y | Y | Y |
| Year fixed effects | Y | Y | Y | Y |
| Cluster by country-industry | Y | Y | Y | Y |
| Controls | Y | Y | Y | Y |
| N | 105,641 | 115,073 | 124,031 | 134,939 |
| $\mu_{i,g}$ (FAT) | 0.746*** (0.000) | 0.797*** (0.000) | 0.879*** (0.000) | 0.985*** (0.000) |
| Firm fixed effects | Y | Y | Y | Y |
| Year fixed effects | Y | Y | Y | Y |
| Cluster by country-industry | Y | Y | Y | Y |
| Controls | Y | Y | Y | Y |
| N | 105,601 | 115,030 | 123,983 | 134,884 |
| $\mu_{i,g}$ (OC) | -2.592** (0.047) | -2.894** (0.038) | -3.408** (0.016) | -4.475*** (0.003) |
| Firm fixed effects | Y | Y | Y | Y |
| Year fixed effects | Y | Y | Y | Y |
| Cluster by country-industry | Y | Y | Y | Y |
| Controls | Y | Y | Y | Y |
| N | 82,068 | 89,864 | 97,432 | 106,844 |
| $\mu_{i,g}$ (CCC) | -3.123** (0.026) | -2.986** (0.046) | -2.968** (0.048) | -3.222** (0.039) |
| Firm fixed effects | Y | Y | Y | Y |
| Year fixed effects | Y | Y | Y | Y |
| Cluster by country-industry | Y | Y | Y | Y |
| Controls | Y | Y | Y | Y |
| N | 82,068 | 89,864 | 97,432 | 106,844 |
| $\mu_{i,g}$ (ID) | -1.634* (0.075) | -1.94* (0.054) | -2.048* (0.051) | -2.798** (0.012) |
| Firm fixed effects | Y | Y | Y | Y |
| Year fixed effects | Y | Y | Y | Y |
| Cluster by country-industry | Y | Y | Y | Y |
| Controls | Y | Y | Y | Y |
| N | 82,068 | 89,864 | 97,432 | 106,844 |

Table 12: Interaction test to assess leniency programs' additional effects on operational efficiency in individualistic countries (continued)

| | (1) | (2) | (3) | (4) |
|-----------------------------|-------------------|-------------------|--------------------|---------------------|
| | 1 year | 2 years | 3 years | 4 years |
| $\mu_{i,g}$ (IT) | 0.2147 (0.777) | 0.414 (0.611) | 1.097 (0.186) | 1.995** (0.029) |
| Firm fixed effects | Y | Y | Y | Y |
| Year fixed effects | Y | Y | Y | Y |
| Cluster by country-industry | Y | Y | Y | Y |
| Controls | Y | Y | Y | Y |
| N | 82,068 | 89,864 | 97,432 | 106,844 |
| $\mu_{i,g}$ (RD) | -0.957 (0.211) | -0.954 (0.229) | -1.361* (0.088) | -1.676** (0.044) |
| Firm fixed effects | Y | Y | Y | Y |
| Year fixed effects | Y | Y | Y | Y |
| Cluster by country-industry | Y | Y | Y | Y |
| Controls | Y | Y | Y | Y |
| N | 82,068 | 89,864 | 97,432 | 106,844 |
| $\mu_{i,g}$ (RT) | -0.218 (0.255) | -0.242 (0.238) | -0.150 (0.464) | -0.008 (0.970) |
| Firm fixed effects | Y | Y | Y | Y |
| Year fixed effects | Y | Y | Y | Y |
| Cluster by country-industry | Y | Y | Y | Y |
| Controls | Y | Y | Y | Y |
| N | 81,945 | 89,718 | 97,266 | 106,657 |

*Note: The dependent variables are variables standing for operational efficiency in this study. We control for firm and year fixed effect and clustering by country-industry following Dasgupta & Zaldokas (2019). The firm-level and country-level covariates standing for firm size, sales growth, leverage, tangibility, free cash flow, GDP, unemployment, and imports as a percentage of GDP follow Cheng et al. (2018) and Dasgupta & Žaldokas (2019). In addition, when examining the regulatory effects on working capital management (proxied by Cash Conversion Cycle and Operating Cycle) and their components, we also control for capital intensity, real interest rate, profit, investment, and dividends following Gaur et al. (2005) and Jalal & Khaksari (2020). Following Borusyak et al. (2024), we group the firm's identifier and the identifier of the chosen dimension and test the additional effect of leniency programs on firms in a chosen dimension. The coefficient of interest is $\mu_{i,g}$, which denotes the additional impact of leniency programs on firms in individualistic countries. Significance levels are denoted as follows: *** signifies 1%, ** indicates 5%, and * represents 10%.*

In this study, the lens of individualism versus collectivism, grounded in Hofstede's cultural dimensions, provides an insightful perspective for understanding the differential impacts of a leniency program across diverse cultural settings. Countries marked by high levels of Individualism, which prioritize personal autonomy, competition, and individual achievement (Hofstede, 2011; Hofstede et al., 2005), manifest distinct financial behaviors. While the Total Assets Turnover (TAT) did not show significant alterations, an in-depth look at its constituents offers valuable insights. In individualistic cultures, where competition and entrepreneurship are deeply embedded, the FAT ratio tends to improve over time. This is because these cultural values promote continuous self-improvement and resource optimization within firms. Over the long term, these values drive a sustained enhancement in operational efficiency, as evidenced by a steady increase in FAT ratios, demonstrating the long-standing impact of cultural principles on business performance metrics.

This focus on efficiency is mirrored in the declining trends in operational cycles, such as the Operating Cycle (OC) and the Cash Conversion Cycle (CCC). These indicators suggest more efficient management of inventory and receivables attesting to an ethos of self-reliance and optimization. Notably, this pattern might also align with the relatively higher matured market in individualistic societies (Kadic-Maglajlic et al., 2018). In particular, it resonates with the unique business environment of collectivistic-oriented countries associated with less-matured economies where asymmetric information problems between buyers and sellers necessitate innovative approaches to attract consumers (Demirgüç-Kunt & Maksimovic, 1998; Van Horen, 2007). Unlike collectivistic settings, where stronger community bonds can drive firms to offer more lenient credit policies, the competitive nature of individualistic cultures lessens the pressure on firms to relax credit terms (Blut et al., 2022). In such contexts, firms prioritize operational efficiency, capitalizing on the individualistic emphasis on competition and innovation instead of yielding to consumer bargaining power. This creates an environment where the focus is on streamlining processes and seizing market opportunities aligning corporate strategies with the larger individualistic cultural paradigm and less on accommodating consumer bargaining power through credit term adjustments. In general, the results also confirm our Hypothesis 10 that the impact of leniency laws on operational efficiency is less pronounced in Individualistic countries.

2.5.3.3.Heterogeneous impacts across firm types

i> Large firms

Table 13: Interaction test to assess leniency programs' additional effects on operational efficiency in large firms.

| | (1) | (2) | (3) | (4) |
|-----------------------------|-------------------|-------------------|-------------------|--------------------|
| | 1 year | 2 years | 3 years | 4 years |
| $\mu_{i,g}$ (TAT) | 0.008 (0.198) | 0.005 (0.329) | 0.008 (0.2000) | 0.012* (0.062) |
| Firm fixed effects | Y | Y | Y | Y |
| Year fixed effects | Y | Y | Y | Y |
| Cluster by country-industry | Y | Y | Y | Y |
| Controls | Y | Y | Y | Y |
| N | 110,192 | 121,309 | 133,471 | 147,198 |
| $\mu_{i,g}$ (FAT) | 0.002 (0.991) | -0.128 (0.415) | -0.180 (0.245) | -0.283* (0.068) |
| Firm fixed effects | Y | Y | Y | Y |
| Year fixed effects | Y | Y | Y | Y |
| Cluster by country-industry | Y | Y | Y | Y |
| Controls | Y | Y | Y | Y |
| N | 110,143 | 121,254 | 133,407 | 147,125 |
| $\mu_{i,g}$ (OC) | 1.339 (0.145) | 1.080 (0.235) | 0.327 (0.719) | 0.134 (0.888) |
| Firm fixed effects | Y | Y | Y | Y |
| Year fixed effects | Y | Y | Y | Y |
| Cluster by country-industry | Y | Y | Y | Y |
| Controls | Y | Y | Y | Y |
| N | 85,380 | 94,174 | 104,076 | 115,450 |
| $\mu_{i,g}$ (CCC) | -1.490 (0.118) | -1.232 (0.203) | -1.164 (0.221) | -0.803 (0.427) |
| Firm fixed effects | Y | Y | Y | Y |
| Year fixed effects | Y | Y | Y | Y |
| Cluster by country-industry | Y | Y | Y | Y |
| Controls | Y | Y | Y | Y |
| N | 85,380 | 94,174 | 104,076 | 115,450 |
| $\mu_{i,g}$ (ID) | 0.465 (0.512) | 0.494 (0.492) | 0.034 (0.961) | 0.035 (0.962) |
| Firm fixed effects | Y | Y | Y | Y |
| Year fixed effects | Y | Y | Y | Y |
| Cluster by country-industry | Y | Y | Y | Y |
| Controls | Y | Y | Y | Y |
| N | 85,380 | 94,174 | 104,076 | 115,450 |

Table 13: Interaction test to assess leniency programs' additional effects on operational efficiency in large firms (continued)

| | (1) | (2) | (3) | (4) |
|-----------------------------|----------------------|---------------------|---------------------|---------------------|
| | 1 year | 2 years | 3 years | 4 years |
| $\mu_{i,g}$ (IT) | -1.250** (0.040) | -0.875 (0.121) | -0.704 (0.200) | -0.778 (0.190) |
| Firm fixed effects | Y | Y | Y | Y |
| Year fixed effects | Y | Y | Y | Y |
| Cluster by country-industry | Y | Y | Y | Y |
| Controls | Y | Y | Y | Y |
| N | 85,380 | 94,174 | 104,076 | 115,450 |
| $\mu_{i,g}$ (RD) | 0.874 (0.111) | 0.585 (0.308) | 0.292 (0.631) | 0.098 (0.874) |
| Firm fixed effects | Y | Y | Y | Y |
| Year fixed effects | Y | Y | Y | Y |
| Cluster by country-industry | Y | Y | Y | Y |
| Controls | Y | Y | Y | Y |
| N | 85,380 | 94,174 | 104,076 | 115,450 |
| $\mu_{i,g}$ (RT) | -0.332*** (0.007) | -0.327** (0.016) | -0.311** (0.031) | -0.330** (0.025) |
| Firm fixed effects | Y | Y | Y | Y |
| Year fixed effects | Y | Y | Y | Y |
| Cluster by country-industry | Y | Y | Y | Y |
| Controls | Y | Y | Y | Y |
| N | 85,255 | 94,023 | 103,900 | 115,246 |

*Note: The dependent variables are variables standing for operational efficiency in this study. We control for firm and year fixed effects and clustering by country-industry following Dasgupta & Zaldokas (2019). The firm-level and country-level covariates standing for firm size, sales growth, leverage, tangibility, free cash flow, GDP, unemployment, and imports as a percentage of GDP follow Cheng et al. (2018) and Dasgupta & Žaldokas (2019). In addition, when examining the regulatory effects on working capital management (proxied by Cash Conversion Cycle and Operating Cycle) and their components, we also control for capital intensity, real interest rate, profit, investment, and dividends following Gaur et al. (2005) and Jalal & Khaksari (2020). Following Borusyak et al. (2024), we group the firm's identifier and the identifier of the chosen dimension and test the additional effect of leniency programs on firms in a chosen dimension. The coefficient of interest is $\mu_{i,g}$, which denotes the additional impact of leniency programs on large firms. Significance levels are denoted as follows: *** signifies 1%, ** indicates 5%, and * represents 10%.*

Table 13 reveals that large firms consistently underperform in Receivable Turnover over a four-year period suggesting an extension of more generous credit terms to clients, confirming our Hypothesis 11. Given their substantial resources and bargaining power, large firms are well-positioned to offer more lenient credit terms (Rajan & Petersen, 1997). Such a strategy could serve multiple purposes including solidifying long-term customer relationships, gaining a competitive edge, or capitalizing on the additional financial flexibility afforded by a lenient regulatory environment. This underperformance in Receivable Turnover may not be a sign of inefficiency, but rather an indicator of a deliberate strategy to foster customer loyalty and strategic positioning in the aftermath of regulatory leniency.

The underperformance in Inventory Turnover during the first year can be understood in the context of strategic inventory management. Large firms may choose to hold more inventory as a buffer against market uncertainties or to facilitate rapid response to emerging market opportunities. The leniency program might provide these firms with the confidence and flexibility to pursue such a strategy without immediate concerns of regulatory constraints. In summation, the firm-level examination of the leniency program's effects on large firms yields a detailed understanding of financial performance.

ii> Highly profitable firms

Table 14: Interaction test to assess leniency programs' additional effects on operational efficiency in highly profitable firms.

| | (1) | (2) | (3) | (4) |
|-----------------------------|--------------------|-------------------|--------------------|--------------------|
| | 1 year | 2 years | 3 years | 4 years |
| $\mu_{i,g}$ (TAT) | 0.0103* (0.066) | 0.007 (0.244) | 0.006 (0.264) | 0.004 (0.474) |
| Firm fixed effects | Y | Y | Y | Y |
| Year fixed effects | Y | Y | Y | Y |
| Cluster by country-industry | Y | Y | Y | Y |
| Controls | Y | Y | Y | Y |
| N | 109,781 | 120,739 | 132,688 | 146,216 |
| $\mu_{i,g}$ (FAT) | 0.039 (0.772) | -0.090 (0.535) | -0.104 (0.479) | -0.178 (0.267) |
| Firm fixed effects | Y | Y | Y | Y |
| Year fixed effects | Y | Y | Y | Y |
| Cluster by country-industry | Y | Y | Y | Y |
| Controls | Y | Y | Y | Y |
| N | 109,732 | 120,684 | 132,626 | 146,145 |
| $\mu_{i,g}$ (OC) | 0.831 (0.296) | 0.955 (0.239) | 1.019 (0.195) | 1.193 (0.153) |
| Firm fixed effects | Y | Y | Y | Y |
| Year fixed effects | Y | Y | Y | Y |
| Cluster by country-industry | Y | Y | Y | Y |
| Controls | Y | Y | Y | Y |
| N | 85,030 | 93,691 | 103,391 | 114,584 |
| $\mu_{i,g}$ (CCC) | 0.399 (0.613) | 1.016 (0.230) | 1.5807* (0.058) | 2.239** (0.010) |
| Firm fixed effects | Y | Y | Y | Y |
| Year fixed effects | Y | Y | Y | Y |
| Cluster by country-industry | Y | Y | Y | Y |
| Controls | Y | Y | Y | Y |
| N | 85,030 | 93,691 | 103,391 | 114,584 |
| $\mu_{i,g}$ (ID) | -0.101 (0.865) | 0.053 (0.932) | 0.268 (0.650) | 0.572 (0.375) |
| Firm fixed effects | Y | Y | Y | Y |
| Year fixed effects | Y | Y | Y | Y |
| Cluster by country-industry | Y | Y | Y | Y |
| Controls | Y | Y | Y | Y |
| N | 85,030 | 93,691 | 103,391 | 114,584 |

Table 14: Interaction test to assess leniency programs' additional effects on operational efficiency in highly profitable firm (continued)

| | (1) | (2) | (3) | (4) |
|-----------------------------|---------------------|---------------------|---------------------|---------------------|
| | 1 year | 2 years | 3 years | 4 years |
| $\mu_{i,g}$ (IT) | -0.087 (0.902) | -0.034 (0.963) | -0.077 (0.906) | 0.178 (0.788) |
| Firm fixed effects | Y | Y | Y | Y |
| Year fixed effects | Y | Y | Y | Y |
| Cluster by country-industry | Y | Y | Y | Y |
| Controls | Y | Y | Y | Y |
| N | 85,030 | 93,691 | 103,391 | 114,584 |
| $\mu_{i,g}$ (RD) | 0.932* (0.075) | 0.903* (0.090) | 0.751 (0.160) | 0.622 (0.264) |
| Firm fixed effects | Y | Y | Y | Y |
| Year fixed effects | Y | Y | Y | Y |
| Cluster by country-industry | Y | Y | Y | Y |
| Controls | Y | Y | Y | Y |
| N | 85,030 | 93,691 | 103,391 | 114,584 |
| $\mu_{i,g}$ (RT) | -0.352** (0.018) | -0.378** (0.022) | -0.382** (0.026) | -0.371** (0.040) |
| Firm fixed effects | Y | Y | Y | Y |
| Year fixed effects | Y | Y | Y | Y |
| Cluster by country-industry | Y | Y | Y | Y |
| Controls | Y | Y | Y | Y |
| N | 84,903 | 93,537 | 103,211 | 114,375 |

*Note: The dependent variables are variables standing for operational efficiency in this study. We control for firm and year fixed effect and clustering by country-industry following Dasgupta & Zaldokas (2019). The firm-level and country-level covariates standing for firm size, sales growth, leverage, tangibility, free cash flow, GDP, unemployment, and imports as a percentage of GDP follow Cheng et al. (2018) and Dasgupta & Žaldokas (2019). In addition, when examining the regulatory effects on working capital management (proxied by Cash Conversion Cycle and Operating Cycle) and their components, we also control for capital intensity, real interest rate, profit, investment, and dividends following Gaur et al. (2005) and Jalal & Khaksari (2020). Following Borusyak et al. (2024), we group the firm's identifier and the identifier of the chosen dimension and test the additional effect of leniency programs on firms in a chosen dimension. The coefficient of interest is $\mu_{i,g}$, which denotes the additional impact of leniency programs on highly profitable firms. Significance levels are denoted as follows: *** signifies 1%, ** indicates 5%, and * represents 10%.*

Table 14 further reveals that these high-profitability firms exhibit a trend of relaxed credit policies over the study period manifesting in an elongated Cash Conversion Cycle (CCC) in later years.

This pattern aligns with the strategic investment perspective on trade credit as posited by Abuhommous (2017). Given their financial robustness, these firms are better positioned to implement a more accommodating credit policy as a calculated strategic initiative. This is further underscored by Nadiri's (1969) application of the Dorfman–Steiner model, where trade credit functions as an investment geared toward fostering long-term customer relations (Dorfman & Steiner, 1954; Nadiri, 1969). The intent here is multi-dimensional—consolidating current client relationships, carving out a competitive niche, and potentially leveraging their financial potency to tap into new markets. This is corroborated by Abuhommous (2017) who found that greater investments in accounts receivable are linked to higher future profitability. In general, the results confirm our Hypothesis 12 that highly profitable firms relax their credit policy more after leniency programs.

2.6. Discussion

In this study, our identification relies on the generalized DiD estimation based on a staggered passage of leniency laws in 64 countries around the world from 1990-2020. While previous work by Dasgupta and Žaldokas (2019) relied on Cartel Regulation 2013 for their temporal mapping, our study enriches this dataset with more recent updates by using Cartel Regulation 2018 and local official statutes.

Our methodology stands out for its application of an advanced DiD estimator, as developed by Borusyak et al. (2024), to address the limitations of traditional two-way fixed-effect models. Unlike prior studies, our research employs a comprehensive, year-by-year longitudinal analysis to uncover the true impact of leniency laws on firms' operational performance. This innovative approach offers more accurate and dynamic insights significantly enriching the existing literature on leniency programs and their effects. Our methodology, utilizing the advanced DiD estimator developed by Borusyak et al. (2024), enhances the precision of our findings ensuring that the measured effects of leniency laws on firms' operational performance are accurately captured. This approach not only addresses the limitations of traditional models, but also brings dynamic insights by analyzing the evolving impact of these laws year by year. As a result, our study provides a more detailed and temporally detailed understanding of the effects of leniency programs on firm behavior.

Our general findings reveal a dual strategy. Firms initially extend credit terms, a short-term approach that risks reducing asset turnover, while simultaneously optimizing fixed asset utilization, a long-term tactic aimed at sustainable growth. The net impact of these forces on total asset turnover remains indeterminate indicating an intricate interplay between short-term and long-term strategies. Critically, firms appear to adapt their credit policies strategically over time to sustain consumer relationships, remain competitive, and manage product quantities (Deloof & Jegers, 1996; Nadiri, 1969; Pike et al., 2005) all while achieving long-term efficiency gains. Thus, while leniency laws initially strain short-term operational efficiency, firms appear to recalibrate their strategies for a more sustainable long-term performance. The findings remain robust even after accounting for industry-level market concentration.

Furthermore, we comprehensively study the multifaceted effects of leniency laws on operational efficiency, not only vertically over time, but also horizontally across distinct contexts. These effects are most observable in developing economies intensified by elevated levels of informational asymmetry between market participants. Intriguingly, the laws also resonate differently according to cultural frameworks as delineated by the Hofstede (2011) study. Firms in cultures with low power distance, high uncertainty avoidance, long-term orientation, and are collectivistic are notably more apt to relax credit policies post-lenieny. Additionally, our data reveals that larger and more profitable firms extend more advantageous payment terms in the wake of leniency laws suggesting the influence of strategic considerations. The findings collectively underscore the multi-faceted impact of leniency laws on corporate behavior illuminating the need for managers to adapt both short-term operations and long-term strategies accordingly.

The relatively recent adoption of leniency laws across the globe, especially in emerging economies, underscores a significant trend in international business regulation. Despite their origin in the early 1990s, these laws have been adopted slowly with key emerging markets like Thailand and Vietnam yet to implement them. This gradual global spread of leniency laws, as evidenced in our comprehensive dataset (Table 2), indicates a cautious, but growing recognition of their effectiveness. Our findings, which demonstrate that these laws can enhance competition, especially in developing countries characterized by high levels of informational asymmetry, present a strong case for their adoption as a competitive policy tool in emerging economies. The

effectiveness of leniency laws in stimulating competitive practices suggests that policymakers in these markets could significantly benefit from their implementation.

Appendix:

Table A1: Description and calculation of variables used in the study

| Variables | References | Calculation | Sources |
|-----------------------|---|---|---|
| Total Asset Turnover | | Net Sales or Revenues/Total Assets | Datastream |
| Fixed Assets Turnover | | Net Sales or Revenues/Fixed Assets | Datastream |
| Cash Conversion Cycle | (Wang, 2019) | CCC = Days of Inventory Outstanding + Days of Receivable Outstanding – Days of Payables Outstanding | Datastream |
| Firm size | (Dasgupta & Žaldokas, 2019) | Ln(Total Assets) | Datastream |
| LnGDP | (Dasgupta & Žaldokas, 2019) | Ln(GDP) | World Bank national accounts data and OECD National Accounts data files |
| Unemployment | | | International Labour Organization, ILOSTAT database. |
| Import(% GDP) | (Dasgupta & Žaldokas, 2019) | | World Bank national accounts data and OECD National Accounts data files |
| Tangibility | (Jalal & Khaksari, 2020) | Net property, plant, and equipment/Total assets | Datastream |
| Sale growth | (Dasgupta & Žaldokas, 2019; Rajan & Petersen, 1997) | | Datastream |

Table A1: Description and calculation of variables used in the study (continued)

| | | | |
|--------------------|--|--|---|
| FCF | (Cheng et al., 2018; Gao et al., 2021) | A dummy variable that is equal to one if a firm's free cash flow is not negative and zero otherwise. | Datastream |
| Capital Intensity | (Gaur et al., 2005) | Gross Fixed Assets/(Gross Fixed Assets + Inventories) | Datastream |
| Real Interest Rate | (Jalal & Khaksari, 2020) | Lending interest rate adjusted for inflation as measured by the GDP deflator. | International Monetary Fund, International Financial Statistics and data files. |
| Profit | (Jalal & Khaksari, 2020) | Operating profit before taxes and depreciation/Total assets | Datastream |
| Leverage | (Giroud & Mueller, 2010; Jalal & Khaksari, 2020) | Total assets/(Total assets – Total debts) | Datastream |
| Investment | (Jalal & Khaksari, 2020) | Capital expenditures/Total assets | Datastream |
| Dividend | (Jalal & Khaksari, 2020) | Cash dividends/Total assets | Datastream |

Table A2: Filtering screens

| Screen | Content | Reference |
|--|--|---|
| Screen 1: Keeping only equity, delete all other types of companies. | Because the other types are non-common stock and may behave irregularly. Ince and Porter (2006) also argues that eliminating non-common equity securities and correcting errors in the data significantly improve the time-series properties of market-wide returns | (Ince & Porter, 2006) |
| Screen 2: Dropping all Financial and Utility, real estate firms. | Dissimilarities in their financial characteristics and regulated nature as compared to other industries | (Fama & French, 1992; Karolyi & Wu, 2018) |
| Screen 3: Deleting stock not listed on a major exchange. | | (Ince & Porter, 2006) |
| Screen 4: Removing all nonlocal firms. | | (Ince & Porter, 2006) |
| Screen 5: Dropping stocks with specific characteristics consisting of “income trust,” “preferred stocks,” “partner,” etc., in the company name in ALL country. | Their behavior is different from common stocks due to their special features (not common stocks). For example, REITs are the real estate composite index. Quite like a fund, people just put money into it and invest in property, so those subjects don’t have corporations leading to a lack of operational efficiency ratios. | (Griffin et al., 2010) |

Table A2: Filtering screens (continued)

| | | |
|---|---|---|
| Screen 6: Dropping stocks with specific characteristics consisting of “income trust,” “preferred stocks,” “partner,” etc., in the company name in specific countries. | Their behavior is different from common stocks. | (Griffin et al., 2010) |
| Screen 7: Delete all stocks listed that are not in the currency of the country in which the market is located. | Eliminating foreign factors, especially when examining a cross-country study. | (Ince & Porter, 2006) |
| Screen 8: Excluding firms with negative sales. | | (Griffin et al., 2010) |
| Screen 9: Excluding firms with negative book values and prices. | | (Easley et al., 2002; Griffin et al., 2010) |
| Screen 10: Excluding firms with a range of market-to-book value. | Excluding firms with a market-to-book value higher than three or less than 0.01 | (Barlev et al., 2007) |
| Screen 11: Excluding firms with negative total assets. | | (Barlev, 2007; Dasgupta & Zaldokas, 2019) |
| Screen 12: Excluding companies with a CCC higher than 365. | | (Jalal & Khaksari, 2020; Bhattacharyya et al. 2023) |

Table A3: Relevant summary statistics from extant cross-countries studies

Panel A: Relevant summary statistics from Dasgupta & Žaldokas', 2019 paper

| Variables | N | Mean | Median | SD |
|---------------------|---------|-----------|---------|-----------|
| Assets (\$millions) | 633,400 | 3,692.295 | 100.353 | 892,415.2 |
| Tangibility | 462,654 | 0.316 | 0.270 | 0.242 |

Note: In this table, data is collected from Compustat Global and North America Compustat and winsorized at 1%.

Panel B: Relevant summary statistics from Dong et al.'s, 2019 paper

| Variables | N | Mean | Median | SD |
|---------------------|---------|----------|--------|-----------|
| Assets (\$ million) | 507,354 | 2,886.19 | 130.75 | 37,700.46 |

Note: Data is collected from Compustat Global and North America Compustat filtered and winsorized at 1%.

Table A4: Number of unique stocks and firm-year observation comparison across studies

| Our sample | | | (Dong et al., 2019) | | (Ma et al., 2019) |
|------------|--------------|------------------|----------------------------------|------------------|-------------------|
| Datasource | Datastream | | Compustat Global & North America | | Datastream |
| Country | Unique stock | Firm - year Obs. | Unique stock | Firm - year Obs. | Unique stock |
| Argentina | 86 | 895 | 73 | 925 | |
| Australia | 1,363 | 7,316 | 2,075 | 20,082 | 2,799 |
| Austria | 125 | 1,030 | 132 | 1,472 | 197 |
| Belgium | 152 | 1,343 | 162 | 1,843 | 256 |
| Brazil | 166 | 1,438 | 384 | 4,492 | |
| Bulgaria | 141 | 758 | 17 | 126 | 108 |
| Canada | 1,544 | 9,397 | 3,701 | 28,176 | 2,435 |
| Chile | 160 | 1,417 | 164 | 2,124 | |
| China | 2,497 | 10,634 | 2,478 | 27,416 | |
| Colombia | 61 | 451 | 38 | 349 | |
| Croatia | 101 | 614 | 30 | 255 | 122 |
| Cyprus | 66 | 382 | 34 | 275 | 146 |
| Czech | 49 | 206 | 34 | 274 | |
| Denmark | 187 | 1,604 | 196 | 2,335 | 385 |
| Ecuador | 2 | 10 | 2 | 17 | |
| Estonia | 13 | 123 | 17 | 181 | |
| Finland | 188 | 1,745 | 158 | 2,060 | 223 |
| France | 1,132 | 8,969 | 1,026 | 11,219 | 1,621 |
| Germany | 1,108 | 9,271 | 1,012 | 11,508 | 1,306 |
| Greece | 288 | 2,384 | 234 | 2,223 | 412 |
| Hong Kong | 1,314 | 11,254 | 364 | 3,654 | 1,664 |
| Hungary | 47 | 389 | 32 | 306 | 87 |
| Iceland | 19 | 112 | 10 | 80 | |
| India | 2,491 | 12,756 | 2,113 | 24,173 | 2,955 |
| Indonesia | 486 | 4,198 | 338 | 3,775 | 485 |
| Ireland | 85 | 618 | 108 | 1,209 | 67 |
| Israel | 333 | 2,396 | 285 | 2,601 | 786 |
| Italy | 325 | 2,239 | 340 | 3,643 | 584 |
| Japan | 4,473 | 54,999 | 3,877 | 53,694 | 3,584 |
| Jordan | 96 | 712 | 103 | 828 | |
| Kenya | 33 | 235 | | | 61 |
| Latvia | 27 | 218 | 28 | 270 | |
| Lithuania | 27 | 151 | 34 | 305 | 31 |
| Luxembourg | 24 | 122 | 44 | 416 | 17 |
| Malaysia | 1,011 | 8,713 | 1,035 | 12,848 | 1,087 |
| Mexico | 167 | 1,573 | 146 | 1,681 | 242 |

Table A4: Number of unique stocks and firm-year observation comparison across studies (continued)

| Our sample | | | (Dong et al., 2019) | | (Ma et al.,2019) |
|--------------|--------------|------------------|----------------------------------|------------------|------------------|
| Datasource | Datastream | | Compustat Global & North America | | Datastream |
| Country | Unique stock | Firm - year Obs. | Unique stock | Firm - year Obs. | Unique stock |
| Netherlands | 216 | 2,039 | 244 | 2,884 | 281 |
| New Zealand | 151 | 1,011 | 157 | 1,623 | 263 |
| Nigeria | 71 | 387 | 55 | 500 | |
| Norway | 284 | 1,778 | 340 | 3,063 | 583 |
| Oman | 77 | 703 | 58 | 604 | |
| Pakistan | 221 | 1,514 | 205 | 2,232 | 374 |
| Peru | 119 | 955 | 77 | 931 | 178 |
| Philippines | 151 | 1,265 | 174 | 2,154 | 321 |
| Poland | 483 | 3,162 | 402 | 3,454 | 951 |
| Portugal | 93 | 838 | 80 | 838 | 177 |
| Romania | 125 | 769 | 47 | 357 | 176 |
| Russian | 419 | 1,929 | 191 | 1,647 | |
| Singapore | 827 | 7,267 | 738 | 8,066 | 735 |
| Slovakia | 21 | 105 | 10 | 75 | |
| Slovenia | 42 | 270 | 23 | 253 | 96 |
| South Africa | 418 | 2,994 | 370 | 3,857 | 878 |
| South Korea | 2,264 | 20,631 | 1,475 | 8,701 | 2,594 |
| Spain | 187 | 1,575 | 188 | 2,293 | 273 |
| Sweden | 638 | 4,109 | 554 | 5,694 | 1,087 |
| Switzerland | 251 | 2,468 | 270 | 3,596 | 480 |
| Thailand | 638 | 6,835 | 496 | 5,723 | 785 |
| Turkey | 328 | 2,679 | 157 | 1,538 | 422 |

Table A4: Number of unique stocks and firm-year observation comparison across studies (continued)

| Our sample | | | (Dong et al., 2019) | | (Ma et al.,2019) |
|----------------|--------------|------------------|----------------------------------|------------------|------------------|
| Datasource | Datastream | | Compustat Global & North America | | Datastream |
| Country | Unique stock | Firm - year Obs. | Unique stock | Firm - year Obs. | Unique stock |
| Ukraine | 77 | 432 | 6 | 38 | |
| United Kingdom | 2,207 | 12,430 | 2,832 | 28,168 | 3,924 |
| United States | 7,365 | 52,310 | 22,498 | 213,914 | 4,067 |
| Venezuela | 25 | 257 | 21 | 222 | 21 |
| Vietnam | 955 | 5,592 | | | |
| Zambia | 9 | 39 | 9 | 81 | |

Note: “Unique stock” stands for the number of unique stocks, and “Firm-year obs.” stands for the number of firm-year observations.

Table A5: Number of unique stocks and firm-year observation comparison across studies (subset of Table A4)

| My sample | | | (Dong et al., 2019) | | (Ma et al.,2019) |
|---------------|--------------|---------------------|----------------------------------|------------------|------------------|
| Datasource | Datastream | | Compustat Global & North America | | Datastream |
| Country | Unique Stock | Firm - year Obs. | Unique Stock | Firm - year Obs. | Unique Stock |
| Bulgaria | 141 | 758 | 17 | 126 | 108 |
| Canada | 1,544 | 9,397 | 3,701 | 28,176 | 2,435 |
| Croatia | 101 | 614 | 30 | 255 | 122 |
| Hong Kong | 1,314 | 11,254 | 364 | 3,654 | 1,664 |
| Romania | 125 | 769 | 47 | 357 | 176 |
| Russian | 419 | 1,929 | 191 | 1,647 | |
| Turkey | 328 | 2,679 | 157 | 1,538 | 422 |
| United States | 7,365 | 52,310 | 22,498 | 213,914 | 4,067 |

Note: “Unique stock” stands for the number of unique stocks, and “Firm-year obs.” stands for the number of firm-year observations.

Table A6: Parallel trend assumption test

| Dependent variables | p-value of joint null test | p-value of joint null test |
|--------------------------|------------------------------------|--------------------------------------|
| | Two years before leniency passages | Three years before leniency passages |
| Total Assets Turnover | 0.1899 | 0.2939 |
| Fixed Assets Turnover | 0.0502 | 0.0617 |
| Operating Cycle | 0.1699 | 0.2152 |
| Cash Conversion Cycle | 0.8701 | 0.8223 |
| Inventory Days | 0.0729 | 0.1542 |
| Inventory Turnover | 0.9748 | 0.9895 |
| Account Receivables Days | 0.8097 | 0.4466 |
| Receivable Turnover | 0.1755 | 0.2957 |
| Days Payable Outstanding | 0.0134(v) | 0.0289 (v) |

Notes: Three years and two years are the number of periods before the event date used for the parallel trend test. The number in each column is $Prob > \chi^2$, which is the p-value of the associated joint null test where $\mu = 0$. That $Prob > \chi^2$ is higher than 0.05 supports the parallel trend assumption. The results show that parallel is satisfied in most cases leaving exceptions for Days Payable Outstanding (with the (v) at the superscript). Due to the parallel trend assumption violation, we exclude day payable outstanding from our test.

Figure A1: Correlation matrix of key independent variables utilized in the empirical analysis.

| | Firm size | Tangibility | Lag(sale growth) | Free cash flow | Capital intensity | Profit | Leverage | Investment | Dividend | Import (%GDP) | Ln (GDP) | Unemployment | Real interest rate |
|---------------------------|-----------|-------------|------------------|----------------|-------------------|--------|----------|------------|----------|---------------|----------|--------------|--------------------|
| Firm size | 1.00 | | | | | | | | | | | | |
| Tangibility | -0.13 | 1.00 | | | | | | | | | | | |
| Lag(sale growth) | -0.04 | -0.03 | 1.00 | | | | | | | | | | |
| Free cash flow | -0.10 | -0.16 | -0.03 | 1.00 | | | | | | | | | |
| Capital intensity | -0.15 | 0.59 | -0.05 | -0.08 | 1.00 | | | | | | | | |
| Profit | -0.26 | 0.05 | -0.02 | 0.39 | -0.02 | 1.00 | | | | | | | |
| Leverage | -0.11 | 0.23 | 0.01 | -0.15 | 0.07 | -0.13 | 1.00 | | | | | | |
| Investment | -0.04 | 0.37 | 0.13 | -0.30 | 0.23 | 0.11 | 0.06 | 1.00 | | | | | |
| Dividend | -0.05 | -0.01 | -0.02 | 0.01 | 0.01 | 0.30 | -0.17 | 0.03 | 1.00 | | | | |
| Import (%GDP) | -0.08 | -0.01 | 0.03 | -0.02 | -0.01 | -0.01 | -0.04 | 0.01 | 0.12 | 1.00 | | | |
| Ln(GDP) | -0.18 | -0.15 | -0.02 | 0.05 | -0.04 | -0.04 | -0.01 | -0.05 | -0.16 | -0.62 | 1.00 | | |
| Unemployment | -0.02 | 0.01 | -0.01 | -0.01 | -0.02 | -0.01 | -0.01 | 0.01 | 0.01 | -0.15 | -0.09 | 1.00 | |
| Real interest rate | -0.01 | 0.05 | 0.01 | -0.02 | 0.01 | 0.01 | 0.04 | 0.04 | 0.03 | 0.03 | -0.12 | 0.14 | 1.00 |

Note: Correlation matrix of all independent variables.

Chapter Three - Essay Two: Firm operational adaptation to mega regional trade agreements: Evidence from the impact of CPTPP on Vietnam

Abstract

Amid escalating globalization, significant trade pacts, such as the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP), provide transformative benefits to firms in member nations offering not just tariff reductions, but also opportunities to expand market shares in new international arenas. This research investigates the CPTPP's impact on Vietnamese firms from 2017-2021 using Propensity Score Matching and Difference-in-Differences (PSM-DiD) analysis. We observe an initial dip in operational efficiency in the first year of the CPTPP reflective of a strategic realignment phase with increased fixed asset investments and trade credit extensions aimed at capturing these new market opportunities. However, subsequent years reveal a substantial recovery in operational efficiency indicative of successful adaptation and an enhanced ability to tap into the anticipated growth and overseas markets. The CPTPP's effects were particularly pronounced for high profitability, large-sized firms, those listed on HOSE (Ho Chi Minh Stock Exchange), and, since 2020, for those resilient to COVID-19's impact. Despite financial constraints, these firms strive to leverage the CPTPP's benefits to increase revenue and alleviate financial stress, although the ongoing focus on debt management and financial stability may constrain significant investments or strategic shifts. Our findings highlight the CPTPP's role as a catalyst for market expansion in emerging markets and the strategic maneuvers firms adopt to capitalize on these opportunities.

Keywords: operational efficiency, CPTPP, PSM-DID, transition markets, multi-regional competition

3.1. Introduction

Free Trade Agreements (FTAs) serve as foundational frameworks between two or more nations aimed at reducing or eliminating trade barriers and tariffs to foster economic growth. Among these, the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP) stands as a pivotal multilateral FTA that has substantially influenced the economic contours of its member countries. From a macroeconomic viewpoint, FTAs, like the CPTPP, catalyze economic expansion by fostering export-led growth, improving home country welfare, and stimulating overall economic development (Goodman & Kaempfer, 1993; Shah et al., 2022; Sohn & Lee, 2010). Beyond these overarching economic gains, FTAs also serve as negotiation arenas to enhance trade-related standards and regulations among participating nations (Lim et al., 2012). At the microeconomic level, the scholarly focus has extended to the effects of FTAs on various firm-level metrics, such as trade balance, productivity, earnings management, profitability, and financial structure (Baggs & Brander, 2006; Hussain & Ali Shah, 2022; Lin, 2015; Zhou et al., 2023). However, despite this extensive body of work, one crucial dimension remains conspicuously unexplored – the impact of FTAs on operational efficiency. In addressing this gap, our study uniquely positions itself by spotlighting the CPTPP with a particular focus on its influence on the operational efficiency of firms in Vietnam.

Operational efficiency, one of the three fundamental components of the Dupont model within finance areas, encapsulates a firm's ability to facilitate the production of goods or provision of services with minimal waste and at the lowest possible cost. This attribute is intrinsically tied to a firm's performance and profitability (Aktas et al., 2015), return on equity. An enhancement in operational efficiency can yield substantial benefits for an organization, such as cost mitigation, augmented competitiveness, superior customer service, increased agility, and optimized resource utilization. Collectively, these factors contribute to improved risk management and support a firm's resilience in the global market (Chhaochharia et al., 2017; Eisdorfer & Hsu, 2011). Fundamentally, operational efficiency remains a critical element in successful business strategy formulation.

Initially characterized by its modest scale and limited trading activities, the Vietnamese stock market has experienced significant growth both in terms of market capitalization and transaction volume. Established in 2000 with only two listed companies and a collective market capitalization

of approximately USD 28 million, the market had expanded by 2019 to feature 745 listed firms with a combined market capitalization exceeding 140 billion USD (Dinh et al., 2023). Concurrently, Vietnam has been gaining prominence as a global manufacturing hub, particularly under the “China Plus One” strategy.⁷ This approach has positioned Vietnam as an appealing alternative for international businesses looking to diversify their supply chains, increase resilience, and reduce over-dependence on a single nation. The country's strategic geographical location, coupled with competitive labor and production costs, has made it a prime investment destination for manufacturing. While our study focuses on Vietnam as the treatment group, we also include China, India, Thailand, the Philippines, and Indonesia as control countries, consistent with prior research (Le & Tran-Nam, 2018; Webb et al., 2020).

Grasping the influence of international trade agreements on operational efficiency is particularly relevant for Vietnam as it undergoes a critical economic transformation from an agrarian base to a manufacturing-driven model – a shift where operational efficiency is crucial (Laiprakobsup & Chorkaew, 2018). In addition, despite the significant role of Vietnam in the global manufacturing landscape and its entry into CPTPP on 30 December 2018 (Mahadevan & Nugroho, 2019; Plummer, 2019; Petri & Plummer, 2020), there is a lack of comprehensive studies examining the impact of this major trade agreement on the operational efficiency of Vietnamese firms. Recognizing the critical nature of this issue, our research seeks to fill an existing void in the academic literature. We scrutinize the time-sensitive effects of the CPTPP on the operational efficiency of Vietnamese firms from 2017-2021. To accomplish this, we deploy Propensity Score Matching in combination with a Difference-in-Differences (PSM-DiD) analytical framework allowing us to benchmark Vietnamese firms against similar firms from other Asian countries not participating in the CPTPP. While our study focuses on Vietnam as the treatment group, we also include China, India, Thailand, the Philippines, and Indonesia as control countries consistent with prior research (Le & Tran-Nam, 2018; Webb et al., 2020).

Our findings reveal an initial decrease in operational efficiency in the first year of CPTPP implementation interpreted as an adjustment period. However, from the second year onward, firms demonstrated significant improvements in operational efficiency indicating successful

⁷ China Plus One started gaining traction in the business world around the late 2000s and early 2010s (Strategic Direction, 2007) and refers to a strategy in which companies avoid investing only in China and diversify their businesses to alternative destinations.

adaptation to the new trade conditions. Further analysis reveals that the CPTPP has a more pronounced impact on firms with high profitability, large size, those listed on HOSE (Ho Chi Minh Stock Exchange), and those in industries least affected by COVID-19. Even firms under financial constraints seek to harness the benefits of the CPTPP to increase revenue and mitigate financial pressures. However, a continued emphasis on debt management and financial stability may hinder the potential for significant investments or strategic shifts.

The existing literature on the CPTPP predominantly emphasizes its macroeconomic impacts as extensively discussed in studies by Petri (2019) and Li and Whalley (2021). While these works provide valuable insights, there is a noticeable paucity of firm-level evidence, particularly concerning operational efficiency in non-banking sectors. In addition, most existing research regarding the impacts of FTAs tend to gravitate toward the financial implications (Goodman, 1993; Shah, 2022) overlooking how these agreements influence operational efficiency through metrics like financial ratios and operational days. Our research contributes a novel perspective by dissecting the multifaceted impacts of the CPTPP, an agreement still undergoing significant transformation with increasing global interest evidenced by numerous countries seeking membership. As such, our findings offer timely insights into how evolving international trade dynamics, as epitomized by the CPTPP, sculpt firm-level operational strategies and financial health. Understanding these dynamics can guide strategic decision-making, helping these stakeholders to better anticipate the effects of such agreements and formulate appropriate responses. It can also contribute to broader economic discourse about the role of international trade agreements in shaping business operations and economic landscapes.

The remainder of this paper is organized as follows. Section 2 provides a comprehensive literature review discussing the general impacts of the CPTPP, the globalization progress of Vietnam, the importance of the operational efficiency to firms, and how firms react when CPTPP happens. Section 3 presents the development of our hypotheses. Section 4 outlines the data, methodology, and empirical results for this study. Finally, Section 5 concludes the paper summarizing the findings and discussing their implications. The references supporting this study are listed in Section 6.

3.2. Literature review

3.2.1. Macroeconomic and microeconomic impacts of the CPTPP

The CPTPP stands as a paradigm shift in the realm of international trade agreements. Embodying its “comprehensive” nature, the CPTPP transcends traditional trade pact boundaries encompassing a broad spectrum of issues ranging from tariff reductions to intellectual property rights, labor and environmental standards, and the burgeoning field of digital trade (Wu, 2022; Nath, 2018; Ajmera, 2023). Equally important is its “progressive” element that signals a forward-looking approach. This encompasses a commitment to not only economic growth, but also sustainable development, inclusivity, and equitable distribution of trade benefits (Ajmera, 2023). This dual focus aligns the CPTPP with the 21st-century global economic and social imperatives marking it as a trailblazer in setting the standards for future trade agreements and necessitating a thorough exploration of its multifaceted impact in the literature.

The CPTPP emerged as the successor to the Trans-Pacific Partnership (TPP) following the withdrawal of the United States. The remaining signatories including Australia, Brunei Darussalam, Canada, Chile, Japan, Malaysia, Mexico, Peru, New Zealand, Singapore, and Vietnam united to reestablish the agreement culminating in its official signing on March 8, 2018, in Santiago, Chile. By the close of 2018, the agreement was in force for the first eight countries including Vietnam. Grounded in the theory of Comparative Advantage, the agreement seeks to optimize the allocation of resources across countries where Vietnam can leverage its comparative advantages, such as lower labor costs, growing industrial capacity, and strategic geographic location. This is expected to stimulate both trade and capital flows offering potentially higher returns on investments and new opportunities in the financial markets. Under conservative projections, the CPTPP is anticipated to elevate Vietnam's GDP by approximately 1.1% by the year 2030. If we factor in a moderate uplift in productivity, this GDP increase could potentially reach as high as 3.5% as suggested by (Ngan, 2018). Collectively, these 11 nations represent 13% of the world's GDP, boasting a combined GDP of £11 trillion as of 2023 (UK Government, 2023). In a testament to its evolving influence, the CPTPP remains open to countries that meet its rigorous standards. The United Kingdom began its accession process in February 2021. This evolving landscape is particularly pertinent this year as New Zealand assumes the role of chair for the CPTPP (New Zealand Ministry of Foreign Affairs and Trade, 2023) further emphasizing the

pact's dynamic and ever-expanding influence in global trade. Simultaneously, nations within the region, such as Vietnam, are making individual strides toward diminishing trade barriers and encouraging global commerce highlighted by its novel free trade agreements with the European Union and the UK. These developments underscore the CPTPP's ongoing progress and expanding influence in global trade.

Extant literature provides evidence regarding the impact of the Free Trade Agreement, a broader term of CPTPP, in both macroeconomic and microeconomic contexts. When examining the free trade area between Canada and the U.S., Goodman and Kaempfer (1993) prove that FTA significantly enhances both home and world welfare in the presence of quotas. Shah et al. (2022) also reports the FTA between China and Pakistan increase bilateral trade, which consequently affect trade balances of these two countries. By borrowing the “trade structure” concept from Lederman and Maloney (2003), Sohn and Lee (2010) examine a panel estimation for 66 countries from 1991-2004 to verify that FTA enhance economic growth. Regarding firm-level analysis, Baggs and Brander (2006) show that the tariff change after the Canada-US FTA is associated with the change in profits and leverage of firms depending upon the exported orientation. By examining the Pakistan-Malaysia FTA, Hussain and Ali Shah (2022) found that changes in trade policy led to decreased profits, increased leverage, and reduced dividend payouts for firms that faced heightened competition from other markets. Matsushita (2023) theoretically suggests ways to use CPTPP the first FTA containing a comprehensive chapter on State Owned Enterprises (SOEs) in order to enhance the effects of legal disciplines implemented on SOEs’ activities. Furthermore, research by Lin et al. (2015) has indicated a notable rise in financial restatements and earnings management as a consequence of tariff reductions. This finding is consistent with the Shleifer (2004) proposition that heightened competition could potentially stimulate an increase in unethical practices and the “Fraud Triangle” theory proposed by Cressey (1954).

Acknowledging the potential for concurrent events to influence our study, it is imperative to distinguish between the Belt and Road Initiative (BRI) and the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP) to address concerns about potential contamination effects. In analyzing the differential impacts of the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP) and the Belt and Road Initiative (BRI) on firm performance and market competition, it is essential to delineate the distinct nature and objectives

of these two frameworks. The CPTPP, a trade agreement aimed at reducing trade barriers and setting high-standard regulations, directly influences the operational dynamics of firms within its member countries. By facilitating a more open and competitive market environment through the reduction of tariffs and quotas, the CPTPP necessitates firms to innovate and enhance their efficiencies to thrive. This trade-focused framework contrasts with the BRI's macro-level goal of improving infrastructure and economic policy coordination across continents, which, while impactful, indirectly affects firm performance by enhancing overall economic connectivity rather than specifically targeting market competition dynamics.

The CPTPP's emphasis on creating a unified market and its direct effects on firm-level competition and efficiency make it particularly relevant for evaluating the trade agreement's benefits for Vietnamese firms. Unlike the BRI, which broadly targets infrastructural development and may indirectly benefit firms through improved logistics and connectivity, the CPTPP's specific focus on trade regulations and market access directly correlates with enhanced competitive practices and operational performance among firms. By isolating the effects of the CPTPP, our analysis aims to provide a nuanced understanding of how trade liberalization under this agreement specifically contributes to driving firm efficiency and competitiveness in Vietnam, thereby offering insights into the trade agreement's unique role in fostering economic advancement distinct from the broader objectives of the BRI.

3.2.2. Globalization and competitive advantages of Vietnam

Vietnam embarked on a transformative journey toward economic and political integration with the international community through its landmark Doi Moi reform in 1986 (Beresford, 2008; Vo, 2018). This pivotal reform not only marked the end of Vietnam's isolation and dependence on the former Soviet Union, but also set the stage for increased global engagement. As a significant milestone, Vietnam joined the first Free Trade Agreement (FTA) designed for ASEAN countries, known as AFTA, in 1995. This move was further solidified by its accession to the World Trade Organization (WTO) in 2007 (Barai et al., 2017; Vuving, 2008). Post-WTO membership, Vietnam accelerated its involvement in multiple regional FTAs, particularly ASEAN+1 agreements and bilateral trade pacts with countries such as Chile and South Korea between 2008 and 2015. This

active participation has catapulted Vietnam to the status of an “FTA hub” reinforcing its strategic position in both regional and global trade networks (Barai et al., 2017).

Vietnam also stands out as one of the countries with a particularly robust portfolio of trade agreements. This extensive engagement reflects Vietnam's strategic approach to integrating itself into the global economy. This is further highlighted by Vietnam's remarkable rise in the global export rankings from the 50th position in 2006 just prior to joining the World Trade Organization to being the 20th largest exporter worldwide by 2022. These developments reflect Vietnam's relentless pursuit of diversifying its economic partnerships and optimizing its trade relations, thereby elevating its role in the global economic landscape.

As U.S.-China trade tensions escalate, Vietnam has inadvertently emerged as a beneficiary. The imposition of increased U.S. tariffs on a range of Chinese products has led manufacturers to seek alternatives accelerating Vietnam's metamorphosis into a global manufacturing hub. In this context, Vietnam has positioned itself as a compelling alternative for business relocation aligning with the “China Plus One” strategy.⁸ Global businesses, keen to diversify, enhance supply chain resiliency, and reduce dependency on one country are increasingly looking at Vietnam as an attractive investment destination (Nguyen & Notteboom, 2016).

Several factors contribute to Vietnam's burgeoning status as a manufacturing hotspot. First, the country's robust infrastructure, including international airports, seaports, and rail links, stands out among Southeast Asian nations facilitating efficient production and transportation flows. In addition, the country offers a cost advantage that Vietnam's average manufacturing labor costs are approximately half those in China, US \$2.99 per hour as opposed to China's US \$6.50 per hour (Liu, 2022). Moreover, Vietnam boasts a relatively large, well-educated labor force further enhancing its attractiveness for production. To capitalize on this, the Vietnamese government has also initiated various vocational education and training programs aimed at skill enhancement.

However, the rapid economic transformation and increased global integration brought about by the CPTPP present both opportunities and challenges for Vietnamese firms. Opportunities arise

⁸ China Plus One is a business strategy where companies avoid over-reliance on China for manufacturing by diversifying their operations to include another Asian country, thereby mitigating risk and capitalizing on the unique advantages offered by different regions.

from expanded market access, potential for increased foreign investments, and enhanced competitiveness in the global arena. Conversely, challenges include adapting to stringent trade regulations, facing heightened competition from international players, and the need to upgrade technological capabilities and labor skills. The changes in trade regulations, market conditions, and competitive dynamics require firms to adapt their operations and strategies. Understanding how these firms adjust and the impact on their operational efficiency is crucial for policymakers, investors, and the firms themselves. Despite the significant role of Vietnam in the global manufacturing landscape and its recent entry into the CPTPP, there is a lack of comprehensive studies examining the impact of this major trade agreement on the operational efficiency of Vietnamese firms. This study seeks to fill this research gap providing valuable insights into the microeconomic implications of the CPTPP for an emerging economy like Vietnam.

3.2.3. Importance of operational efficiency

As theorized by Leibenstein (1966) through the concept of “X-efficiency,” organizational capability is the ability of a firm to outperform competitors despite having access to similar resources. This competitive edge drives firms to become more efficient, a phenomenon that has received empirical validation (Frantz, 1992). Increasing competitive pressures trigger a range of organizational changes. These changes not only improve efficiency, but also promote the strategic hiring of top-tier CEOs and reduce organizational slack. Collectively, these shifts elevate overall firm performance (Dasgupta et al., 2018). More importantly, these organizational capabilities can act as durable competitive advantages protecting against the risks of imitation, substitution, dissipation, and appropriation (Collis, 1994). As noted by Ulrich and Lake (2011), progressive organizations go beyond mere efficiency gains; they invest in building an organizational culture that empowers every employee to act and think as leaders fostering an adaptable and resilient environment. This becomes particularly vital in an era where market conditions are in constant flux and the competitive landscape is incessantly evolving.

Building on the concept of organizational capability, operational efficiency is a critical aspect that enables firms to outperform their competitors. This efficiency is dissected into three layers. The first layer is total asset turnover, a fundamental disaggregation of return on assets providing insights into the firm’s profitability (Fairfield & Yohn 2001). As a main component of the DuPont

analysis, a framework for assessing a company's return on equity, total asset turnover is a key indicator of how efficiently a company uses its assets to generate sales or revenues. Fairfield and Yohn (2001) states that the most fundamental disaggregation of ROA providing insight into a firm's profitability is profit margin and asset turnover emphasized widely in many books (Bernstein & Wild 1998; Revsine et al., 2005; Stickney et al., 2004).

The comparative analysis of profit margin and asset turnover, as discussed by Fairfield and Yohn (2001), Nissim and Penman (2001), and Soliman (2008), places significant emphasis on the role of asset turnover in predicting future profitability. These studies suggest that innovations leading to improved asset turnover are not just transient effects. They have a lasting correlation with changes in a firm's future profitability, especially in competitive market environments. This correlation is critical as it indicates that efficient asset management strategies can provide firms with a sustainable advantage in dynamic output markets. Moreover, the practical applications of analyzing total asset turnover extend beyond mere performance metrics. Eisdorfer and Hsu (2011) have utilized this measure to assess the financial implications of bankruptcy highlighting its importance in risk management. In a similar vein, Chhaochharia et al. (2017) explored how asset turnover can reflect the level of a firm's overinvestment relative to opportunity costs revealing insights into investment efficiency and resource allocation. Additionally, Aktas et al. (2015) identified a link between poor asset turnover and the deterioration of shareholder wealth underscoring its significance in maintaining investor confidence and ensuring long-term financial stability.

The second layer of operational efficiency is focused on fixed assets turnover. Fixed assets, encompassing long-term tangible assets like machinery, buildings, and equipment, serve as the cornerstone for long-term growth within firms (Birhanu et al., 2016). These assets are crucial as they directly contribute to production capacity, operational capabilities, and, ultimately, the revenue generation potential of a company. Changes in these assets are often a result of strategic capital budgeting decisions reflecting a firm's long-term investment strategies and growth objectives (Groth, 1992). The turnover of these assets is a key indicator as to how effectively a firm is utilizing its long-term investments to generate sales making it an essential metric for assessing the efficiency of a firm's capital deployment and its capacity for sustainable growth.

While the importance of FAT is acknowledged in the corporate finance literature, empirical studies specifically addressing this aspect are surprisingly limited.

Turning to short-term operational efficiency, key metrics include the CCC, and the OC. Empirical evidence suggests that firms often augment their cash reserves by increasing their holdings in cash and cash equivalents (Dasgupta & Žaldokas, 2019). Unlike cash and cash equivalents, which are liquid assets readily convertible into cash within a short period (i.e., typically three months), both the CCC and OC represent ongoing, sustainable financial management practices. Studies like Lazaridis and Tryfonidis (2006) have emphasized the importance of the CCC in emerging economies noting that efficient management of this cycle is crucial for maintaining liquidity and operational stability. Similarly, Deloof (2003) highlights how OC management is pivotal for firms in these economies as it reflects the efficiency in converting investments in inventory and receivables into sales. These cycles are not just isolated financial metrics, but are intertwined with the overall operational efficiency and long-term sustainability of firms, particularly in emerging markets where financial agility and resource optimization are key to navigating volatile economic landscapes. This cyclical investment strategy is expected to yield more returns than single, isolated transactions ensuring a firm's long-term viability (Groth, 1992).

Following the insights of Hill et al. (2010) and Boisjoly et al. (2020), we focus on the working capital requirement through the framework of the OC, a well-established metric in the existing literature. Calculated by adding account inventory days to receivables days, this measure provides the time frame within which firms sell their products and collect receivables. Not only has the OC been widely used to assess working capital management, as noted by Jalal and Khaksari (2020), but it has also been employed to understand cash-holding strategies as highlighted by Wang and Deng (2014). A shorter cycle is often preferred, signaling more efficient operations (Groth, 1992) and its influence extends to shaping a company's cash-holding strategies (Wang et al., 2014). However, in emerging markets, the dynamics of the OC can be more complex due to factors like market volatility, less developed financial systems, and higher uncertainty in supply chain and payment processes (Afrifa & Tauringana, 2015). These conditions can lead to longer OC necessitating more careful management strategies. Additionally, firms in these markets may face greater challenges in accessing financing making efficient working capital management even more critical (Ameer, 2010). Increases in working capital require additional financing, attracting

both financing and opportunity costs (Kieschnick et al., 2013) that could escalate into higher interest expenses and even bankruptcy risks (Shin & Soenen, 1998). Moreover, capital tied up in net working capital constrains firms from engaging in other short-term, value-enhancing investment opportunities, a constraint that can be particularly limiting in the resource-constrained settings of emerging economies (Ek & Guerin, 2011).

The third analytical layer focuses on three fundamental components of working capital: receivable turnover, inventory turnover, and payable turnover, crucial for understanding working capital management and cash-holding strategies as noted by Jalal and Khaksari (2020) and Wang and Deng (2014). In emerging markets, managing these components often involves navigating challenges such as fluctuating market conditions and limited access to finance that can lead to extended receivables periods and higher financing costs (Afrifa & Tauringana, 2015; Ameer, 2010). Expanding working capital in these contexts requires significant financial resources bringing about financing and opportunity costs (Kieschnick et al., 2013) and potentially increasing the risks of elevated interest expenses and bankruptcy (Shin & Soenen, 1998). This makes the effective management of working capital a critical aspect, especially in emerging economies where balancing liquidity and minimizing costs is crucial.

3.3. Hypothesis development

3.3.1. Effects of CPTPP on operational efficiency

The extensive exploration of operational efficiency, the CPTPP, and Vietnam's economic landscape within their respective domains (as indicated by Aktas et al. 2015; Baggs & Brander 2006; Goodman & Kaempfer 1993; Shah et al. 2022; Zahra 2008) has revealed a notable gap at their intersection, particularly regarding the CPTPP's impact on Vietnamese firms' operational efficiency. Our study seeks to fill this gap focusing on how the CPTPP affects these firms' operational dynamics.

Vietnam's accession to the CPTPP has ushered in a complex interplay of market power, competition, and strategic business adaptations challenging existing paradigms of operational and inventory efficiency. The agreement compels firms to reevaluate and enhance their operational strategies in a more dynamic market often necessitating significant asset investments and shifts in financial tactics, such as offering more favorable trade credit terms (Banner, 1958; Brennan et al.,

1988; Mian & Smith Jr, 1992). These strategic responses, vital for maintaining competitiveness within the CPTPP's diverse market, could initially lead to a dip in FAT and receivables efficiency. Furthermore, the need for product differentiation and quality assurance in the CPTPP context (Lee & Stowe, 1993; Ng et al., 1999; Smith, 1987) may drive firms to increase investments in innovation, technology, and new product lines to remain competitive in the new international trading environment. This approach, while essential for long-term market penetration, could result in maintaining or even raising inventory levels to cater to varied market demands counterbalancing any efficiency gains and inventory-decreased orientation from reduced market power.

Therefore, we hypothesize that Vietnamese firms will experience a phase of adaptation post-CPTPP accession, marked by changes in financial and operational strategies, leading to an initial decline in operational efficiency. In addition, the anticipated shifts in receivables efficiency, combined with an unchanged inventory management approach, are expected to result in an overall increase in day-measures of operational efficiency including the Operating Cycle and the Cash Conversion Cycle. Given these considerations, we propose the following hypothesis:

H₁: Vietnamese firms experience a temporary decrease in operational efficiency after joining CPTPP.

This hypothesis reflects the expectation that the transition to a new trade environment under the CPTPP will necessitate significant investments and adjustments by firms that may temporarily impact their operational efficiency. However, it is also expected that these initial challenges will be outweighed by the long-term benefits of increased market access and competitiveness.

3.3.2. Heterogeneous effects

i> Additional effect of CPTPP on high profitability firms

The CPTPP presents a unique opportunity for firms to expand their market reach and customer base. This is particularly pertinent for high profitability firms that typically have the resources and capabilities to engage in such innovation and expansionary activities (Madrid-Guijarro et al., 2013). According to agency theory (Jensen & Meckling 1976), the management of these firms may be motivated to pursue new opportunities as CEO turnover is higher when market

competition (Dasgupta et al., 2018) increases to signal their competence to shareholders and the market, thereby securing their position and potential benefits. Concurrently, the theory of competitive advantage suggests that these firms need to seek new opportunities continuously to maintain and enhance their competitive position (Porter, 1985). Specifically, robust and sustainable competitive advantages can facilitate prolonged success for a business and enable it to attract capital with greater ease and at a lower cost (Porter, 1991).

However, this active engagement in the CPTPP and the associated expansion into new markets may initially lead to a decrease in operational efficiency. This is due to the costs and challenges associated with entering new markets, adapting to new trade policies, and meeting new customer demands. While these costs may lead to a temporary decrease in operational efficiency, they are necessary investments for firms to optimize their operations in the new environment and capitalize on the opportunities presented by the CPTPP. Therefore, we propose the following hypothesis:

H₂: High profitability firms experience a greater initial decrease in operational efficiency after joining the CPTPP.

ii> Additional effect of CPTPP on large firms

Large firms, characterized by their superior management and operational capabilities, are expected to be disrupted less by the changes in the trade environment brought about by the CPTPP. These firms, often beneficiaries of economies of scale, possess the resources and capabilities to adapt more efficiently to new trade policies and market conditions (Silberston, 1972). Furthermore, the resource-based view, the cornerstone of competitive advantage, suggests that these firms possess valuable, rare, and inimitable resources that can provide them with a competitive advantage in the face of new market challenges (Peteraf, 1993).

In the short term, the operational efficiency of these large firms may not significantly differ from that of other firms as they are also in the process of adjusting to the new trade environment. Moreover, large firms are less likely to make intensive asset investments in response to the CPTPP as they typically prioritize cost-reduction strategies, while smaller firms lean toward revenue-generating strategies (Latham, 2009). However, in the medium term, these firms are expected to reap the benefits of the CPTPP more effectively due to their superior resources and

capabilities. This is in line with the financial slack theory (Uyar et al., 2023a; Uyar et al., 2023c; Wasiuzzaman et al., 2022) that suggests that firms with greater resources can better exploit new opportunities thus improving their performance over time (Zahra, 2008). Therefore, we propose the following hypothesis:

H₃: Large firms in Vietnam experience superior operational efficiency as they effectively exploit the benefits of the CPTPP.

iii> Additional effect of CPTPP on financially constrained firms

Financially constrained firms, often characterized by high leverage (Ding et al., 2013; Livdan et al., 2009; Sharpe, 1994), find themselves in a unique position when faced with the opportunities presented by the CPTPP. Despite their financial limitations, these firms are keen to seize the potential benefits of this trade agreement, such as access to new markets and reduced trade barriers. These benefits could lead to increased sales and profits (Blinder, 2019; Bustos, 2011; Krugman, 1987; Puga & Venables, 1997) that would help the firm to service its debt and potentially reduce its financial constraints over time (Collier et al., 2010). In addition, while managing their existing debt obligations, these firms are also aware of the potential growth and expansion opportunities opened by the CPTPP. The prospect of increased market reach and improved competitiveness fuels their desire to navigate the challenges of the new trade environment with the ultimate goal of enhancing operational efficiency and achieving long-term financial stability.

However, financially constrained firms often operate under significant limitations when it comes to making substantial investments or strategic shifts in response to new trade agreements like the CPTPP. These firms are primarily concerned with managing their existing debt obligations and maintaining financial stability that could restrict their ability to invest in new technologies, expand production, or undertake other significant operational changes that could potentially enhance efficiency. One of the most influential theories of corporate leverage is the pecking order theory of capital structure (Frank & Goyal, 2003). The Pecking Order Theory suggests that firms, due to adverse selection, would prefer to finance any investments with internal funds rather than resorting to external financing (Myers, 1984). However, financial constraints may limit the availability of internal funds limiting their ability to make the necessary investments to take full

advantage of the opportunities presented by the CPTPP. Moreover, the benefits of free trade agreements like the CPTPP, such as access to new markets and reduced trade barriers, may not immediately translate into improved operational efficiency for these high leverage firms. The process of entering new markets and adapting to new trade environments can also involve significant costs and risks. These firms, given their financial constraints and potential risk aversion, may be ill-equipped to handle these challenges.

Given these considerations, we propose the following hypothesis:

H₄: The implementation of the CPTPP does not exert an additional effect on the operational efficiency of high leverage firms in Vietnam.

iv> Additional effect of firms in HOSE (Ho Chi Minh Stock Exchange)

In Vietnam, firms face a critical decision when choosing between listing on the Ho Chi Minh Stock Exchange (HOSE) and the Hanoi Stock Exchange (HNX) as each comes with its own distinct set of requirements and regulatory obligations (Kabir & Thai, 2021). For instance, HOSE-listed firms are required to provide detailed financial statements that include comprehensive information on their outstanding debts, credit lines, and associated liabilities ensuring transparency to major stakeholders, such as shareholders, board members, and managers. This is a stipulation that HNX-listed firms are not obligated to follow. Moreover, the financial prerequisites for listing on the HOSE are more stringent requiring an authorized capital of VND 120 billion as opposed to HNX's more modest requirement of VND 30 billion (Connelly et al., 2017). Profitability stipulations also differ. Firms on the HOSE must demonstrate consistent profitability for two years and should not have outstanding debts older than a year. Alternatively, HNX-listed firms are only obligated to clear any losses carried over from the previous fiscal year. Penalties for misreporting information are also more severe on the HOSE including formal warnings and even the risk of delisting for multiple offenses (Ngo et al., 2018).

In the context of Vietnam's inclusion in the CPTPP, the distinct regulatory requirements of the HOSE and HNX could uniquely influence firms' operational efficiency. Firms listed on the HOSE, given their need to comply with more stringent regulations, could face added complexities in adapting their domestic operations to meet the CPTPP's international standards. This could introduce an additional compliance burden potentially impacting operational efficiency in the

short term. Moreover, the cautious approach these firms might adopt in entering new markets, necessitated by their stringent regulatory responsibilities, could slow down decision-making processes and resource allocation. This could initially affect operational efficiency setting these firms apart from the generally observed trend of increased efficiency among larger firms in the medium-term following Vietnam's entry into the CPTPP.

H5: Firms listed on the Ho Chi Minh Stock Exchange (HOSE) initially experience more of a decrease in operational efficiency compared to their counterparts on HNX.

v> Additional effects on firms that is least exposed to COVID-19

In the midst of our investigation, it is impossible to overlook the simultaneous occurrence of the COVID-19 pandemic, a global health crisis with profound implications that has riveted the scholarly community (Li et al., 2023; Ngo et al., 2022a; Nguyen et al., 2022). Originating in January 2020, this pandemic has thus far claimed over 4.5 million lives worldwide and has had a disparate impact on various industries. Notably, our post-treatment analysis period from 2019-2021 overlaps with the timeline of the pandemic. This co-occurrence introduces a level of complexity to our study as the pandemic created a fluctuating backdrop that influenced how firms in different sectors could capitalize on the opportunities offered by the CPTPP. Consequently, any assessment of operational efficiency and financial performance during this period must take into account the modifying effects of the COVID-19 pandemic on corporate strategies and outcomes.

In the first year following Vietnam's entry into the CPTPP, we anticipate no significant difference in the operational efficiency gains from the CPTPP between firms in industries least affected and others by the COVID-19 pandemic. This is due to the fact that COVID-19 had not yet emerged as a disruptive global event. However, with the onset of the pandemic in 2020, the situation changed dramatically. Firms in industries less affected by COVID-19 likely had greater resources and capacity to adapt to the regulatory changes and market opportunities offered by the CPTPP positioning them to reap greater efficiency gains in the second and third years of the post-treatment period. In their assessment of the pandemic's impact on credit risk across industries, S&P Global Market Intelligence (2022) analyzed the probability of default (PD) from January 2, 2020 to January 15, 2022. For our study, “least affected” industries by COVID-19 are defined as those with minimal fluctuations in default probabilities, whether positive or negative. This

category encompasses a diverse range of sectors including Distributors, Containers and Packaging, Oil, Gas and Consumable Fuels, Food Products, Textiles, Apparel and Luxury Goods, and Metals and Mining.

Conversely, firms in other sectors may have had to divert significant resources to manage the crisis, potentially impeding their ability to leverage the benefits of the CPTPP fully during these years. Taking into account these considerations, our sixth hypothesis (H6) emerges:

H₆: Firm in least-affected industries by COVID-19 will witness the outperformance of operational efficiency since the year 2020.

3.4. Methodology and empirical results

3.4.1. Data

This study seeks to enrich the literature by examining the impact of Vietnam's integration into the CPTPP on firm-level operational efficiency employing a comparative analysis with countries in a similar economic bracket. The selection of China, India, Thailand, the Philippines, Indonesia, and Vietnam as part of the study's scope, from 2017-2021, is strategic. The selected countries for this study share several key similarities that make them apt for comparative analysis, which is clarified in the justification for PSM-DID section.

On April 18, 2007, Vietnam's Ministry of Finance initiated its first foray into information disclosure regulations with the introduction of Circular 38/2007/TT-BTC aimed at guiding firms on stock exchange information disclosure. This pivotal regulation underwent several revisions: Circular 09/2010/TT-BTC enacted on January 15, 2010, Circular 52/2012/TT-BTC on April 5, 2012, and, ultimately, Circular 155/2015/TT-BTC on October 6, 2015⁹. Notably, it was the introduction of Circular 155/2015/TT-BTC that marked a turning point significantly enhancing the richness and reliability of data on Vietnamese firms. This latest regulation instituted more stringent disclosure requirements heightening transparency while also adapting to emerging market dynamics and international standards.

⁹ As reported by Circular No. 155/2015/TT-BTC of the Ministry of Finance: Guidance on information disclosure on the stock market. (Sourced from: <https://vanban.chinhphu.vn/default.aspx?pageid=27160&docid=182551>)

When our data start from 2015, the lag sales growth moves our data starting point to 2017. The firm-level data for this investigation is sourced from Refinitiv Datastream, a commonly used dataset in finance regarding financial information (Dobrick et al. 2023; Fang et al. 2021; Guérin & Suntheim 2021). The analysis is further enriched by macro-level variables that are essential in understanding the broader economic landscape and are extracted from the World Bank's comprehensive databases. To ensure transparency and facilitate understanding, a detailed summary of each variable, including their definitions and sources, is meticulously presented in the Appendix, Table A1. This tabulation provides a thorough and transparent account of the variables under consideration in this study.

In conducting our research, we have elected to exclude firms operating within the financial and utilities sectors, in accordance with the methodologies used in prior research, due to the distinct operational nature of these firms compared to those in other industries (Garvey & Hanka 1999; Lee 1997). Following the approach delineated by Koliass et al. (2011), all firm-level variables are log-transformed, especially operational efficiency variables. This process, however, presents challenges when variables hold zero values that are problematic for logarithmic transformations and denominators. To circumvent this, each zero value is replaced with the smallest non-zero value present in our dataset, a solution that may introduce outliers. To counter the adverse effects of outliers on estimation, particularly when dealing with ratios, we implement a data winsorization strategy. This strategy entails replacing the top and bottom 1% of the data distribution for every variable with the highest and lowest values not removed, respectively, a method widely recognized and utilized in the literature (Gompers et al., 2005). This process ensures the maintenance of data integrity while minimizing potential estimation issues. In addition, following Masso and Vahter (2015), we exclude all firms that do not have observations during the pre-treatment period (the years 2017 and 2018) so that we can observe the change over time of each company.

Observing the research protocols, we have consciously chosen to exclude any observations that contain at least one missing variable from our analysis (Bushee, 1998; Campbell et al., 2016; van Bakkum, 2016). This decision is primarily driven by two key considerations. The first is our commitment to evaluating the impact of the CPTPP on a consistent cohort of firms to preserve the internal validity of our findings. Introducing observations with missing data would inject an

unwelcome degree of heterogeneity that could potentially confound our results. The second consideration concerns our use of propensity score matching, a technique requiring a full complement of data to create robustly comparable control and treatment groups. We present the summary statistics of firm-level variables used in this study in Table 1 and correlation matrix of independent variables in the Appendix, Table A2. Upon examining the summary statistics presented in Table 1, it is evident that the means and medians for all variables are closely aligned suggesting nearly symmetrical distributions for these variables. The implications of this symmetry are noteworthy for our study. When data values are evenly spread around a central point, as in symmetrical distributions, the robustness of our research to potential outliers is enhanced. These distributions also streamline the interpretation of our results. Additionally, symmetrical data distributions generally yield greater predictive accuracy, which holds significant relevance for our research objectives. As further validation, the correlation matrix in the Appendix, Figure A1 reveals no substantial correlations among the variables examined.

Table 1: Summary statistics

| | N | Max | Min | Std.dev | Median | Mean |
|----------------|--------|------------|--------|-----------|---------|-----------|
| TAT | 49,639 | 1.662 | 0.000 | 0.323 | 0.845 | 0.843 |
| FAT | 49,035 | 95.583 | 0.000 | 6.879 | 2.962 | 3.877 |
| CCC | 45,336 | 359.471 | 40.856 | 2.879 | 139.877 | 174.885 |
| OC | 45,593 | 487.846 | 46.062 | 3.109 | 194.416 | 198.346 |
| inv_turn | 45,911 | 498.210 | 0.161 | 3.706 | 4.137 | 4.711 |
| rec_turn | 47,719 | 72.966 | 0.148 | 2.829 | 4.055 | 4.178 |
| pay_turn | 47,084 | 111.056 | 0.213 | 2.773 | 4.953 | 5.206 |
| DPO | 47,141 | 221.406 | 2.886 | 2.901 | 66.686 | 69.407 |
| DRO | 47,773 | 336.970 | 3.875 | 2.857 | 81.450 | 86.976 |
| DIO | 45,732 | 273.144 | 1.000 | 3.676 | 65.765 | 73.719 |
| Assets (000\$) | 51,202 | 72,200.000 | 0.722 | 6,000.967 | 345.655 | 1,714.975 |
| Tangibility | 50,932 | 0.878 | 0.000 | 0.199 | 0.244 | 0.282 |
| Cap_Intensity | 40,496 | 1.000 | 0.061 | 0.223 | 0.775 | 0.723 |
| L.Sale growth | 48,381 | 0.858 | -4.265 | 0.464 | 0.052 | -0.008 |
| Profits | 51,050 | 0.326 | -0.532 | 0.083 | 0.052 | 0.057 |
| Leverage | 51,194 | 17.586 | 0.019 | 2.026 | 0.707 | 1.270 |
| Investment | 47,916 | 0.408 | 0.000 | 0.067 | 0.035 | 0.058 |
| Dividend | 50,992 | 0.152 | 0.000 | 0.027 | 0.013 | 0.021 |
| Free Cash Flow | 51,194 | 1.000 | 0.000 | 0.478 | 1.000 | 0.648 |

Note: The following table provides summary statistics for the primary variables utilized in the subsequent analysis. The definitions and calculations of each variable are presented in Appendix, Table A1. All firm-level variables, except Free Cash Flow, are winsorized at 1%.

3.4.2. Justification of PSM-DiD

Discerning the causal effects of policy intervention or the impacts of specific events is a complex task often encountered by researchers and policymakers. The gold standard for such investigations is the Randomized Control Trial (RCT) (Meldrum, 2000), a study design wherein participants are randomly assigned to either the treatment or the control group thereby addressing selection bias (Cook & Campbell, 1979). This random assignment minimizes selection bias and allows for a reliable comparison of outcomes between the two groups. However, the application of RCTs is not always feasible or ethical (London & Kimmelman, 2020). In some cases, withholding a potentially beneficial policy or treatment from a group of individuals for the sake of a randomized trial would be ethically unacceptable. Furthermore, practical constraints, such as cost, time, or the specific nature of the intervention, could render RCTs unfeasible. In these situations, researchers usually turn to quasi-experimental or non-experimental study designs to infer causality (Leatherdale, 2018).

Non-experimental designs, which measure outcomes before and after the program for participants only without a comparison group, can still provide useful insights (Leatherdale, 2018). However, they are less robust in controlling for selection bias and other confounding factors (Craig et al. 2012). Alternatively, quasi-experimental designs, such as the Difference-in-Differences (DiD) approach, offer a more robust method for inferring causality (Fong et al., 2006). DiD measures outcomes for program participants and non-participants without random assignment, comparing the change in outcomes over time between a group exposed to an intervention (the treatment group) and another group that was not (the control group). The difference in the differences is then attributed to the effect of the intervention. Abadie (2005) underscored that the DiD estimator, owing to its broad applicability, is one of the most popular tools for applied research in economics. This estimator serves as a crucial instrument for evaluating the effects of public intervention and other treatments of interest on relevant outcome variables.

Nevertheless, a significant challenge in non-experimental studies is addressing selection bias. The groups or individuals exposed to a specific program or policy may differ significantly from those not exposed. For instance, physician practices that opt to participate in a new payment system could be fundamentally different from those that choose not to participate, potentially leading to skewed results. Addressing the inherent selection bias in non-experimental studies is a significant challenge for researchers. To overcome this, matching methodologies have been adopted since the early 20th century (Bernard 1945; Chapin 1949). However, it was not until the 1970s that these methods found a theoretical footing. Pioneering works by Cochran and Rubin (1973) laid the groundwork for these methods focusing on situations with a single covariate and primarily seeking to estimate the average treatment effect on the treated (ATT).

Since the 1970s, extensive research has been conducted on how to select treated and control subjects optimally for comparison using matching methods. These methodologies have gained increasing traction in diverse disciplines, including economics, epidemiology, medicine, and political science. Among these methods, the Propensity Score Matching (PSM) technique, proposed by Rosenbaum and Rubin (1983), stands out for its effectiveness. PSM aims to minimize bias due to covariates by selecting well-matched samples from the original treated and control groups. The fundamental objective of PSM is to emulate a randomized experiment as closely as possible. This is achieved by ensuring that the treated and control groups have similar distributions of observed covariates creating a counterfactual scenario that can serve as a reliable comparison for the treatment group.

By combining both PSM and DiD methodologies, creating a PSM-DiD model, researchers can offer a robust approach to estimate the effects of a treatment, policy, or intervention in a non-experimental setting. This combined model not only mitigates the selection bias inherent in non-experimental studies, but also accommodates the complexity of real-world contexts where randomization is not feasible. Moreover, Ryan et al. (2019) concludes that DiD using PSM outperform standard DiD and DiD using “persistent trend assumptions” regarding lowest mean-squared error and least sensitive to deviations from the parallel trends assumption. Therefore, the PSM-DiD model presents a compelling approach to understanding the causal effects of interventions when RCTs are not a viable option. Currently, PSM-DiD is widely adopted in the

finance area, especially when examining the effects of policies or events (He et al., 2022; Sun & Abraham, 2020; Yuan et al., 2023).

The selection of China, India, Thailand, the Philippines, Indonesia, and Vietnam as part of the study's scope, from 2017-2021, is strategic. The selected countries for this study share several key similarities that make them apt for comparative analysis. Economically, these nations represent emerging markets characterized by rapid industrialization, increasing integration into the global economy, and similar stages of economic development. This uniformity ensures that the operational dynamics explored are influenced by comparable economic forces. Geographically, their proximity within the Asian region means they are subject to similar regional economic trends, environmental factors, and policy shifts, which is crucial for understanding the regional economic context influencing Vietnam post-CPTPP, similar to the approach adopted by Jayaraman (2012).

In terms of sectoral diversity, these countries encompass a wide range of dominant industries from manufacturing to technology and agriculture offering a comprehensive view of different sectoral responses to trade agreements. Additionally, their varied involvement in different trade agreements provides a rich backdrop for assessing the unique impact of the CPTPP in contrast to other trade dynamics. China and India, as larger economies, have distinct trade strategies and agreements, while Thailand, the Philippines, and Indonesia have their unique positions in regional trade networks. This variance helps in isolating the effects of Vietnam's CPTPP integration from broader economic trends. The choice is also built upon the foundation laid by previous research, such as the studies by Le and Tran-Nam (2018) and Webb et al. (2020), that also utilized these countries as a control group against Vietnam's treatment.

3.4.3. Main specification

We want to examine the impact of CPTPP on the operational efficiency of firms in Vietnam. Following the existing literature (Dasgupta & Žaldokas, 2019), we have a standard two-way fixed effects model:

$$\text{Operational efficiency}_{it} = \alpha + \mu * CPTPP_{kt} + \lambda * X_{ikt} + \gamma_i + \tau_t + \varepsilon_{it} \quad (1)$$

where i , k , and t index firms, countries, and years, respectively. The dependent variable, *Operational efficiency* $_{it}$, is represented through three distinct tiers. The first tier corresponds to total assets turnover providing a broad measure of how efficiently a firm utilizes its assets. The second tier delves deeper into both long-term and short-term efficiency. It includes fixed assets turnover, representing long-term operational efficiency, and the cash conversion cycle (CCC) and operating cycle (OC), which encapsulate short-term efficiency. The third and most detailed tier further dissects the components of the CCC and OC providing insight into days payable outstanding (DPO), days receivable outstanding (DRO), and days inventory outstanding (DIO). In robustness tests, we also test for the impact of CPTPP on alternative indices of components of short-term operational efficiency including inventory turnover, receivable turnover, and payable turnover due to their popularity in the extant literature. This tiered approach allows for a comprehensive understanding of a firm's operational efficiency and is presented in Figure 1.

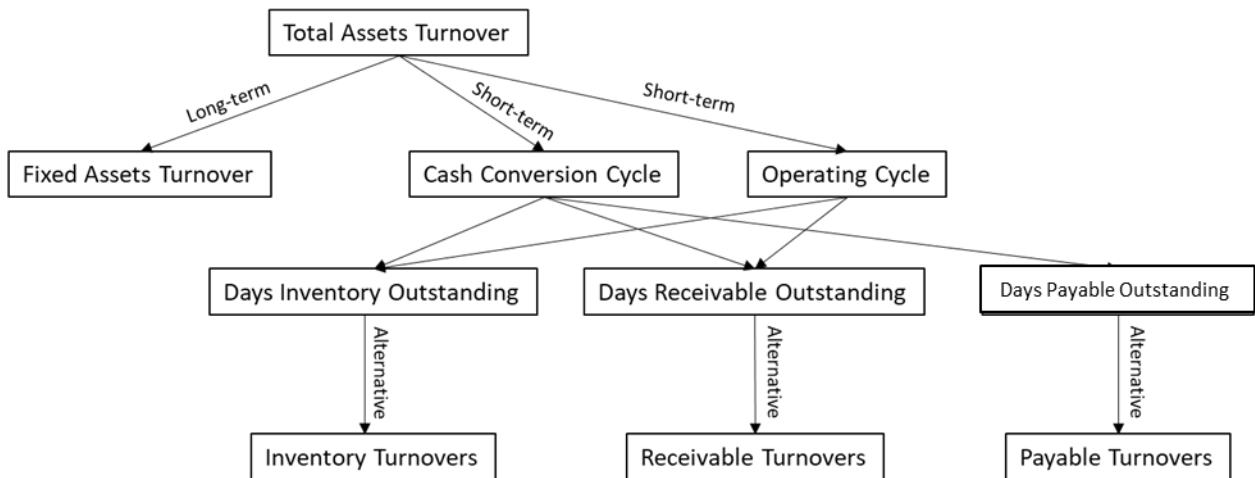


Figure 1: Three tiers of dependent variables

Note: This figure describes three layers of the dependent variables in this study representing the operational efficiency of firm.

The variable of interest, $CPTPP_{kt}$, is equal to one for observations of firms in Vietnam after CPTPP and zero otherwise (Bertrand & Mullainathan, 2003). The coefficient of this variable is the coefficient of interest that denotes the impact of entering CPTPP on operational efficiency of firms in Vietnam compared to firms in other countries during the same time period. The components of that variable, including $Treat_{it}$ and $Post_{it}$, are also included. In our baseline specification, our control variables X_{ikt} include firm size, tangibility, leverage, free cash flow,

GDP, delta exchange rate, and lag sales growth as standard firm-level control variables following Dasgupta and Žaldokas, 2019. We also include GDP growth, FDI (% GDP), and inflation as control variables due to their potential influence on firms' operational efficiency. GDP growth and FDI (% GDP) capture the broader economic conditions and investment climate that can affect business operations, while inflation, by creating uncertainties in future price levels, may impact firms' strategic planning and investment decisions. In addition, we also add political factors as the average of the six dimensions from the Worldwide Government Index that provides a comprehensive measure of a country's political environment following Kaufmann et al., 2010 and Ma et al., 2019.

As we delve into the examination of short-term operational efficiency, we pay specific attention to measures such as the Cash Conversion Cycle (CCC), the Operating Cycle (OC), and their individual components (DIO, DRO, DPO). Our analysis is further refined by the inclusion of additional control variables as suggested by seminal works in the field of finance. Gaur et al. (2005) demonstrated the important role of capital intensity in shaping inventory management, especially in relation to inventory turnover. In a similar vein, Jalal and Khaksari (2020) highlighted the significance of profit, investments, and dividends as crucial determinants of the Cash Conversion Cycle. These refined analytical layers allow us to gain a more in-depth and comprehensive understanding of the dynamics at play. It is also important to note the inherent interconnectedness of the short-term operational efficiency variables. Due to this interconnectedness and the specific dynamics they encapsulate, these control variables are used when analyzing all short-term efficiency indicators. In contrast, when considering long-term measures, such as Fixed Assets Turnover (FAT) and Total Assets Turnover (TAT), these control variables may not be as pertinent. This is due to the fact that FAT and TAT encapsulate different dynamics, more reflective of long-term strategic decisions rather than short-term operational efficiencies.

3.4.4. Matching sample progress

In the application of matching methods, it is paramount to integrate variables that are known to influence both the treatment assignment and the outcome in line with existing studies (Glazerman et al., 2003; Heckman et al., 1998; Rubin & Thomas, 1996). However, given the constraints of small sample sizes, it may not always be feasible to incorporate an exhaustive list of variables. In

such cases, the priority should shift toward variables that are perceived to have a connection with the outcome. This is to avoid the elevated variance introduced when variables unrelated to the outcome, yet highly correlated with treatment assignment, are included (Brookhart et al., 2006). It is also important to exclude any variable potentially influenced by the treatment of interest (Frangakis & Rubin, 2002; Rosenbaum, 1984).

Applying these principles to the case of the CPTPP, we find that its enactment triggers immediate modifications in macroeconomic components, such as tariffs, regulations, and trade barriers, that have broad implications for the economy. However, the impact of the CPTPP on firm-level operational efficiency unfolds at a slower pace as firms need time to recalibrate their strategies and resource allocations in response to the changed trade environment. Therefore, in our PSM methodology, we have chosen to concentrate exclusively on firm-level variables, deliberately excluding macroeconomic ones. This approach, in concert with controlling for industry fixed effects following Howell, 2016, Tang et al., 2021, and Yang et al., 2012) allows us to analyze the subtle effects of the CPTPP on firm operational efficiency accurately and robustly without introducing undue variance or bias into our study. As such, it offers a more valid and focused evaluation of the impact of this significant trade agreement.

To understand the influence of each treatment on each firm better, we employ a logit model to compute the propensity score. This score, which takes into account firm-level control variables and industry fixed effects, represents the likelihood of a firm being treated (being in Vietnam) given its characteristics during the pre-event period. The computed propensity score essentially encapsulates the information from these pre-treatment observations of all of the control variables (Caliendo & Kopeinig, 2008; Crinò, 2010; Dehejia & Wahba, 1999; Rosenbaum & Rubin, 1983; Tang et al., 2021; Yang et al., 2012). Therefore, we average all firm-level characteristics of firms relevant to operational efficiency during the pre-treatment period for matching purposes (Howell, 2017; Masso & Vahter, 2015). The results of the logistics in the Appendix, Table A2 show that the firm-level covariates added are mostly statistically significant. In general, firms exhibiting characteristics including smaller size, greater profitability, high leverage, lower investment, larger dividends, and lower free cash flow are more likely to be categorized as “treated” (representing firms in Vietnam). Tangibility, Capital Intensity, and Lag Sales Growth do not exhibit a significant association with this likelihood.

In our study, we adopt a matching approach that pairs each treated firm with its nearest neighbor based on the similarity of their propensity scores for treatment (with replacement). This technique is supported by the extant literature (Chen et al., 2023; Florackis & Sainani, 2018). Matching with replacement allows for minimizing the distance between propensity scores of treatment units and their matched comparison units. This method permits each treatment unit to be matched with the closest comparison unit, even allowing for the same comparison unit to be matched multiple times. This approach is advantageous for reducing bias (Dehejia & Wahba, 2002). A key step in PSM is trimming, which involves the exclusion of observations with extreme propensity scores to reduce bias. Specifically, we remove 2% of observations at the extremes of the propensity score distribution (1% at each end) to focus on the common support region where the treated and control units overlap (Austin, 2022; Millimet & Tchernis, 2012). In addition, we employ a caliper width of 0.01 as recommended by Cao et al. (2022) and Li and Wang (2023). This ensures a precise match between pairs constraining the absolute difference in their propensity scores within the specified caliper width.

Post-matching, it is imperative that the pre-treatment variables are balanced between the treatment and the control groups (Caliendo & Kopeinig, 2008). To confirm this balance visually, we present Figure A2 in the Appendix that illustrates the overlap and balance between the treated and untreated groups based on their propensity scores. The similarity in both height (density) and distribution along the x-axis for the two groups indicates successful matching. Furthermore, we validate these results with kernel density estimates presented as Figure A3 in the Appendix. We also conduct empirical tests to assess the significance of differences in independent variables before the implementation of the CPTPP between the treatment and the control groups. These findings are detailed in Table 2.

Table 2: Balancing test for matching using PSM

| | | Mean | | t-test | |
|-------------------|-----------|---------|---------|-------------|---------|
| | | Treated | Control | T-statistic | p-value |
| Ln(Assets) | Unmatched | 2.3351 | 2.5647 | -50.280 | 0.000 |
| | Matched | 2.4105 | 2.4096 | 0.090 | 0.929 |
| Ln(Tangibility) | Unmatched | -1.7367 | -1.6279 | -2.680 | 0.007 |
| | Matched | -1.5982 | -1.6622 | 0.770 | 0.440 |
| Ln(Cap_Intensity) | Unmatched | -0.4913 | -0.413 | -4.020 | 0.000 |
| | Matched | -0.437 | -0.477 | 1.000 | 0.319 |
| Ln(Profits) | Unmatched | -3.8599 | -3.9438 | 0.770 | 0.444 |
| | Matched | -3.8705 | -3.9011 | 0.140 | 0.891 |
| Ln(Leverage) | Unmatched | -0.0278 | -0.3992 | 9.500 | 0.000 |
| | Matched | -0.107 | -0.103 | -0.050 | 0.957 |
| Ln(Investment) | Unmatched | -3.984 | -3.396 | -11.830 | 0.000 |
| | Matched | -3.663 | -3.711 | 0.420 | 0.678 |
| Ln(Dividend) | Unmatched | -7.0635 | -5.868 | -7.690 | 0.000 |
| | Matched | -7.474 | -8.0176 | 1.470 | 0.143 |
| Free Cash Flow | Unmatched | 0.589 | 0.659 | -4.370 | 0.000 |
| | Matched | 0.614 | 0.604 | 0.350 | 0.727 |
| Ln(L.Sale growth) | Unmatched | -5.685 | -5.092 | -4.450 | 0.000 |
| | Matched | -5.391 | -5.117 | -1.070 | 0.287 |

Note: Matching method is applied to test whether there is a significant difference between the treated and matched groups on potential determinants of Vietnam entering CPTPP at the end of 2018.

From Table 2, it appears that the matching approach has enabled us to construct a control group that is similar to the treated firms at the time of treatment in terms of their key observed characteristics. Once propensity score matching has been implemented, these differences in pre-treatment productivity of the treatment and the control groups, in terms of their productivity level and other observed covariates, are no longer statistically significant. In our analysis, we have taken significant care to ensure that our matched treatment and control groups are well-balanced. Following Rubin (2001), we report the Standardized Mean Difference (SMD) of the matched sample in Appendix, Table A3. As evidenced by our Standardized Mean Differences calculations for each covariate, we find all values to be less than 0.1332. This is well within the threshold recommended by Rubin (2001), who suggests that for regression adjustment to be trustworthy, absolute standardized differences of means should be less than 0.25. Furthermore, our SMD values fall within the range that Cohen (2013) designates as representing a “small” effect size.

This indicates that the differences in means between our treatment and control groups in the matched sample are indeed minor relative to the pooled standard deviation. Consequently, we are confident that our propensity score matching process has yielded well-balanced groups and that the subsequent findings from our study can be trusted as being robust and reliable.

The validity of our matched sample gains further credence through a meticulous breakdown of its representation across industries and countries as elaborated in Tables A4 and A5 in the Appendix. Table A4 verifies that the matched sample is inclusive featuring firms from every country present in our initial data set. Similarly, Table A5 assures us that this geographic diversity is mirrored in the control group. Furthermore, when we scrutinize the distribution of firms across various industries on an annual basis, we find a remarkable symmetry between the control and treatment groups. This balance, both across sectors and over time, fortifies the robustness of our sample making it an ideal foundation upon which to build our study.

3.4.5. Impact of CPTPP on operational efficiency

3.4.5.1. General results

After having the matched sample, we applied two-way fixed effects DiD to examine the impact of CPTPP on operational of firms in Vietnam surround the entry to CPTPP. We examine Equation (1) with four different specifications. Building upon the fundamental controls of two-way fixed effects and other crucial variables, we further refine our analysis by adopting a multi-faceted specification approach in line with the existing literature wherein clustering plays a pivotal role. For our most stringent and also main specification, we control for firm and year fixed effects in addition to other variables, while also clustering at the country-industry level in Table 3 as suggested by Dasgupta and Žaldokas (2019). This approach provides a robust framework for our analysis allowing us to navigate complex interactions between firm, industry, and country-specific factors. Additionally, we conduct supplementary specification tests integrating a variety of fixed effects and clustering methodologies. These tests not only enable us to assess the sensitivity of our findings, but also act as robustness checks to reinforce the validity of our results.

For the second specification, we commence with the standard procedure controlling for firm and year fixed effects along with the consideration of the other variables in Table A6. Regarding the third specification, we subsequently introduce clustering by industry to mitigate potential

correlation of error terms within the same sector in Table A7. This step is essential given that firms within the same industry often operate under analogous economic conditions and trends. We utilize the Datastream's Industry Level 3 Name (INDC3) for industry classification in line with the methodological precedent set by Chattopadhyay et al. (2020) and Chlomou and Demirakos (2020).

For our fourth specification, we maintain control over firm-level and industry*year fixed effects in conjunction with industry clustering in Table A8. The introduction of industry*year fixed effects affords a finer level of control enabling us to account for shocks or trends that affect different industries in diverse ways over time. This includes industry-specific fluctuations in technology, market conditions, and regulatory landscapes. This level of specificity and control surpasses what can be achieved with year fixed effects alone, which only account for trends that uniformly impact all industries within a given year.

Table 3: Impact of CPTPP on operational efficiency of firms in Vietnam

| | | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
|---------|-----------------------------|----------|----------|---------|---------|---------|----------|---------|
| | | ln(TAT) | ln(FAT) | ln(CCC) | ln(OC) | ln(DIO) | ln(DRO) | ln(DPO) |
| 1 year | <i>CPTPP</i> | -0.242** | -0.310** | 0.243** | 0.248** | 0.213 | 0.287*** | 0.179 |
| | | (0.022) | (0.031) | (0.016) | (0.021) | (0.158) | (0.006) | (0.143) |
| | Firm fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Year fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Cluster by country-industry | Y | Y | Y | Y | Y | Y | Y |
| | Controls | Y | Y | Y | Y | Y | Y | Y |
| | N | 2,120 | 2,120 | 2,120 | 2,120 | 2,120 | 2,120 | 2,120 |
| | R-squared | 0.373 | 0.156 | 0.155 | 0.164 | 0.084 | 0.164 | 0.081 |
| 2 years | <i>CPTPP</i> | -0.0485 | -0.0376 | 0.0023 | 0.029 | -0.068 | 0.0842 | -0.059 |
| | | (0.369) | (0.503) | (0.961) | (0.535) | (0.250) | (0.152) | (0.469) |
| | Firm fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Year fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Cluster by country-industry | Y | Y | Y | Y | Y | Y | Y |
| | Controls | Y | Y | Y | Y | Y | Y | Y |
| | N | 2,840 | 2,840 | 2,840 | 2,840 | 2,840 | 2,840 | 2,840 |
| | R-squared | 0.218 | 0.299 | 0.177 | 0.189 | 0.165 | 0.197 | 0.072 |
| 3 years | <i>CPTPP</i> | -0.0607 | -0.103** | 0.0197 | 0.0333 | 0.0117 | 0.0608 | -0.0125 |
| | | (0.172) | (0.048) | (0.613) | (0.387) | (0.829) | (0.179) | (0.848) |
| | Firm fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Year fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Cluster by country-industry | Y | Y | Y | Y | Y | Y | Y |
| | Controls | Y | Y | Y | Y | Y | Y | Y |
| | N | 3,532 | 3,532 | 3,532 | 3,532 | 3,532 | 3,532 | 3,532 |
| | R-squared | 0.151 | 0.366 | 0.186 | 0.194 | 0.176 | 0.216 | 0.073 |

*Note: The results of the Difference-in-Differences regression from Equation (1): Operational efficiency_{it} = β₁ * Post_{it} + β₂ * Treat_{it} + μ * CPTPP_{kt} + λ * X_{ikt} + γ_i + τ_t + ε_{it}. In our study, the variable of interest, CPTPP, represents the impact of Vietnam's participation in the agreement on the country's operational efficiency. Our firm-level control variables include firm size, tangibility, leverage, free cash flow, GDP, delta exchange rate, and lag sales growth while the country-level independent variables are GDP growth, FDI (% GDP), inflation, and political factors as the average of the six dimensions from the WGI. We also add Capital Intensity, Profit, Investment, and Dividend for the regression on short-term operational efficiency. All firm-specific variables have been subjected to a 1% winsorization followed by a logarithmic transformation. In addition, we also control for firm and year fixed effects while clustering by country-industry. Industries are classified by INDC3 from Datastream following Chattopadhyay et al. (2020) and Chlomou and Demirakos (2020). The values in parentheses are p-values. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.*

The findings presented in Table 3 shed light on the temporal effects of Vietnam's entry into the CPTPP on firms' operational efficiency. The first-year post-implementation witnessed a significant dip in operational efficiency across all measures. This initial impact can be interpreted as a transition period, a necessary phase of adjustment where firms are acclimating to the new market conditions ushered in by the CPTPP. This phase of realignment may temporarily depress certain performance metrics as firms recalibrate their strategies and operations to the new business landscape.

By the second year, we see a marked attenuation of the negative impacts on all operational metrics suggesting that Vietnamese firms have successfully navigated the new trade conditions. This could be attributed to firms refining their operations, enhancing asset utilization, and optimizing their working capital management in response to the new competitive environment. In the third year, a resurgence of the negative impact on fixed assets turnover is observed. However, this should not be construed as a regression. Rather, it could signify firms investing in new fixed assets to leverage the expanded market opportunities offered by the CPTPP. This investment might temporarily depress fixed assets turnover as firms work toward maximizing the utility of these new assets. Meanwhile, the components of CCC and OC (i.e., receivable, inventory, and payable outstanding days) did not manifest sustained significant impacts in the second and third years indicating that firms had effectively realigned their short-term operational management practices to the new trade environment.

In essence, our results highlight the transformative potential of major trade agreements like the CPTPP and confirm our first hypothesis (H1) that Vietnamese firms will experience a temporary decrease in operational efficiency after joining CPTPP. Despite initial hurdles, firms can adapt and flourish under the new market conditions leading to enhanced performance in the long run. These findings underscore the need for a dynamic understanding of the impacts of such agreements that can fluctuate across different aspects of firm performance and over time. The stability of our findings is confirmed through the consistency of our results across multiple specifications. Our main specification, which controls for firm and year fixed effects and clusters by country-industry, yields result similar to those from the three other specifications detailed in the Appendix, Tables A6, A7, and A8. These additional specifications, which follow existing literature, further substantiate the robustness of our results.

In addition, the decrease in operational efficiency is primarily driven by a dip in both fixed assets turnover and receivables turnover. This suggests that firms are making significant upfront investments in fixed assets as a strategic response to the new trade environment created by the CPTPP. These investments, aimed at meeting new customer demands and complying with new trade policies, may not immediately yield increased sales or output. However, they are crucial for firms to adapt their operations to the new environment and seize the opportunities presented by the CPTPP.

At the same time, the decrease in receivables turnover indicates that firms are extending more trade credit, a strategic move aimed at expanding their consumer base and enhancing their market position. This strategy, while potentially increasing firms' short-term financial burdens, involves offering trade credit at subsidized rates, effectively reducing the price for credit customers. This approach aligns with the theoretical perspective that extending credit can serve as a more potent competitive tool than merely offering attractive pricing (Banner 1958; Brennan et al. 1988).

In essence, the initial decrease in operational efficiency reflects firms' strategic adaptations to the new trade environment ushered in by the CPTPP. Firms are investing in fixed assets and extending more trade credit to seize the opportunities presented by the agreement. While these strategies may lead to a temporary decrease in operational efficiency, they are expected to enhance firms' competitiveness and long-term profitability in the new trade environment.

3.4.5.2. Results on other determinants

We report the coefficient of covariates of the DiD regression when examining the impact of CPTPP on operational efficiency. For a holistic understanding, we present the regression on the entire matched sample rather than limiting it to a specific time frame. Cross-checking the table of covariates of the DiD regression in the first and second years post-CPTPP, the results of covariates maintain the same trajectory. We also report the multivariate regression detail in Table 4. In presenting our results, we adopt the approach used by Lu et al., (2023a), who also employ a Propensity Score Matching-Difference-in-Differences (PSM-DiD) framework in their research.

Table 4: Coefficients of control variables in regressions

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
|---------------------|---------------------|----------------------|----------------------|-----------------------|----------------------|----------------------|----------------------|
| | ln(TAT) | ln(FAT) | ln(CCC) | ln(OC) | ln(DIO) | ln(DRO) | ln(DPO) |
| <i>CPTPP</i> | -0.061 (0.172) | -0.103** (0.048) | 0.020 (0.613) | 0.033 (0.387) | 0.012 (0.829) | 0.061 (0.179) | -0.013 (0.848) |
| Ln(Assets) | 4.155* (0.057) | 0.466 (0.732) | -0.123 (0.903) | -0.247 (0.823) | 0.466 (0.487) | -0.333 (0.758) | 0.397 (0.753) |
| Ln(Tangibility) | 0.012 (0.721) | -0.668*** (0.000) | -0.057 (0.267) | -0.047 (0.358) | 0.205*** (0.004) | -0.202*** (0.000) | -0.101 (0.107) |
| Ln(Leverage) | -0.005 (0.901) | -0.009 (0.845) | 0.017 (0.544) | -0.028 (0.359) | -0.062* (0.065) | -0.015 (0.640) | 0.119*** (0.004) |
| Free Cash Flow | 0.124*** (0.000) | 0.151*** (0.000) | -0.102*** (0.000) | -0.102*** (0.000) | -0.057** (0.042) | -0.127*** (0.000) | -0.088*** (0.009) |
| Ln(L.Sale growth) | 0.007** (0.015) | 0.0171*** (0.000) | -0.008*** (0.000) | -0.0094*** (0.000) | -0.009*** (0.003) | -0.008*** (0.000) | -0.005* (0.056) |
| LnGDP | 1.188** (0.036) | 1.204 (0.102) | -0.442 (0.263) | -0.865** (0.034) | -1.216** (0.045) | -0.432 (0.334) | 0.151 (0.806) |
| Ln(D_Exchange rate) | 0.008 (0.610) | -0.013 (0.384) | -0.006 (0.561) | -0.015* (0.088) | -0.039** (0.028) | -0.010 (0.307) | 0.023 (0.118) |
| Ln(FDI(% GDP)) | 0.042 (0.252) | 0.155*** (0.001) | -0.030 (0.392) | 0.016 (0.680) | -0.073 (0.306) | 0.019 (0.630) | -0.130** (0.022) |
| Ln(GDP growth) | -0.009 (0.633) | 0.004 (0.899) | -0.019 (0.364) | -0.012 (0.525) | -0.063 (0.166) | -0.012 (0.588) | 0.002 (0.941) |
| Ln(Inflation) | -0.065** (0.025) | -0.152*** (0.000) | 0.077*** (0.008) | 0.048 (0.132) | 0.057 (0.314) | 0.049 (0.156) | 0.120*** (0.007) |
| Political_factors | 0.029 (0.952) | 0.180 (0.774) | -0.442 (0.266) | -0.321 (0.449) | -1.139** (0.042) | -0.590 (0.195) | -0.472 (0.436) |

Table 4: Coefficients of control variables in regressions (continued)

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
|-----------------------------|---------|---------|----------------------|----------------------|----------------------|----------------------|----------------------|
| | ln(TAT) | ln(FAT) | ln(CCC) | ln(OC) | ln(DIO) | ln(DRO) | ln(DPO) |
| Ln(Cap_Intensity) | | | -0.065 (0.404) | -0.12 (0.149) | -0.953*** (0.000) | 0.382*** (0.000) | 0.128 (0.163) |
| Ln(Profits) | | | -0.038*** (0.000) | -0.043*** (0.000) | -0.029*** (0.000) | -0.051*** (0.000) | -0.022*** (0.004) |
| Ln(Investment) | | | -0.053*** (0.000) | -0.052*** (0.000) | -0.031*** (0.006) | -0.054*** (0.000) | -0.040*** (0.007) |
| Ln(Dividend) | | | -0.005* (0.098) | -0.005 (0.111) | -0.002 (0.541) | -0.005* (0.072) | -0.004 (0.117) |
| Firm fixed effects | Y | Y | Y | Y | Y | Y | Y |
| Year fixed effects | Y | Y | Y | Y | Y | Y | Y |
| Cluster by country-industry | Y | Y | Y | Y | Y | Y | Y |
| Controls | Y | Y | Y | Y | Y | Y | Y |
| Observations | 3,532 | 3,532 | 3,532 | 3,532 | 3,532 | 3,532 | 3,532 |
| R-squared | 0.151 | 0.366 | 0.186 | 0.194 | 0.176 | 0.216 | 0.073 |

*Note: The results of the DiD regression from Equation (1): $Operational\ efficiency_{it} = \beta_1 * Post_{it} + \beta_2 * Treat_{it} + \mu * CPTPP_{kt} + \lambda * X_{ikt} + \gamma_i + \tau_t + \varepsilon_{it}$. In our study, the variable of interest, CPTPP, represents the impact of Vietnam's participation in the agreement on the country's operational efficiency. Our firm-level control variables include firm size, tangibility, leverage, free cash flow, GDP, delta exchange rate, and lag sales growth while the country-level independent variables are GDP growth, FDI (% GDP), inflation, and political factors as the average of the six dimensions from the WGI. We also add Capital Intensity, Profit, Investment, and Dividend for the regression on short-term operational efficiency. All firm-specific variables have been subjected to a 1% winsorization followed by a logarithmic transformation. In addition, we also control for firm and year fixed effects while clustering by country-industry. Industries are classified by INDC3 from Datastream following Chattopadhyay et al. (2020) and Chlomou and Demirakos (2020). The values in parentheses are p-values. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.*

Given the coefficient of CPTPP associated with ln(FAT) is $\mu = -0.103$ and statistically significant, we interpret this as the CPTPP having a negative impact on the FAT of firms in Vietnam, adjusting for FTA of firms in other countries. In this case, after delogging, after CPTPP the negative significant result suggests that FAT of Vietnamese firms decreased by 9.6%¹⁰ comparing

¹⁰ The delogging equation is: Percentage change = $(e^{\mu} - 1) * 100\% = (0.904 - 1) * 100\% = -9.6\%$

to firms in other control countries. In our sample, firm size does not exhibit a clear relationship with operational efficiency. However, leverage appears to have a noteworthy impact on days of payable outstanding. Higher leverage may increase DPO as firms with more debt might delay supplier payments to conserve cash (Brinckmann et al., 2019). Relating to liquidity, Free Cash Flow (FCF), and profits, crucial financial resources for firms play an essential role in promoting operational efficiency (Jeffrey et al., 2010; Xin et al., 2019). Such efficiency could be the result of the firm's capacity to invest in advanced production methodologies or leading-edge technologies (Li & Zhan, 2019) thereby increasing the productivity of their assets. In the same vein, these firms also tend to exhibit a shorter Cash Conversion Cycle (CCC) and its components indicating skillful management of working capital. Empowered by their financial flexibility, they are in a position to negotiate more advantageous credit terms with suppliers and invest in systems that reduce inventory downtime.

Sales growth positively impacts operational efficiency in multiple ways. As a business expands and sales volumes increase, the firm can achieve economies of scale that allows it to distribute fixed costs over a larger number of units reducing the cost per unit and improving operational efficiency (Fetz & Filippini, 2010). The improved cash flow from increased sales provides more resources for investment in technologies or processes that enhance efficiency, such as automation or refined supply chain management (Kuei et al., 2001). Additionally, the influx of cash from increased sales allows for investment in R&D leading to innovative products or services that meet market demands more efficiently (Coad et al., 2021). Thus, sales growth and operational efficiency feed into each other underlining the importance of strategic sales growth planning in enhancing overall business performance.

Capital intensity, which measures a firm's reliance on fixed assets in its operations, plays a noteworthy role in determining short-term asset operational efficiency. Elevated levels of capital intensity could constrain a firm's liquidity and working capital. Consequently, the firm could extend more favorable credit terms to customers as a cash flow preservation strategy, even if this action has the potential to elongate the receivables collection cycle and depress receivable turnover rates. Extending longer credit terms may not only serve as a mechanism for customer retention, but also stabilize revenue streams over time (Vittas & Cho, 1995). In industries where capital-intensive firms operate, elongated payment terms are often integral to long-term contracts

and strategic partnerships (von Hirschhausen & Neumann, 2008). For instance, extended receivable periods may dovetail with broader negotiation tactics, such as volume discounts, fostering mutual benefits in long-term contractual arrangements. Given their significant investments in fixed assets, highly capital-intensive companies are motivated to excel in operational efficiency. This drive likely manifests in optimized production and inventory management processes leading to reduced Days Inventory Outstanding (DIO). This optimization is consistent with the notion that firms with heavy investments in production and automation technologies tend to have more efficient operational flows (Lu et al., 2023b).

High levels of investment and dividends can both positively influence a firm's short-term operational efficiency. Investment often signals a growth and expansion focus leading to improved operational procedures, new technology adoption, and optimized resource utilization, all of which enhance production efficiency (Buzzell et al., 1975; Jackson, 2007). Investment can also streamline supply chain and accounts receivable processes positively affecting the cash conversion cycle. Similarly, higher dividend payouts, typically characteristic of mature firms, necessitate efficient operational processes to ensure consistent cash flow for dividend payments. These firms may optimize inventory management to free up cash for dividends increasing inventory turnover and operational efficiency. The need to maintain steady cash flow for dividends may also encourage strategies for accelerated receivable collections and better credit terms with suppliers.

The Gross Domestic Product (GDP) is an indication of the general economic health of a country. A positive relationship between operational efficiency with GDP could be explained that in a strong economy, firms are likely to have higher sales and, as such, higher asset turnover. This environment not only boosts demand for goods and services, but also encourages firms to optimize operations, scale up production, and tap into economies of scale (Almfraji & Almsafir, 2014). Concurrently, a strong economy frequently spurs technological innovation further amplifying operational efficiencies (Sweet & Eterovic, 2015). A negative relationship between DIO and OC with GDP could be explained by in a strong economy, firms may sell their inventory faster, which could shorten their cash conversion and operating cycles.

Fluctuations in exchange rates, especially a depreciation of the local currency, can profoundly impact a firm's operational efficiency. A depreciating local currency renders a country's exports more cost-effective and appealing to international buyers thereby stimulating sales (Dornbusch, 1987; Forbes, 2002; Salomon & Shaver, 2005). This surge in demand can expedite inventory turnover as reflected in a decrease in Days of Inventory Outstanding (DIO). Concurrently, a depreciated local currency can elevate the cost of imported goods prompting consumers to opt for domestically produced alternatives. This shift in consumer preference can further enhance the sales of local firms. The cumulative effect of augmented exports and domestic sales can expedite the operating cycle leading to a reduction in the Operating Cycle (OC).

Certainly, Foreign Direct Investment (FDI) often serves as a catalyst for the introduction of advanced technologies and superior management practices in a host country (Agbloyor et al., 2013; Ang, 2009; Dhingra et al., 2016; Yao & Wei, 2007). These enhancements can amplify the productivity of a firm's fixed assets generating higher sales without necessitating an equivalent increase in fixed asset investment, which, in turn, improves the FAT ratio. Additionally, FDI can foster improvements in the overall business environment including enhanced access to credit and more streamlined supply chains (Agyapong & Bedjabeng, 2019; Yu & Li, 2020). These improvements can empower firms to manage their payables more effectively. For instance, improved access to credit could enable a firm to expedite payments to suppliers reducing DPO. Furthermore, multinational firms, often beneficiaries of FDI, might introduce more efficient payment practices or leverage their bargaining power with suppliers to negotiate quicker payment cycles. Thus, FDI plays a pivotal role in enhancing a firm's operational efficiency. Inflation generally leads to an increase in the cost of goods sold (COGS). If sales do not increase at the same rate, this can lead to a decrease in total asset turnover. In addition, firms may try to delay paying their bills for as long as possible during high inflation periods. By delaying payments, a firm can hold onto its cash longer and, by the time it pays its bills, the real value of the cash it's paying with will have been eroded by inflation.

In our current investigation into the impact of the CPTPP on firms in Vietnam as compared to other signatory nations, we opt to control for the WGI. The WGI offers a broad measure of governance quality capturing elements that are uniformly agreed upon by all CPTPP member countries through various chapters of the agreement. This allows for a more consistent baseline

against which to evaluate the effects of the CPTPP on operational efficiency across different nations. In contrast, our Essay 1 focused on the effects of anti-collusion laws, which are country-specific and inherently encapsulate elements of regulatory quality unique to each jurisdiction. Therefore, incorporating the WGI in that context would have been redundant as the national laws already accounted for governance variations.

3.4.6. Further extension

Following our examination of the temporal impact of the CPTPP on operational efficiency, we seek to delve deeper to discern whether the CPTPP exerts additional effects on specific subsets of firms. Drawing on logical reasoning and the existing literature, we intend to scrutinize the additional effects on firms classified based on profitability, firm size, financially constrained level, listing on specific stock exchanges such as HOSE, and firms in industries least affected by COVID. Our objective is to provide a holistic understanding of the CPTPP's impact on Vietnamese firms. The specification is as below:

$$\begin{aligned} \text{Operational efficiency}_{it} = & \alpha + \mu * CPTPP_{kt} + \rho * Chosen_{dimension} * CPTPP_{kt} + \\ & + \nu * Chosen_{dimension} + \lambda * X_{ikt} + \gamma_i + \tau_t + \varepsilon_{it} \end{aligned} \quad (2)$$

where i , k , and t index firms, countries, and years, respectively. The dependent variable, *Operational efficiency*_{it}, is represented through three distinct tiers. The first tier corresponds to total assets turnover providing a broad measure of how efficiently a firm utilizes its assets. The second tier delves deeper into both long-term and short-term efficiency. It includes fixed assets turnover, representing long-term operational efficiency, and the cash conversion cycle (CCC) and the operating cycle (OC), which encapsulate short-term efficiency. The third and most detailed tier further dissects the components of the CCC and OC providing insights into days payable outstanding (DPO), days receivable outstanding (DRO), and days inventory outstanding (DIO). Our firm-level control variables include firm size, tangibility, leverage, free cash flow, GDP, delta exchange rate, and lag sales growth, while the country-level independent variables are GDP growth, FDI (% GDP), inflation, and political factors as the average of the six dimensions from the Worldwide Government Index. We also add further Capital Intensity, Profit, Investment, and Dividend for the regression on short-term operation efficiency. $CPTPP_{kt}$ is the interaction of $Treat_{i,t}$ and $Post_{i,t}$. $Chosen_dimension$, a binary variable, is the

dimension of interest we want to examine further classified by comparison with the median value of the associated industry. The variable on interest is $Chosen_dimension * CPTPP_{kt}$, the interaction between $Chosen_dimension$ and $CPTPP_{kt}$, which shows us whether there is an additional effect of CPTPP on specific groups of firms. Also, similar to the main specification, we control for firm and year fixed effects along with clustering by country-industry. The chosen dimension variable ($Chosen_{dimension}$) is included when running this DDD regression but is omitted in the tables regarding DDD results due to potential collinearity issues.

3.4.6.1. Additional impact of CPTPP on high profitability firms

The trade agreement (CPTPP) provides firms with an avenue to broaden their market presence. High profitability firms, equipped with the necessary resources and capabilities, are particularly poised to seize this opportunity. Agency theory suggests that the management of these firms may be incentivized to pursue new ventures to signal their competence to shareholders, while the theory of competitive advantage underscores the need for continuous innovation to maintain their market position. Therefore, we want to examine whether there is any additional impact of CPTPP on high profitability firms in Vietnam.

Table 5: Interaction test to assess CPTPP 's additional effects on operational efficiency in high profitability firm in Vietnam

| | ln(TAT) | ln(FAT) | ln(CCC) | ln(OC) | ln(DIO) | ln(DRO) | ln(DPO) | |
|---------|------------------------------|----------------------|----------------------|---------------------|---------------------|--------------------|---------------------|--------------------|
| 1 year | <i>CPTPP * profitability</i> | -0.058* (0.055) | -0.100*** (0.001) | 0.080*** (0.008) | 0.090*** (0.005) | 0.029 (0.386) | 0.144*** (0.000) | 0.105** (0.042) |
| | <i>CPTPP</i> | -0.215** (0.041) | -0.262* (0.070) | 0.204* (0.051) | 0.204* (0.065) | 0.198 (0.190) | 0.215** (0.044) | 0.127 (0.321) |
| | Firm fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Year fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Cluster by country-industry | Y | Y | Y | Y | Y | Y | Y |
| | Controls | Y | Y | Y | Y | Y | Y | Y |
| | N | 2,120 | 2,120 | 2,120 | 2,120 | 2,120 | 2,120 | 2,120 |
| | R-squared | 0.384 | 0.162 | 0.16 | 0.168 | 0.085 | 0.171 | 0.084 |
| 2 years | <i>CPTPP * profitability</i> | -0.027 (0.433) | -0.052* (0.065) | 0.048 (0.206) | 0.064 (0.118) | 0.027 (0.486) | 0.112** (0.015) | 0.096 (0.125) |
| | <i>CPTPP</i> | -0.0462 (0.418) | -0.0209 (0.727) | -0.0101 (0.851) | 0.00879 (0.875) | -0.0656 (0.303) | 0.0408 (0.544) | -0.0996 (0.283) |
| | Firm fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Year fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Cluster by country-industry | Y | Y | Y | Y | Y | Y | Y |
| | Controls | Y | Y | Y | Y | Y | Y | Y |
| | N | 2,840 | 2,840 | 2,840 | 2,840 | 2,840 | 2,840 | 2,840 |
| | R-squared | 0.22 | 0.3 | 0.179 | 0.192 | 0.167 | 0.201 | 0.075 |
| 3 years | <i>CPTPP * profitability</i> | -0.015 (0.649) | -0.039 (0.153) | 0.034 (0.369) | 0.055 (0.191) | 0.019 (0.622) | 0.099* (0.052) | 0.092 (0.149) |
| | <i>CPTPP</i> | -0.0936** (0.049) | -0.107* (0.074) | 0.0247 (0.646) | 0.0321 (0.547) | 0.0195 (0.779) | 0.0491 (0.421) | -0.059 (0.510) |
| | Firm fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Year fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Cluster by country-industry | Y | Y | Y | Y | Y | Y | Y |
| | Controls | Y | Y | Y | Y | Y | Y | Y |
| | N | 3,532 | 3,532 | 3,532 | 3,532 | 3,532 | 3,532 | 3,532 |
| | R-squared | 0.153 | 0.367 | 0.187 | 0.196 | 0.176 | 0.219 | 0.074 |

*Note: The results of the Difference-in-Differences regression from Equation (2): $Operational\ efficiency_{it} = \alpha + \mu * CPTPP_{kt} + \rho * profitability * CPTPP_{kt} + \lambda * X_{ikt} + \gamma_i + \tau_t + \varepsilon_{it}$. In our study, the variable of interest, $CPTPP_{kt} * profitability$, represents the additional impact of CPTPP on the operational efficiency of high profitability firms (compared to the median of associated industries). Our firm-level control variables include firm size, tangibility, leverage, free cash flow, GDP, delta exchange rate, and lag sales growth while the country-level independent variables are GDP growth, FDI (% GDP), inflation, and political factors as the average of the six dimensions from the WGI. We also add Capital Intensity, Profit, Investment, and Dividend for the regression on short-term operational efficiency. All firm-*

*specific variables have been subjected to a 1% winsorization followed by a logarithmic transformation. In addition, we also control for firm and year fixed effects while clustering by country-industry. Industries are classified by INDC3 from Datastream following Chattopadhyay et al. (2020) and Chlomou and Demirakos (2020). The values in parentheses are p-values. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.*

Our findings, as illustrated in Table 5 and further corroborated by the additional specifications in the Appendix Tables A9, A10, and A11, reveal a consistent pattern. High profit firms experience a more pronounced initial decrease in operational efficiency compared to other Vietnamese firms following the implementation of the CPTPP. In particular, in the first year after CPTPP, the negative significant result suggests that TAT of Vietnamese high profitability firms decreased by 5.82% comparing to low profitability companies. It is attributed by the decrease by 9.51% of FAT and increase by 15.03% of DRO in high profitability firms compared to the low profitability one. However, this effect diminishes by the second- and third-year post-implementation (i.e., decrease in both magnitudes and significant levels). These results affirm our second hypothesis (H2) suggesting that high profitability firms may encounter a steeper initial decline in operational efficiency upon joining the CPTPP followed by a quick response.

The empirical results align well with our theoretical underpinnings. According to agency theory (Jensen & Meckling, 1976) and confirmed by the insights of Dasgupta et al. (2018), CEOs of these high profitability firms are incentivized to seize new market opportunities to showcase their competence, even at the risk of short-term efficiency losses. This strategy is further endorsed by Porter's competitive advantage theory (Porter, 1985, 1991), which posits that firms must continuously innovate and adapt to maintain their competitive edge even if it incurs an immediate cost. Consequently, these firms view the initial decline in operational efficiency not as a setback, but as a necessary and calculated investment to optimize their operations for the opportunities ushered in by the CPTPP.

3.4.6.2. Additional impact of CPTPP on large firms

Large firms, with their superior management and operational capabilities, are well-equipped to navigate the changes in the trade environment brought about by the CPTPP. Beneficiaries of economies of scale, these firms have the resources and capabilities to adapt to new trade policies and market conditions efficiently. The resource-based view of competitive advantage suggests

that these firms, with their valuable, rare, and inimitable resources, are well-positioned to face new market challenges. Therefore, we analyze whether larger Vietnamese firms will manifest enhanced operational efficiency as they effectively harness the opportunities presented by the CPTPP.

Table 6: Interaction test to assess CPTPP's additional effects on operational efficiency in large firms in Vietnam

| | ln(TAT) | ln(FAT) | ln(CCC) | ln(OC) | ln(DIO) | ln(DRO) | ln(DPO) | | |
|-----------------------------|-----------------------------|----------------------|----------------------|----------------------|--------------------|--------------------|---------------------|--------------------|--------------------|
| 1 year | <i>CPTPP * large</i> | -0.00927 (0.719) | -0.0112 (0.680) | 0.0328 (0.400) | 0.0127 (0.754) | 0.0387 (0.206) | -0.0282 (0.524) | 0.0924 (0.132) | |
| | <i>CPTPP</i> | -0.239** (0.027) | -0.306** (0.037) | 0.227** (0.032) | 0.242** (0.032) | 0.193 (0.201) | 0.301*** (0.006) | 0.133 (0.321) | |
| | Firm fixed effects | Y | Y | Y | Y | Y | Y | Y | |
| | Year fixed effects | Y | Y | Y | Y | Y | Y | Y | |
| | Cluster by country-industry | Y | Y | Y | Y | Y | Y | Y | |
| | Controls | Y | Y | Y | Y | Y | Y | Y | |
| | N | 2,120 | 2,120 | 2,120 | 2,120 | 2,120 | 2,120 | 2,120 | |
| | R-squared | 0.383 | 0.159 | 0.157 | 0.165 | 0.085 | 0.165 | 0.084 | |
| | 2 years | <i>CPTPP * large</i> | 0.031 (0.211) | 0.0407* (0.072) | 0.00396 (0.903) | -0.0081 (0.823) | 0.0215 (0.449) | -0.041 (0.296) | 0.0619 (0.194) |
| | | <i>CPTPP</i> | -0.0748 (0.191) | -0.067 (0.260) | 0.0117 (0.827) | 0.0445 (0.416) | -0.0627 (0.302) | 0.117* (0.076) | -0.0804 (0.390) |
| Firm fixed effects | | Y | Y | Y | Y | Y | Y | Y | |
| Year fixed effects | | Y | Y | Y | Y | Y | Y | Y | |
| Cluster by country-industry | | Y | Y | Y | Y | Y | Y | Y | |
| Controls | | Y | Y | Y | Y | Y | Y | Y | |
| N | | 2,840 | 2,840 | 2,840 | 2,840 | 2,840 | 2,840 | 2,840 | |
| R-squared | | 0.22 | 0.3 | 0.179 | 0.19 | 0.167 | 0.199 | 0.073 | |
| 3 years | | <i>CPTPP * large</i> | 0.0622*** (0.006) | 0.0674*** (0.001) | -0.0223 (0.537) | -0.0279 (0.478) | 0.000759 (0.975) | -0.0645 (0.133) | 0.0214 (0.653) |
| | | <i>CPTPP</i> | -0.132*** (0.005) | -0.159*** (0.005) | 0.0527 (0.313) | 0.0728 (0.150) | 0.0282 (0.673) | 0.129** (0.026) | -0.0243 (0.784) |
| | Firm fixed effects | Y | Y | Y | Y | Y | Y | Y | |
| | Year fixed effects | Y | Y | Y | Y | Y | Y | Y | |
| | Cluster by country-industry | Y | Y | Y | Y | Y | Y | Y | |
| | Controls | Y | Y | Y | Y | Y | Y | Y | |
| | N | 3,532 | 3,532 | 3,532 | 3,532 | 3,532 | 3,532 | 3,532 | |
| | R-squared | 0.154 | 0.367 | 0.187 | 0.195 | 0.176 | 0.218 | 0.073 | |

*Note: The results of the Difference-in-Differences regression from Equation (2): $Operational\ efficiency_{it} = \alpha + \mu * CPTPP_{kt} + \rho * large * CPTPP_{kt} + \lambda * X_{ikt} + \gamma_i + \tau_t + \varepsilon_{it}$. In our study, the variable of interest, $CPTPP_{kt} * large$, represents the additional impact of CPTPP on the operational efficiency of large firms (compared to the median of associated industries). Our firm-level control variables include firm size, tangibility, leverage, free cash flow, GDP, delta exchange rate, and lag sales growth while the country-level independent variables are GDP growth, FDI (% GDP), inflation, and political factors as the average of the six dimensions from the WGI. We also add Capital Intensity, Profit, Investment, and Dividend for the regression on short-term operational efficiency. All firm-specific variables have been subjected to a 1% winsorization followed by a logarithmic transformation. In addition, we also control for firm and year fixed effects while clustering by country-industry. Industries are classified by INDC3 from Datastream following Chattopadhyay et al. (2020) and Chlomou and Demirakos (2020). The values in parentheses are p-values. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.*

In the short term, the operational efficiency of these large firms may not significantly differ from that of other firms as they too are adjusting to the new trade environment. However, our findings, as illustrated in Table 6 and further corroborated by the additional specifications in Appendix Tables A12, A13, and A14, reveal a consistent pattern. There is an insignificant distinguished effect of CPTPP on large firms in the first year after the entry. In the short term, the operational efficiency of these large firms may not significantly differ from that of other firms as they too are adjusting to the new trade environment. However, the second and third year after the trade agreement reveal an increased rise in the outperformance regarding the operational efficiency of large firms compared to other firms in Vietnam (in both magnitude and significant levels). In particular, in the third year after CPTPP, the positive significant result suggests that TAT of Vietnamese large firms increased by 6.18% comparing to low profitability companies. It is partly attributed by the increase by 7.25% of FAT in these firms. This pattern aligns with the financial slack theory that suggests that firms with more resources can better exploit new opportunities and thus improve their performance over time (Uyar et al., 2023a; Uyar et al., 2023c; Wasiuzzaman et al., 2022). This underscores the potential of large firms to exploit the benefits of the CPTPP effectively thereby enhancing their operational efficiency over the medium term.

3.4.6.3. Additional impact of CPTPP on financially constrained firms

The trade agreement (CPTPP) offers firms a unique opportunity to expand their market reach and increase their competitiveness. However, not all firms are equally positioned to seize these opportunities. In particular, financially constrained firms, often characterized by high leverage,

may face significant challenges in adapting to the new trade environment. These firms, burdened by their debt obligations, may lack the financial flexibility to invest in new technologies, expand production, or undertake other strategic shifts that could enhance operational efficiency. Therefore, we want to examine whether there is any additional impact of CPTPP on financially constrained firms in Vietnam.

Table 7: Interaction test to assess CPTPP's additional effects on operational efficiency in financially constrained firms in Vietnam

| | ln(TAT) | ln(FAT) | ln(CCC) | ln(OC) | ln(DIO) | ln(DRO) | ln(DPO) | | |
|-----------------------------|-----------------------------|----------------------------|---------------------|---------------------|--------------------|-------------------|---------------------|--------------------|--------------------|
| 1 year | <i>CPTPP * constrained</i> | -0.0165 (0.505) | -0.0451* (0.084) | 0.0372 (0.273) | 0.0325 (0.360) | 0.0509 (0.135) | -0.0109 (0.781) | 0.0954* (0.058) | |
| | <i>CPTPP</i> | -0.236** (0.030) | -0.290** (0.047) | 0.225** (0.033) | 0.233** (0.037) | 0.187 (0.207) | 0.292*** (0.008) | 0.133 (0.311) | |
| | Firm fixed effects | Y | Y | Y | Y | Y | Y | Y | |
| | Year fixed effects | Y | Y | Y | Y | Y | Y | Y | |
| | Cluster by country-industry | Y | Y | Y | Y | Y | Y | Y | |
| | Controls | Y | Y | Y | Y | Y | Y | Y | |
| | N | 2,120 | 2,120 | 2,120 | 2,120 | 2,120 | 2,120 | 2,120 | |
| | R-squared | 0.383 | 0.16 | 0.158 | 0.165 | 0.086 | 0.165 | 0.084 | |
| | 2 years | <i>CPTPP * constrained</i> | 0.0168 (0.534) | 0.00214 (0.948) | 0.0189 (0.623) | 0.0208 (0.646) | 0.0361 (0.325) | -0.0246 (0.626) | 0.0345 (0.525) |
| | | <i>CPTPP</i> | -0.0677 (0.242) | -0.048 (0.436) | 0.00454 (0.936) | 0.0306 (0.605) | -0.0695 (0.263) | 0.108 (0.137) | -0.0667 (0.486) |
| Firm fixed effects | | Y | Y | Y | Y | Y | Y | Y | |
| Year fixed effects | | Y | Y | Y | Y | Y | Y | Y | |
| Cluster by country-industry | | Y | Y | Y | Y | Y | Y | Y | |
| Controls | | Y | Y | Y | Y | Y | Y | Y | |
| N | | 2,840 | 2,840 | 2,840 | 2,840 | 2,840 | 2,840 | 2,840 | |
| R-squared | | 0.219 | 0.299 | 0.179 | 0.191 | 0.167 | 0.199 | 0.073 | |
| 3 years | | <i>CPTPP * constrained</i> | 0.0261 (0.248) | 0.0134 (0.647) | 0.00928 (0.761) | 0.0105 (0.803) | 0.0151 (0.716) | -0.0381 (0.427) | 0.0215 (0.610) |
| | | <i>CPTPP</i> | -0.114** (0.014) | -0.133** (0.023) | 0.0373 (0.476) | 0.0541 (0.302) | 0.0213 (0.758) | 0.116* (0.073) | -0.0241 (0.784) |
| | Firm fixed effects | Y | Y | Y | Y | Y | Y | Y | |
| | Year fixed effects | Y | Y | Y | Y | Y | Y | Y | |
| | Cluster by country-industry | Y | Y | Y | Y | Y | Y | Y | |
| | Controls | Y | Y | Y | Y | Y | Y | Y | |
| | N | 3,532 | 3,532 | 3,532 | 3,532 | 3,532 | 3,532 | 3,532 | |
| | R-squared | 0.153 | 0.367 | 0.187 | 0.195 | 0.176 | 0.218 | 0.073 | |

*Note: The results of the Difference-in-Differences regression from Equation (2): $Operational\ efficiency_{it} = \alpha + \mu * CPTPP_{kt} + \rho * constrained * CPTPP_{kt} + \lambda * X_{ikt} + \gamma_i + \tau_t + \varepsilon_{it}$. In our study, the variable of interest, $CPTPP_{kt} * constrained$, represents the additional impact of CPTPP on the operational efficiency of financially constrained firms (compared to the median of associated industries). Our firm-level control variables include firm size, tangibility, leverage, free cash flow, GDP, delta exchange rate, and lag sales growth while the country-level independent variables are GDP growth, FDI (% GDP), inflation, and political factors as the average of the six dimensions from the WGI. We also add Capital Intensity, Profit, Investment, and Dividend for the regression on short-term operational efficiency. All firm-specific variables have been subjected to a 1% winsorization followed by a logarithmic transformation. In addition, we also control for firm and year fixed effects while clustering by country-industry. Industries are classified by INDC3 from Datastream following Chattopadhyay et al. (2020) and Chlomou and Demirakos (2020). The values in parentheses are p-values. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.*

Our findings, as illustrated in Table 7 and further corroborated by the additional specifications in the Appendix Tables A15, A16, and A17, reveal a consistent pattern. There are almost no empirically significant results for any interaction coefficient in all four regression tables. The results affirm our fourth hypothesis (H4) that implementation of the CPTPP does not exert an additional effect on the operational efficiency of high leverage firms in Vietnam. Despite financial limitations, these firms are eager to leverage the CPTPP's benefits, such as new market access and reduced trade barriers, which could boost sales and profits aiding debt service and potentially easing financial constraints. However, their primary focus on managing existing debt and maintaining financial stability could limit their capacity to make substantial investments or strategic shifts. The Pecking Order Theory of capital structure suggests these firms would prefer to finance investments with internal funds (Sánchez-Vidal & Martín-Ugedo, 2005; Shyam-Sunder & Myers, 1999), but financial constraints may limit fund availability restricting their ability to exploit the CPTPP's opportunities. Moreover, the benefits of the CPTPP may not immediately improve operational efficiency for these firms due to the significant costs and risks associated with entering new markets and adapting to new trade environments.

3.4.6.4. Additional effect of firms in HOSE

Large firms tend to outperform their smaller counterparts in the medium term, a phenomenon largely attributable to the inherent advantages conferred by their scale. These advantages often manifest in superior management capabilities and operational efficiencies. However, firms listed on the HOSE, regardless as to their size, operate under a more stringent regulatory framework that

may influence their performance differently. This presents an opportunity to explore the interplay of multiple factors offering a more comprehensive understanding than what can be gleaned from examining a single factor in isolation.

Table 8: Interaction test to assess CPTPP's additional effects on operational efficiency in firms listed on HOSE

| | ln(TAT) | ln(FAT) | ln(CCC) | ln(OC) | ln(DIO) | ln(DRO) | ln(DPO) |
|-----------------------------|----------------------|----------------------|---------------------|---------------------|---------------------|--------------------|--------------------|
| <i>CPTPP * HOSE</i> | -0.127*** (0.003) | -0.171*** (0.001) | 0.121*** (0.000) | 0.102*** (0.000) | 0.095*** (0.004) | 0.061 (0.108) | 0.167** (0.038) |
| <i>CPTPP</i> | -0.180* (0.086) | -0.226 (0.114) | 0.182* (0.071) | 0.198* (0.065) | 0.164 (0.268) | 0.256** (0.015) | 0.095 (0.466) |
| 1 year | | | | | | | |
| Firm fixed effects | Y | Y | Y | Y | Y | Y | Y |
| Year fixed effects | Y | Y | Y | Y | Y | Y | Y |
| Cluster by country-industry | Y | Y | Y | Y | Y | Y | Y |
| Controls | Y | Y | Y | Y | Y | Y | Y |
| N | 2,120 | 2,120 | 2,120 | 2,120 | 2,120 | 2,120 | 2,120 |
| R-squared | 0.388 | 0.168 | 0.163 | 0.169 | 0.087 | 0.166 | 0.088 |
| <i>CPTPP * HOSE</i> | -0.063 (0.197) | -0.097* (0.092) | 0.079** (0.014) | 0.057** (0.044) | 0.063* (0.050) | 0.006 (0.891) | 0.112 (0.216) |
| <i>CPTPP</i> | -0.028 (0.650) | 0.002 (0.971) | -0.027 (0.573) | 0.011 (0.817) | -0.085 (0.184) | 0.094 (0.133) | -0.108 (0.281) |
| 2 years | | | | | | | |
| Firm fixed effects | Y | Y | Y | Y | Y | Y | Y |
| Year fixed effects | Y | Y | Y | Y | Y | Y | Y |
| Cluster by country-industry | Y | Y | Y | Y | Y | Y | Y |
| Controls | Y | Y | Y | Y | Y | Y | Y |
| N | 2,840 | 2,840 | 2,840 | 2,840 | 2,840 | 2,840 | 2,840 |
| R-squared | 0.221 | 0.301 | 0.181 | 0.191 | 0.168 | 0.198 | 0.075 |
| <i>CPTPP * HOSE</i> | -0.029 (0.516) | -0.074 (0.206) | 0.071*** (0.010) | 0.053* (0.053) | 0.045 (0.151) | -0.005 (0.918) | 0.077 (0.332) |
| <i>CPTPP</i> | -0.086 (0.103) | -0.088 (0.175) | 0.005 (0.917) | 0.032 (0.500) | 0.006 (0.934) | 0.099* (0.081) | -0.053 (0.564) |
| 3 years | | | | | | | |
| Firm fixed effects | Y | Y | Y | Y | Y | Y | Y |
| Year fixed effects | Y | Y | Y | Y | Y | Y | Y |
| Cluster by country-industry | Y | Y | Y | Y | Y | Y | Y |
| Controls | Y | Y | Y | Y | Y | Y | Y |
| N | 3,532 | 3,532 | 3,532 | 3,532 | 3,532 | 3,532 | 3,532 |
| R-squared | 0.153 | 0.367 | 0.188 | 0.196 | 0.176 | 0.217 | 0.074 |

*Note: The results of the Difference-in-Differences regression from Equation (2): $Operational\ efficiency_{it} = \alpha + \mu * CPTPP_{kt} + \rho * HOSE * CPTPP_{kt} + \lambda * X_{ikt} + \gamma_i + \tau_t + \varepsilon_{it}$. In our study, the variable of interest, $CPTPP_{kt} * HOSE$, represents the additional impact of CPTPP on the operational efficiency of firms listed on HOSE. Our firm-level control variables include firm size, tangibility, leverage, free cash flow, GDP, delta exchange rate, and lag sales growth while the country-level independent variables are GDP growth, FDI (% GDP), inflation, and political factors as the average of the six dimensions from the WGI. We also add Capital Intensity, Profit, Investment, and Dividend for the regression on short-term operational efficiency. All firm-specific variables have been subjected to a 1% winsorization followed by a logarithmic transformation. In addition, we also control for firm and year fixed effects while clustering by country-industry. Industries are classified by INDC3 from Datastream following Chattopadhyay et al. (2020) and Chlomou and Demirakos (2020). The values in parentheses are p-values. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.*

Our findings, as illustrated in Table 8 and further corroborated by the additional specifications in the Appendix Tables A18, A19, and A20, reveal a consistent pattern. The first-year post-implementation witnessed a significant dip in operational efficiency across all measures. This initial impact can be interpreted as a transition period, a necessary phase of adjustment where firms are acclimating to the new market conditions ushered in by the CPTPP. In particular, in the first year after CPTPP, the negative significant result suggests that TAT of Vietnamese firms listed on HOSE decreased by 12.19% comparing to firms listed on HNX. It is attributed by the decrease by 15.63% of FAT and increase by 12.74% of CCC in firms listed on HOSE compared to those listed on HNX.

By the second and third years, we see a marked attenuation of the negative impacts on all operational metrics (in both magnitude and significant levels) suggesting that Vietnamese firms have successfully navigated the new trade conditions. The results confirm our fifth hypothesis that firms listed on the HOSE may initially experience a decrease in operational efficiency due to the unique challenges associated with operating under stricter laws. Different from large firms who inherently exploit the benefit from their large scale, firms in HOSE are more actively involved in CPTPP when compared to firms listed on other stock exchanges represented by the dip in operational efficiency right at the first year. In essence, while large firms and HOSE-listed firms may face different challenges in the initial stages of CPTPP implementation, their inherent advantages and capabilities enable them to effectively navigate these challenges and improve their operational efficiency over time highlighting the advantage of large scale in business.

3.4.6.5. Additional impact of CPTPP on firms affected by COVID-19

In our analysis, it is crucial to consider the confounding impact of the COVID-19 pandemic, which has been a significant global event since 2020, potentially influencing the implementation of laws and their effects. Specifically, we need to scrutinize the operational efficiency differences among firms in industries least affected by COVID-19. This approach helps us discern whether our results are solely driven by the pandemic's influence. S&P Global Market Intelligence (2022) provides a valuable perspective on this matter assessing the pandemic's impact on industries' credit risk from a probability of default (PD) standpoint spanning from January 2, 2020 to January 15, 2022. We define the “least affected” industries by COVID-19 as those exhibiting the smallest changes in their default probabilities, either on the positive or negative side, shown in Appendix Table 21.

Table 9: Interaction test to assess CPTPP's additional effects on operational efficiency in firms least affected by COVID in Vietnam

| | ln(TAT) | ln(FAT) | ln(CCC) | ln(OC) | ln(DIO) | ln(DRO) | ln(DPO) | |
|---------|-------------------------------|----------------------|----------------------|--------------------|---------------------|----------------------|--------------------|--------------------|
| 1 year | <i>CPTPP * least_affected</i> | 0.0604 (0.131) | 0.063 (0.231) | -0.0211 (0.683) | -0.00473 (0.923) | -0.0705 (0.108) | 0.028 (0.597) | -0.081 (0.339) |
| | <i>CPTPP</i> | -0.279** (0.012) | -0.348** (0.021) | 0.256** (0.019) | 0.252** (0.028) | 0.253* (0.095) | 0.270** (0.011) | 0.227 (0.101) |
| | Firm fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Year fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Cluster by country-industry | Y | Y | Y | Y | Y | Y | Y |
| | Controls | Y | Y | Y | Y | Y | Y | Y |
| | N | 2,120 | 2,120 | 2,120 | 2,120 | 2,120 | 2,120 | 2,120 |
| | R-squared | 0.384 | 0.16 | 0.157 | 0.165 | 0.086 | 0.165 | 0.083 |
| 2 years | <i>CPTPP * least_affected</i> | 0.074** (0.049) | 0.068 (0.149) | -0.028 (0.555) | -0.0001 (0.998) | -0.061* (0.078) | 0.031 (0.576) | -0.086 (0.236) |
| | <i>CPTPP</i> | -0.103* (0.080) | -0.087 (0.182) | 0.029 (0.590) | 0.041 (0.465) | -0.017 (0.788) | 0.079 (0.215) | 0.00005 (1.000) |
| | Firm fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Year fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Cluster by country-industry | Y | Y | Y | Y | Y | Y | Y |
| | Controls | Y | Y | Y | Y | Y | Y | Y |
| | N | 2,840 | 2,840 | 2,840 | 2,840 | 2,840 | 2,840 | 2,840 |
| | R-squared | 0.221 | 0.3 | 0.179 | 0.19 | 0.168 | 0.199 | 0.074 |
| 3 years | <i>CPTPP * least_affected</i> | 0.089** (0.043) | 0.094* (0.090) | -0.055 (0.243) | -0.028 (0.558) | -0.082*** (0.007) | 0.016 (0.772) | -0.096 (0.192) |
| | <i>CPTPP</i> | -0.154*** (0.004) | -0.181*** (0.006) | 0.074 (0.181) | 0.076 (0.149) | 0.077 (0.258) | 0.088 (0.113) | 0.043 (0.654) |
| | Firm fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Year fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Cluster by country-industry | Y | Y | Y | Y | Y | Y | Y |
| | Controls | Y | Y | Y | Y | Y | Y | Y |
| | N | 3,532 | 3,532 | 3,532 | 3,532 | 3,532 | 3,532 | 3,532 |
| | R-squared | 0.154 | 0.368 | 0.188 | 0.195 | 0.177 | 0.217 | 0.074 |

*Note: The results of the Difference-in-Differences regression from Equation (2): Operational efficiency_{it} = α + μ * CPTPP_{kt} + ρ * least_affected * CPTPP_{kt} + λ * X_{ikt} + γ_i + τ_t + ε_{it}. In our study, the variable of interest, CPTPP_{kt} * least_affected, represents the additional impact of CPTPP on the operational efficiency of firms in industries that are least affected by COVID-19. Our firm-level control variables include firm size, tangibility, leverage, free cash flow, GDP, delta exchange rate, and lag sales growth while the country-level independent variables are GDP growth, FDI (% GDP), inflation, and political factors as the average of the six dimensions from the WGI. We also add Capital Intensity, Profit, Investment, and Dividend for the regression on short-term operational efficiency.*

*All firm-specific variables have been subjected to a 1% winsorization followed by a logarithmic transformation. In addition, we also control for firm and year fixed effects while clustering by country-industry. Industries are classified by INDC3 from Datastream following Chattopadhyay et al. (2020) and Chlomou and Demirakos (2020). The values in parentheses are p-values. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.*

Examining our findings, as illustrated in Table 9 and further substantiated by additional specifications in Tables A22, A23, and A24 in the Appendix, a consistent pattern emerges. In the initial year, all firms, irrespective of their industry, capitalized on the opportunities presented by the new trading environment under the CPTPP including expanded customer bases and markets. However, the onset of the COVID-19 pandemic in 2020 necessitated a shift in focus for many firms as they had to divert resources to manage the challenges brought about by the pandemic. Yet firms in industries least affected by COVID-19 were able to maintain their focus on exploiting the benefits of the CPTPP. The results confirm our sixth hypothesis that firms in least-affected industries by COVID-19 will witness the outperformance in operational efficiency since the year 2020. Their relative stability during the pandemic allowed them to enhance and manage their operational activities more efficiently. This pattern underscores the resilience and adaptability of these firms and their ability to navigate the opportunities and challenges presented by the CPTPP effectively even amidst a global crisis. More importantly, this suggests that the observed improvements in operational efficiency are not merely a byproduct of the pandemic's differential impact across industries, but rather reflect the substantive effects of the CPTPP. This bolsters our argument that the CPTPP has had a significant impact on firm operational efficiency independent of the confounding effects of the COVID-19 pandemic.

3.4.7. Robustness test

In our main analysis, for short-term operational efficiency measures, we primarily focus on the impact of the CPTPP on the Cash Conversion Cycle (CCC), The Operational Cycle (OC), and its components including Days Payable Outstanding (DPO), Days Inventory Outstanding (DIO), and Days Receivable Outstanding (DRO). These metrics provide a comprehensive view of a firm's operational efficiency capturing the time it takes for a company to convert resource inputs into cash flows. However, to ensure the robustness of our findings and to provide a deeper insight into the CPTPP's impact, we also conduct additional tests focusing on Receivable Turnover, Inventory

Turnover, and Payable Turnover. These turnover ratios, while related to DPO, DIO, and DRO, offer a different perspective on a firm's operational efficiency. They specifically focus on the frequency at which a company turns over its receivables, inventory, and payables within a given period. This is a measure of efficiency and liquidity that is a slightly different aspect of operational efficiency compared to the time-based measures of DPO, DIO, and DRO. By examining these additional metrics, we seek to provide a more comprehensive and robust assessment of the CPTPP's impact on firms' operational efficiency and to validate the results of our main analysis.

Table 10: Impact of CPTPP on short-term operational ratios of firms in Vietnam

| | | (1) | (2) | (3) |
|---------|-----------------------------|--------------|--------------|--------------|
| | | ln(inv_turn) | ln(rec_turn) | ln(pay_turn) |
| 1 year | <i>CPTPP</i> | -0.201 | -0.281*** | -0.155 |
| | | (0.169) | (0.006) | (0.183) |
| | Firm fixed effects | Y | Y | Y |
| | Year fixed effects | Y | Y | Y |
| | Cluster by country-industry | Y | Y | Y |
| | Controls | Y | Y | Y |
| | N | 2,120 | 2,120 | 2,120 |
| | R-squared | 0.094 | 0.167 | 0.086 |
| 2 years | <i>CPTPP</i> | 0.0762 | -0.0798 | 0.0734 |
| | | (0.186) | (0.173) | (0.361) |
| | Firm fixed effects | Y | Y | Y |
| | Year fixed effects | Y | Y | Y |
| | Cluster by country-industry | Y | Y | Y |
| | Controls | Y | Y | Y |
| | N | 2,840 | 2,840 | 2,840 |
| | R-squared | 0.182 | 0.199 | 0.075 |
| 3 years | <i>CPTPP</i> | -0.0202 | -0.0575 | 0.00651 |
| | | (0.709) | (0.201) | (0.920) |
| | Firm fixed effects | Y | Y | Y |
| | Year fixed effects | Y | Y | Y |
| | Cluster by country-industry | Y | Y | Y |
| | Controls | Y | Y | Y |
| | N | 3,532 | 3,532 | 3,532 |
| | R-squared | 0.191 | 0.218 | 0.081 |

*Note: The results of the Difference-in-Differences regression from Equation (1): Operational efficiency_{it} = β₁ * Post_{it} + β₂ * Treat_{it} + μ * CPTPP_{kt} + λ * X_{ikt} + γ_i + τ_t + ε_{it}. In this regression, the variable of interest, CPTPP, represents the impact of Vietnam's participation in the agreement on the country's operational efficiency. Our firm-level control variables include firm size, tangibility, leverage, free cash flow, Capital Intensity, Profit, Investment, Dividend, GDP, delta exchange rate, and lag sales growth while the country-level independent variables are GDP growth, FDI (% GDP), inflation, and political factors as the average of the six dimensions from the WGI. All firm-specific variables have been subjected to a 1% winsorization followed by a logarithmic transformation. In addition, we also control for firm and year fixed effects while clustering by country-industry. Industries are classified by INDC3 from Datastream following Chattopadhyay et al. (2020) and Chlomou and Demirakos (2020). The values in parentheses are p-values. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.*

Upon analyzing our results, as depicted in Table 10 and further corroborated by the additional specifications in Table A25 in the Appendix, we observe a consistent trend. Mirroring the findings from the day-based operational efficiency measure, the ratio-based results also confirm a temporary dip in operational efficiency in the first year, followed by a swift adaptation as evidenced by the disappearance of the negative impact in the second and third year post-CPTPP. Specifically, the results pertaining to receivable turnover affirm that firms are relaxing their credit policies to attract a new customer base in the emerging markets. This strategy serves a dual purpose. It enhances competitiveness and allows for product verification thereby fostering trust and building long-term customer relationships.

Furthermore, we have conducted comprehensive tests to examine the additional impact of the CPTPP on specific categories of firms including high profit firms, large firms, financially constrained firms, firms listed on the HOSE, and firms from industries are least affected by COVID-19. The results we obtained are analogous to those from the day-based operational efficiency measure for all specifications. This consistency across different firm categories and operational efficiency measures reinforces the robustness of our findings. It suggests that the CPTPP has a pervasive impact across various firm types and industry sectors, influencing their operational efficiency in a consistent manner.

3.5. Conclusion and implications

Drawing upon a comprehensive examination of the impact of Vietnam's entry into the CPTPP on firms' operational efficiency, our study reveals a consistent pattern across different firm categories and operational efficiency measures. In the immediate aftermath of the CPTPP implementation, firms experienced a significant dip in operational efficiency reflecting a transition period of adjustment to the new market conditions. However, by the second and third years, firms successfully navigated the new trade conditions by refining their operations, enhancing asset utilization, and optimizing their working capital management.

Our findings also underscore the strategic adaptations firms made in response to the CPTPP. Significant upfront investments in fixed assets and an extension of more trade credit were observed in addition to strategies aimed at meeting new customer demands, complying with new trade policies, and expanding consumer bases. While these strategies led to a temporary decrease

in operational efficiency, they are expected to enhance firms' competitiveness and long-term profitability in the new trade environment.

Furthermore, our study illuminates the differential impacts of the CPTPP on various types of firms. High profit firms, despite experiencing a more pronounced initial decrease in operational efficiency, demonstrated a proactive response to the opportunities ushered in by the agreement. Large firms began to outperform others in operational efficiency by the second- and third-years post-implementation effectively exploiting the benefits of the CPTPP. Financially constrained firms, despite their limitations, showed resilience with no significant additional effect on their operational efficiency upon joining the CPTPP. Firms listed on the Ho Chi Minh Stock Exchange (HOSE), despite initial challenges, improved their operational efficiency over time due to their inherent advantages and capabilities. Finally, while our data indicates no discernible variation in the impact of the CPTPP on firms belonging to industries least impacted by COVID-19 in 2019, it is noteworthy that these firms continued to leverage the advantages offered by the CPTPP strategically since 2020. This sustained focus amidst a global pandemic underscores the enduring and significant influence of the CPTPP on firm behavior and outcomes.

The findings of this study carry significant implications for policymakers, firms, investors, and researchers. Policymakers engaged in negotiating future trade agreements should consider the transformative potential of such agreements as evidenced by the CPTPP. They should anticipate the fluctuating impacts on different aspects of firm performance over time and potentially provide support to firms during the initial transition period. For firms, the results underscore the importance of strategic adaptations and investments in the wake of major trade agreements. While these may lead to a temporary dip in operational efficiency, they are crucial for long-term profitability and competitiveness. Investors can leverage these insights to make informed decisions anticipating improved performance as firms adapt to new market conditions. Lastly, this study contributes to the academic literature on the impacts of trade agreements on firm performance highlighting the need for further dynamic and detailed research in this area.

In conclusion, our study underscores the transformative potential of major trade agreements like the CPTPP. Despite initial hurdles, firms can adapt and flourish under the new market conditions leading to enhanced performance in the long run. These findings highlight the need for a dynamic

understanding of the impacts of such agreements, which can fluctuate across different aspects of firm performance and over time.

Appendix

Table A1: Source and definition of variables in our sample

| Variables | Calculation | Sources |
|--------------------------------|--|------------|
| Total Asset Turnover | Net Sales or Revenues/Total Assets | Datastream |
| Fixed Assets Turnover | Net Sales or Revenues/Fixed Assets | Datastream |
| Cash Conversion Cycle | CCC = Days of Inventory Outstanding + Days of Receivable Outstanding – Days of Payables Outstanding | Datastream |
| Operating Cycle | OC= Days of Inventory Outstanding + Days of Receivable Outstanding | Datastream |
| Inventory Turnover | Cost of Goods Sold/Average Inventories | Datastream |
| Receivable Turnover | Net Sales or Revenues/Average Account Receivable | Datastream |
| Payable Turnover | Net Sales or Revenues/Average Account Payable | Datastream |
| Firm size | Total Assets | Datastream |
| Tangibility | Net property, plant, and equipment/Total assets | Datastream |
| Leverage | Total debts/Total equity | Datastream |
| FCF | Free Cash Flow, A dummy variable equal to one if a firm's free cash flow is not negative and zero otherwise. | Datastream |
| Capital Intensity | Gross Fixed Assets/(Gross Fixed Assets + Inventories) | Datastream |
| Profits | Operating profit before taxes and depreciation/Total Assets | Datastream |
| Investment | Capital expenditures/Total Assets | Datastream |
| Dividend | Cash dividends/Total Assets | Datastream |
| GDP | Gross Domestic Product, total gross value added by all resident producers in the economy. | WorldBank |
| Delta Exchange Rate | Calculated as an annual average based on monthly averages (local currency units relative to the U.S. dollar). | WorldBank |
| FDI (%GDP) | Net inflows of investment: a measure of the level of international integration and openness of an economy. | WorldBank |
| GDP growth | Annual percentage growth rate of GDP at market prices based on constant local currency. | WorldBank |
| Inflation | Measured by the Consumer Price Index. | WorldBank |
| Worldwide Governance Indicator | Average of the six dimensions: Control of Corruption, Government Effectiveness, Political Stability and Absence of Violence, Regulatory Quality, Rule of Laws, and Voice and Accountability. | WorldBank |

Note: These are all of the variables used in this paper. The sources are Refinitiv Datastream for the firm-level variables and World Bank for the country-level ones.

Table A2: Logistic regression for calculating propensity score

| Variables | Treat | |
|-------------------|-------------|---------|
| | Coefficient | p-value |
| Ln(Assets) | -16.039*** | 0.000 |
| Ln(Tangibility) | 0.0473 | 0.573 |
| Ln(Cap_Intensity) | 0.2156 | 0.177 |
| Ln(Profits) | 0.0907*** | 0.000 |
| Ln(Leverage) | 0.6825*** | 0.000 |
| Ln(Investment) | -0.293*** | 0.000 |
| Ln(Dividend) | 0.0877*** | 0.000 |
| Free Cash Flow | -0.489*** | 0.002 |
| Ln(L.Sale growth) | -0.0051 | 0.765 |
| No. of obs | 6,163 | |
| R-squared | 0.5078 | |

*Note: This logistic regression is employed for propensity score calculation utilizing the average pre-treatment characteristics for each firm. The dependent variable in this analysis is “Treat” denoting firms in Vietnam with a value of one and others with a value of zero. Industry-fixed effects have been accounted for in this regression. Significance levels are denoted as follows: *** signifies 1%, ** indicates 5%, and * represents 10%.*

Table A3: Standardized Mean Differences test for the matched sample

| Variable | Standardized Mean Differences |
|-------------------|-------------------------------|
| Ln(L.Sale growth) | -0.1106 |
| Ln(Assets) | -0.1332 |
| Ln(Tangibility) | 0.0118 |
| Free Cash Flow | -0.0041 |
| Ln(Cap_Intensity) | 0.0084 |
| Ln(Profits) | 0.0314 |
| Ln(Leverage) | 0.0473 |
| Ln(Investment) | -0.1117 |
| Ln(Dividend) | 0.0128 |

Note: Standardized Mean Differences for the firm characteristics in matched sample.

Table A4: Details of firms by countries per year in the matched sample

| Year | Vietnam | China | India | Philippines | Indonesia | Thailand |
|------|---------|-------|-------|-------------|-----------|----------|
| 2017 | 337 | 122 | 83 | 4 | 33 | 40 |
| 2018 | 379 | 139 | 126 | 5 | 60 | 49 |
| 2019 | 376 | 134 | 126 | 5 | 58 | 44 |
| 2020 | 368 | 136 | 114 | 5 | 57 | 40 |
| 2021 | 357 | 129 | 110 | 5 | 48 | 43 |

Note: Number of firms per year for each country in the matched sample.

Table A5: Number of firms in each industry in the matched sample for the treatment and control groups per year**Panel A: Number of firms in each industry in the matched sample for the control group**

| YEAR | AUTMB | BRESR | CHMCL | CNSTM | CONPS | ENEGY | FDBEV | HLTHC | INDGS | MEDIA | PCDGS | RTAIL | TECNO | TELCM | TRLES | UNCLS |
|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 2017 | 4 | 20 | 11 | 54 | 19 | 16 | 48 | 15 | 60 | 5 | 2 | 12 | 4 | 3 | 9 | 0 |
| 2018 | 6 | 29 | 18 | 72 | 26 | 19 | 61 | 20 | 82 | 5 | 2 | 13 | 8 | 5 | 12 | 1 |
| 2019 | 6 | 27 | 18 | 70 | 25 | 18 | 60 | 19 | 81 | 5 | 2 | 11 | 7 | 5 | 12 | 1 |
| 2020 | 6 | 28 | 17 | 68 | 15 | 17 | 57 | 17 | 76 | 5 | 2 | 9 | 7 | 5 | 12 | 1 |
| 2021 | 6 | 27 | 16 | 63 | 24 | 15 | 55 | 19 | 68 | 4 | 2 | 11 | 7 | 5 | 12 | 1 |

Panel B: Number of firms in each industry in the matched sample for the treatment group

| YEAR | AUTMB | BRESR | CHMCL | CNSTM | CONPS | ENEGY | FDBEV | HLTHC | INDGS | MEDIA | PCDGS | RTAIL | TECNO | TELCM | TRLES | UNCLS |
|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 2017 | 4 | 29 | 18 | 55 | 20 | 23 | 42 | 23 | 87 | 2 | 3 | 8 | 10 | 8 | 5 | 0 |
| 2018 | 6 | 32 | 21 | 61 | 24 | 25 | 47 | 26 | 95 | 2 | 3 | 10 | 11 | 9 | 7 | 0 |
| 2019 | 6 | 32 | 21 | 61 | 22 | 25 | 47 | 26 | 94 | 2 | 3 | 10 | 11 | 9 | 7 | 0 |
| 2020 | 6 | 32 | 21 | 57 | 23 | 24 | 45 | 24 | 94 | 2 | 3 | 10 | 11 | 9 | 7 | 0 |
| 2021 | 6 | 32 | 21 | 55 | 22 | 24 | 44 | 23 | 92 | 1 | 3 | 10 | 9 | 8 | 7 | 0 |

Note: We utilize Datastream's Industry Level 3 Name (INDC3) for industry classifications in line with the methodological precedent set by Chattopadhyay et al. (2020) and Chlomou and Demirakos (2020). In particular, "AUTMB": Automobiles & Parts; "BRESR": Basic Resources, "CHMCL": Chemicals; "CNSTM": Construction & Mats, "CONPS": Consumer Prod & Services, "ENEGY": Energy, "FDBEV": Food and Beverage, "HLTHC": Health Care, "INDGS": Ind. Goods & Services, "MEDIA": Media, "PCDGS": Drug & Grocery Stores, "RTAIL": Retailers, "TECNO": Technology, "TELCM": Telecommunications, "TRLES": Travel and Leisure, and "UNCLS": Unclassified.

Table A6: Impact of CPTPP on operational efficiency of firms in Vietnam (Specification 2)

| | | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
|---------|--------------------|----------------------|----------------------|---------------------|---------------------|--------------------|---------------------|-------------------|
| | | ln(TAT) | ln(FAT) | ln(CCC) | ln(OC) | ln(DIO) | ln(DRO) | ln(DPO) |
| 1 year | CPTPP | -0.242*** (0.003) | -0.310*** (0.001) | 0.243*** (0.002) | 0.248*** (0.002) | 0.213** (0.033) | 0.287*** (0.002) | 0.179 (0.104) |
| | Firm fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Year fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Controls | Y | Y | Y | Y | Y | Y | Y |
| | N | 2,120 | 2,120 | 2,120 | 2,120 | 2,120 | 2,120 | 2,120 |
| | R-squared | 0.373 | 0.156 | 0.155 | 0.164 | 0.084 | 0.164 | 0.081 |
| 2 years | CPTPP | -0.049 (0.261) | -0.038 (0.461) | 0.002 (0.958) | 0.029 (0.505) | -0.068 (0.209) | 0.084* (0.090) | -0.059 (0.310) |
| | Firm fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Year fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Controls | Y | Y | Y | Y | Y | Y | Y |
| | N | 2,840 | 2,840 | 2,840 | 2,840 | 2,840 | 2,840 | 2,840 |
| | R-squared | 0.218 | 0.299 | 0.177 | 0.189 | 0.165 | 0.197 | 0.072 |
| 3 years | CPTPP | -0.061* (0.054) | -0.103*** (0.006) | 0.019 (0.524) | 0.033 (0.298) | 0.012 (0.777) | 0.061* (0.097) | -0.013 (0.766) |
| | Firm fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Year fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Controls | Y | Y | Y | Y | Y | Y | Y |
| | N | 3,532 | 3,532 | 3,532 | 3,532 | 3,532 | 3,532 | 3,532 |
| | R-squared | 0.151 | 0.366 | 0.186 | 0.194 | 0.176 | 0.216 | 0.073 |

*Note: The results of the Difference-in-Differences regression from Equation (1): $Operational\ efficiency_{it} = \beta_1 * Post_{it} + \beta_2 * Treat_{it} + \mu * CPTPP_{kt} + \lambda * X_{ikt} + \gamma_i + \tau_t + \varepsilon_{it}$. In our study, the variable of interest, CPTPP, represents the impact of Vietnam's participation in the agreement on the country's operational efficiency. Our firm-level control variables include firm size, tangibility, leverage, free cash flow, GDP, delta exchange rate, and lag sales growth while the country-level independent variables are GDP growth, FDI (% GDP), inflation, and political factors as the average of the six dimensions from the WGI. We also add Capital Intensity, Profit, Investment, and Dividend for the regression on short-term operational efficiency. All firm-specific variables have been subjected to a 1% winsorization followed by a logarithmic transformation. In addition, we also control for firm and year fixed effects (specification 2). The values in parentheses are p-values. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.*

Table A7: Impact of CPTPP on the operational efficiency of firms in Vietnam (Specification 3)

| | | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
|---------|---------------------|---------------------|---------------------|--------------------|--------------------|-------------------|---------------------|--------------------|
| | | ln(TAT) | ln(FAT) | ln(CCC) | ln(OC) | ln(DIO) | ln(DRO) | ln(DPO) |
| 1 year | CPTPP | -0.242** (0.029) | -0.310** (0.035) | 0.243** (0.034) | 0.248** (0.036) | 0.213 (0.223) | 0.287*** (0.004) | 0.179 (0.249) |
| | Firm fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Year fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Cluster by industry | Y | Y | Y | Y | Y | Y | Y |
| | Controls | Y | Y | Y | Y | Y | Y | Y |
| | N | 2,120 | 2,120 | 2,120 | 2,120 | 2,120 | 2,120 | 2,120 |
| | R-squared | 0.373 | 0.156 | 0.155 | 0.164 | 0.084 | 0.164 | 0.081 |
| 2 years | CPTPP | -0.0485 (0.291) | -0.0376 (0.463) | 0.002 (0.962) | 0.029 (0.459) | -0.068 (0.304) | 0.0842 (0.141) | -0.059 (0.498) |
| | Firm fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Year fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Cluster by industry | Y | Y | Y | Y | Y | Y | Y |
| | Controls | Y | Y | Y | Y | Y | Y | Y |
| | N | 2,840 | 2,840 | 2,840 | 2,840 | 2,840 | 2,840 | 2,840 |
| | R-squared | 0.218 | 0.299 | 0.177 | 0.189 | 0.165 | 0.197 | 0.072 |
| 3 years | CPTPP | -0.0607 (0.174) | -0.103* (0.098) | 0.0197 (0.660) | 0.0333 (0.361) | 0.0117 (0.855) | 0.0608 (0.234) | -0.0125 (0.848) |
| | Firm fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Year fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Cluster by industry | Y | Y | Y | Y | Y | Y | Y |
| | Controls | Y | Y | Y | Y | Y | Y | Y |
| | N | 3,532 | 3,532 | 3,532 | 3,532 | 3,532 | 3,532 | 3,532 |
| | R-squared | 0.151 | 0.366 | 0.186 | 0.194 | 0.176 | 0.216 | 0.073 |

*Note: The results of the Difference-in-Differences regression from Equation (1): Operational efficiency_{it} = β₁ * Post_{it} + β₂ * Treat_{it} + μ * CPTPP_{kt} + λ * X_{ikt} + γ_i + τ_t + ε_{it}. In our study, the variable of interest, CPTPP, represents the impact of Vietnam's participation in the agreement on the country's operational efficiency. Our firm-level control variables include firm size, tangibility, leverage, free cash flow, GDP, delta exchange rate, and lag sales growth while the country-level independent variables are GDP growth, FDI (% GDP), inflation, and political factors as the average of the six dimensions from the WGI. We also add Capital Intensity, Profit, Investment, and Dividend for the regression on short-term operational efficiency. All firm-specific variables have been subjected to a 1% winsorization followed by a logarithmic transformation. In addition, we also control for firm and year fixed effects clustering by industry (specification 3). Industries are classified by INDC3 from Datastream following Chattopadhyay et al. (2020) and Chlomou and Demirakos (2020). The values in parentheses are p-values. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.*

Table A8: Impact of CPTPP on the operational efficiency of firms in Vietnam (Specification 4)

| | | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
|---------|-----------------------------|---------------------|---------------------|--------------------|--------------------|--------------------|---------------------|--------------------|
| | | ln(TAT) | ln(FAT) | ln(CCC) | ln(OC) | ln(DIO) | ln(DRO) | ln(DPO) |
| 1 year | CPTPP | -0.217** (0.008) | -0.265** (0.005) | 0.234** (0.038) | 0.242** (0.037) | 0.182 (0.274) | 0.279*** (0.005) | 0.169 (0.284) |
| | Firm fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Year*Industry fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Cluster by industry | Y | Y | Y | Y | Y | Y | Y |
| | Controls | Y | Y | Y | Y | Y | Y | Y |
| | N | 2,120 | 2,120 | 2,120 | 2,120 | 2,120 | 2,120 | 2,120 |
| | R-squared | 0.395 | 0.199 | 0.188 | 0.197 | 0.119 | 0.184 | 0.111 |
| 2 years | CPTPP | -0.0538 (0.269) | -0.0348 (0.516) | 0.00485 (0.922) | 0.0338 (0.419) | -0.0726 (0.287) | 0.0905 (0.117) | -0.0573 (0.508) |
| | Firm fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Year*Industry fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Cluster by industry | Y | Y | Y | Y | Y | Y | Y |
| | Controls | Y | Y | Y | Y | Y | Y | Y |
| | N | 2,840 | 2,840 | 2,840 | 2,840 | 2,840 | 2,840 | 2,840 |
| | R-squared | 0.253 | 0.337 | 0.205 | 0.217 | 0.187 | 0.216 | 0.096 |
| 3 years | CPTPP | -0.0597 (0.183) | -0.0916 (0.126) | 0.0164 (0.710) | 0.0296 (0.405) | 0.00715 (0.914) | 0.0601 (0.240) | -0.0147 (0.824) |
| | Firm fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Year*Industry fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Cluster by industry | Y | Y | Y | Y | Y | Y | Y |
| | Controls | Y | Y | Y | Y | Y | Y | Y |
| | N | 3,532 | 3,532 | 3,532 | 3,532 | 3,532 | 3,532 | 3,532 |
| | R-squared | 0.199 | 0.412 | 0.221 | 0.23 | 0.2 | 0.239 | 0.097 |

*Note: The results of the Difference-in-Differences regression from Equation (1): Operational efficiency_{it} = β₁ * Post_{it} + β₂ * Treat_{it} + μ * CPTPP_{kt} + λ * X_{ikt} + γ_i + τ_t + ε_{it}. In our study, the variable of interest, CPTPP, represents the impact of Vietnam's participation in the agreement on the country's operational efficiency. Our firm-level control variables include firm size, tangibility, leverage, free cash flow, GDP, delta exchange rate, and lag sales growth while the country-level independent variables are GDP growth, FDI (% GDP), inflation, and political factors as the average of the six dimensions from the WGI. We also add Capital Intensity, Profit, Investment, and Dividend for the regression on short-term operational efficiency. All firm-specific variables have been subjected to a 1% winsorization followed by a logarithmic transformation. In addition, we also control for firm and year*industry fixed effects clustering by industry (specification 4). Industries are classified by INDC3 from Datastream following Chattopadhyay et al. (2020) and Chlomou and Demirakos (2020). The values in parentheses are p-values. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.*

Table A9: Interaction test to assess CPTPP's additional effects on operational efficiency in high profitability firms in Vietnam (Specification 2)

| | | ln(TAT) | ln(FAT) | ln(CCC) | ln(OC) | ln(DIO) | ln(DRO) | ln(DPO) |
|---------|------------------------------|----------------------|----------------------|---------------------|---------------------|--------------------|---------------------|---------------------|
| 1 year | <i>CPTPP * profitability</i> | -0.0583 (0.149) | -0.100** (0.032) | 0.0802** (0.041) | 0.0902** (0.021) | 0.029 (0.562) | 0.144*** (0.002) | 0.105* (0.058) |
| | <i>CPTPP</i> | -0.215*** (0.010) | -0.262*** (0.006) | 0.204** (0.011) | 0.204** (0.011) | 0.198* (0.055) | 0.215** (0.023) | 0.127 (0.263) |
| | Firm fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Year fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Controls | Y | Y | Y | Y | Y | Y | Y |
| | N | 2,120 | 2,120 | 2,120 | 2,120 | 2,120 | 2,120 | 2,120 |
| | R-squared | 0.384 | 0.162 | 0.16 | 0.168 | 0.085 | 0.171 | 0.084 |
| 2 years | <i>CPTPP * profitability</i> | -0.0269 (0.465) | -0.0523 (0.228) | 0.0477 (0.185) | 0.0639* (0.083) | 0.027 (0.556) | 0.112*** (0.007) | 0.0996** (0.043) |
| | <i>CPTPP</i> | -0.0462 (0.328) | -0.0209 (0.707) | -0.0101 (0.827) | 0.00879 (0.853) | -0.0656 (0.267) | 0.0408 (0.450) | -0.0996 (0.117) |
| | Firm fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Year fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Controls | Y | Y | Y | Y | Y | Y | Y |
| | N | 2,840 | 2,840 | 2,840 | 2,840 | 2,840 | 2,840 | 2,840 |
| | R-squared | 0.22 | 0.3 | 0.179 | 0.192 | 0.167 | 0.201 | 0.075 |
| 3 years | <i>CPTPP * profitability</i> | -0.0152 (0.668) | -0.0395 (0.356) | 0.0347 (0.318) | 0.0552 (0.126) | 0.0185 (0.690) | 0.0986** (0.017) | 0.0922* (0.050) |
| | <i>CPTPP</i> | -0.0936** (0.020) | -0.107** (0.028) | 0.0247 (0.530) | 0.0321 (0.432) | 0.0195 (0.711) | 0.0491 (0.293) | -0.059 (0.270) |
| | Firm fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Year fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Controls | Y | Y | Y | Y | Y | Y | Y |
| | N | 3,532 | 3,532 | 3,532 | 3,532 | 3,532 | 3,532 | 3,532 |
| | R-squared | 0.153 | 0.367 | 0.187 | 0.196 | 0.176 | 0.219 | 0.074 |

*Note: The results of the Difference-in-Differences regression from Equation (2) $Operational\ efficiency_{it} = \alpha + \mu * CPTPP_{kt} + \rho * profitability * CPTPP_{kt} + \lambda * X_{ikt} + \gamma_i + \tau_t + \varepsilon_{it}$. In our study, the variable of interest, $CPTPP_{kt} * profitability$, represents the additional impact of CPTPP on the operational efficiency of high profitability firms (compared to the median of associated industries). Our firm-level control variables include firm size, tangibility, leverage, free cash flow, GDP, delta exchange rate, and lag sales growth while the country-level independent variables are GDP growth, FDI (% GDP), inflation, and political factors as the average of the six dimensions from the WGI. We also add Capital Intensity, Profit, Investment, and Dividend for the regression on short-term operational efficiency. All firm-specific variables have been subjected to a 1% winsorization followed by a logarithmic transformation. In addition, we also control for firm and year fixed effects (specification 2). The values in parentheses are p-values. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.*

Table A10: Interaction test to assess CPTPP's additional effects on operational efficiency in high profitability firms in Vietnam (Specification 3)

| | ln(TAT) | ln(FAT) | ln(CCC) | ln(OC) | ln(DIO) | ln(DRO) | ln(DPO) | |
|---------|------------------------------|----------------------|----------------------|----------------------|----------------------|--------------------|---------------------|--------------------|
| 1 year | <i>CPTPP * profitability</i> | -0.0583* (0.051) | -0.100*** (0.006) | 0.0802*** (0.009) | 0.0902*** (0.005) | 0.029 (0.369) | 0.144*** (0.001) | 0.105* (0.050) |
| | <i>CPTPP</i> | -0.215** (0.033) | -0.262* (0.064) | 0.204* (0.079) | 0.204* (0.087) | 0.198 (0.251) | 0.215** (0.025) | 0.127 (0.408) |
| | Firm fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Year fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Cluster by industry | Y | Y | Y | Y | Y | Y | Y |
| | Controls | Y | Y | Y | Y | Y | Y | Y |
| | N | 2,120 | 2,120 | 2,120 | 2,120 | 2,120 | 2,120 | 2,120 |
| | R-squared | 0.384 | 0.162 | 0.16 | 0.168 | 0.085 | 0.171 | 0.084 |
| 2 years | <i>CPTPP * profitability</i> | -0.0269 (0.451) | -0.0523* (0.088) | 0.0477 (0.185) | 0.0639* (0.098) | 0.027 (0.459) | 0.112** (0.019) | 0.0996 (0.142) |
| | <i>CPTPP</i> | -0.0462 (0.221) | -0.0209 (0.689) | -0.0101 (0.850) | 0.00879 (0.846) | -0.0656 (0.317) | 0.0408 (0.496) | -0.0996 (0.302) |
| | Firm fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Year fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Cluster by industry | Y | Y | Y | Y | Y | Y | Y |
| | Controls | Y | Y | Y | Y | Y | Y | Y |
| | N | 2,840 | 2,840 | 2,840 | 2,840 | 2,840 | 2,840 | 2,840 |
| | R-squared | 0.22 | 0.3 | 0.179 | 0.192 | 0.167 | 0.201 | 0.075 |
| 3 years | <i>CPTPP * profitability</i> | -0.0152 (0.636) | -0.0395 (0.159) | 0.0347 (0.340) | 0.0552 (0.161) | 0.0185 (0.601) | 0.0986* (0.052) | 0.0922 (0.164) |
| | <i>CPTPP</i> | -0.0936** (0.037) | -0.107 (0.124) | 0.0247 (0.658) | 0.0321 (0.474) | 0.0195 (0.797) | 0.0491 (0.425) | -0.059 (0.484) |
| | Firm fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Year fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Cluster by industry | Y | Y | Y | Y | Y | Y | Y |
| | Controls | Y | Y | Y | Y | Y | Y | Y |
| | N | 3,532 | 3,532 | 3,532 | 3,532 | 3,532 | 3,532 | 3,532 |
| | R-squared | 0.153 | 0.367 | 0.187 | 0.196 | 0.176 | 0.219 | 0.074 |

Note: The results of the Difference-in-Differences regression from Equation (2): $Operational\ efficiency_{it} = \alpha + \mu * CPTPP_{kt} + \rho * profitability * CPTPP_{kt} + \lambda * X_{ikt} + \gamma_i + \tau_t + \varepsilon_{it}$. In our study, the variable of interest, $CPTPP_{kt} * profitability$, represents the additional impact of CPTPP on the operational efficiency of high profitability firms (compared to the median of associated industries). Our firm-level control variables include firm size, tangibility, leverage, free cash flow, GDP, delta exchange rate, and lag sales growth while the country-level independent variables are GDP growth, FDI (% GDP), inflation, and political factors as the average of the six dimensions from the WGI. We also add Capital Intensity, Profit, Investment, and Dividend for the regression on short-term

*operational efficiency. All firm-specific variables have been subjected to a 1% winsorization followed by a logarithmic transformation. In addition, we also control for firm and year fixed effects clustering by industry (specification 3). Industries are classified by INDC3 from Datastream following Chattopadhyay et al. (2020) and Chlomou and Demirakos (2020). The values in parentheses are p-values. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.*

Table A11: Interaction test to assess CPTPP's additional effects on operational efficiency in high profitability firms in Vietnam (Specification 4)

| | ln(TAT) | ln(FAT) | ln(CCC) | ln(OC) | ln(DIO) | ln(DRO) | ln(DPO) | |
|-----------------------------|------------------------------|------------------------------|----------------------|----------------------|---------------------|-------------------|---------------------|--------------------|
| 1 year | <i>CPTPP * profitability</i> | -0.064** (0.043) | -0.108*** (0.004) | 0.085*** (0.006) | 0.095*** (0.003) | 0.034 (0.294) | 0.148*** (0.000) | 0.111** (0.048) |
| | <i>CPTPP</i> | -0.183** (0.036) | -0.210* (0.063) | 0.191* (0.092) | 0.194* (0.093) | 0.166 (0.312) | 0.204** (0.031) | 0.113 (0.465) |
| | Firm fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Year*Industry fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Cluster by industry | Y | Y | Y | Y | Y | Y | Y |
| | Controls | Y | Y | Y | Y | Y | Y | Y |
| | N | 2,120 | 2,120 | 2,120 | 2,120 | 2,120 | 2,120 | 2,120 |
| | R-squared | 0.407 | 0.207 | 0.193 | 0.202 | 0.12 | 0.191 | 0.114 |
| | 2 years | <i>CPTPP * profitability</i> | -0.036 (0.333) | -0.065** (0.041) | 0.056 (0.135) | 0.071* (0.065) | 0.034 (0.354) | 0.119** (0.014) |
| <i>CPTPP</i> | | -0.049 (0.222) | -0.014 (0.787) | -0.010 (0.850) | 0.011 (0.811) | -0.074 (0.276) | 0.045 (0.455) | -0.102 (0.287) |
| Firm fixed effects | | Y | Y | Y | Y | Y | Y | Y |
| Year*Industry fixed effects | | Y | Y | Y | Y | Y | Y | Y |
| Cluster by industry | | Y | Y | Y | Y | Y | Y | Y |
| Controls | | Y | Y | Y | Y | Y | Y | Y |
| N | | 2,840 | 2,840 | 2,840 | 2,840 | 2,840 | 2,840 | 2,840 |
| R-squared | | 0.256 | 0.339 | 0.208 | 0.22 | 0.189 | 0.221 | 0.099 |
| 3 years | | <i>CPTPP * profitability</i> | -0.0263 (0.419) | -0.0551** (0.048) | 0.0451 (0.243) | 0.0653 (0.104) | 0.0253 (0.475) | 0.108** (0.039) |
| | <i>CPTPP</i> | -0.0988** (0.043) | -0.102 (0.145) | 0.0237 (0.674) | 0.0314 (0.496) | 0.0133 (0.867) | 0.0508 (0.418) | -0.0608 (0.474) |
| | Firm fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Year*Industry fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Cluster by industry | Y | Y | Y | Y | Y | Y | Y |
| | Controls | Y | Y | Y | Y | Y | Y | Y |
| | N | 3,532 | 3,532 | 3,532 | 3,532 | 3,532 | 3,532 | 3,532 |
| | R-squared | 0.202 | 0.413 | 0.223 | 0.232 | 0.2 | 0.242 | 0.098 |

Note: The results of the Difference-in-Differences regression from Equation (2): $Operational\ efficiency_{it} = \alpha + \mu * CPTPP_{kt} + \rho * profitability * CPTPP_{kt} + \lambda * X_{ikt} + \gamma_i + \tau_t + \varepsilon_{it}$. In our study, the variable of interest, $CPTPP_{kt} * profitability$, represents the additional impact of CPTPP on the operational efficiency of high profitability firms (compared to the median of associated industries). Our firm-level control variables include firm size, tangibility, leverage, free cash flow, GDP, delta exchange rate, and lag sales growth while the country-level independent variables are GDP growth, FDI (% GDP), inflation, and political factors as the average of the six dimensions from the WGI. We also add further Capital Intensity, Profit, Investment, and Dividend for the regression on short-

*term operational efficiency. All firm-specific variables have been subjected to a 1% winsorization followed by a logarithmic transformation. In addition, we also control for firm and year*industry fixed effects clustering by industry (specification 4). Industries are classified by INDC3 from Datastream following Chattopadhyay et al. (2020) and Chlomou and Demirakos (2020). The values in parentheses are p-values. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.*

Table A12: Interaction test to assess CPTPP's additional effects on operational efficiency in large firms in Vietnam (Specification 2)

| | | ln(TAT) | ln(FAT) | ln(CCC) | ln(OC) | ln(DIO) | ln(DRO) | ln(DPO) |
|---------|----------------------|----------------------|----------------------|---------------------|---------------------|-------------------|---------------------|--------------------|
| 1 year | <i>CPTPP * large</i> | -0.009 (0.818) | -0.0112 (0.809) | 0.033 (0.402) | 0.013 (0.746) | 0.039 (0.439) | -0.028 (0.543) | 0.092* (0.095) |
| | <i>CPTPP</i> | -0.239*** (0.004) | -0.306*** (0.001) | 0.227*** (0.005) | 0.242*** (0.003) | 0.193* (0.061) | 0.301*** (0.002) | 0.133 (0.241) |
| | Firm fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Year fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Controls | Y | Y | Y | Y | Y | Y | Y |
| | N | 2,120 | 2,120 | 2,120 | 2,120 | 2,120 | 2,120 | 2,120 |
| | R-squared | 0.383 | 0.159 | 0.157 | 0.165 | 0.085 | 0.165 | 0.084 |
| 2 years | <i>CPTPP * large</i> | 0.031 (0.400) | 0.041 (0.349) | 0.004 (0.912) | -0.008 (0.826) | 0.022 (0.639) | -0.041 (0.329) | 0.062 (0.209) |
| | <i>CPTPP</i> | -0.075 (0.112) | -0.067 (0.229) | 0.012 (0.801) | 0.045 (0.348) | -0.063 (0.287) | 0.117** (0.031) | -0.080 (0.204) |
| | Firm fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Year fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Controls | Y | Y | Y | Y | Y | Y | Y |
| | N | 2,840 | 2,840 | 2,840 | 2,840 | 2,840 | 2,840 | 2,840 |
| | R-squared | 0.22 | 0.3 | 0.179 | 0.19 | 0.167 | 0.199 | 0.073 |
| 3 years | <i>CPTPP * large</i> | 0.062* (0.078) | 0.067 (0.114) | -0.022 (0.519) | -0.028 (0.437) | 0.0008 (0.987) | -0.065 (0.116) | 0.021 (0.648) |
| | <i>CPTPP</i> | -0.132*** (0.001) | -0.159*** (0.001) | 0.0527 (0.181) | 0.0728* (0.075) | 0.0282 (0.592) | 0.129*** (0.006) | -0.0243 (0.650) |
| | Firm fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Year fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Controls | Y | Y | Y | Y | Y | Y | Y |
| | N | 3,532 | 3,532 | 3,532 | 3,532 | 3,532 | 3,532 | 3,532 |
| | R-squared | 0.154 | 0.367 | 0.187 | 0.195 | 0.176 | 0.218 | 0.073 |

Note: The results of the Difference-in-Differences regression from Equation (2): $Operational\ efficiency_{it} = \alpha + \mu * CPTPP_{kt} + \rho * large * CPTPP_{kt} + \lambda * X_{ikt} + \gamma_i + \tau_t + \varepsilon_{it}$. In our study, the variable of interest, $CPTPP_{kt} * large$, represents the additional impact of CPTPP on the operational efficiency of large firms (compared to the median of associated industries). Our firm-level control variables include firm size, tangibility, leverage, free cash flow, GDP, delta exchange rate, and lag sales growth while the country-level independent variables are GDP growth, FDI (% GDP), inflation, and political factors as the average of the six dimensions from the WGI. We also add Capital Intensity, Profit, Investment, and Dividend for the regression on short-term operational efficiency. All firm-specific variables have been subjected to a 1% winsorization followed by a logarithmic transformation. In addition, we also control for firm and year fixed effects (specification 2). The values in parentheses are p-values. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Table A13: Interaction test to assess CPTPP's additional effects on operational efficiency in large firms in Vietnam (Specification 3)

| | ln(TAT) | ln(FAT) | ln(CCC) | ln(OC) | ln(DIO) | ln(DRO) | ln(DPO) | |
|---------|----------------------|----------------------|---------------------|-------------------|-------------------|--------------------|---------------------|--------------------|
| 1 year | <i>CPTPP * large</i> | -0.009 (0.743) | -0.011 (0.700) | 0.033 (0.414) | 0.013 (0.767) | 0.039 (0.261) | -0.028 (0.540) | 0.092 (0.165) |
| | <i>CPTPP</i> | -0.239** (0.031) | -0.306** (0.039) | 0.227* (0.068) | 0.242* (0.062) | 0.193 (0.272) | 0.301*** (0.010) | 0.133 (0.423) |
| | Firm fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Year fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Cluster by industry | Y | Y | Y | Y | Y | Y | Y |
| | Controls | Y | Y | Y | Y | Y | Y | Y |
| | N | 2,120 | 2,120 | 2,120 | 2,120 | 2,120 | 2,120 | 2,120 |
| | R-squared | 0.383 | 0.159 | 0.157 | 0.165 | 0.085 | 0.165 | 0.084 |
| 2 years | <i>CPTPP * large</i> | 0.031 (0.225) | 0.041* (0.094) | 0.004 (0.909) | -0.008 (0.836) | 0.022 (0.475) | -0.041 (0.325) | 0.062 (0.232) |
| | <i>CPTPP</i> | -0.0748* (0.068) | -0.067 (0.157) | 0.0117 (0.822) | 0.0445 (0.318) | -0.0627 (0.330) | 0.117* (0.087) | -0.0804 (0.397) |
| | Firm fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Year fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Cluster by industry | Y | Y | Y | Y | Y | Y | Y |
| | Controls | Y | Y | Y | Y | Y | Y | Y |
| | N | 2,840 | 2,840 | 2,840 | 2,840 | 2,840 | 2,840 | 2,840 |
| | R-squared | 0.22 | 0.3 | 0.179 | 0.19 | 0.167 | 0.199 | 0.073 |
| 3 years | <i>CPTPP * large</i> | 0.062** (0.011) | 0.067*** (0.003) | -0.022 (0.566) | -0.028 (0.510) | 0.0008 (0.976) | -0.065 (0.154) | 0.021 (0.672) |
| | <i>CPTPP</i> | -0.132*** (0.003) | -0.159** (0.014) | 0.0527 (0.342) | 0.0728 (0.105) | 0.0282 (0.706) | 0.129* (0.072) | -0.0243 (0.773) |
| | Firm fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Year fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Cluster by industry | Y | Y | Y | Y | Y | Y | Y |
| | Controls | Y | Y | Y | Y | Y | Y | Y |
| | N | 3,532 | 3,532 | 3,532 | 3,532 | 3,532 | 3,532 | 3,532 |
| | R-squared | 0.154 | 0.367 | 0.187 | 0.195 | 0.176 | 0.218 | 0.073 |

*Note: The results of the Difference-in-Differences regression from Equation (2): $Operational\ efficiency_{it} = \alpha + \mu * CPTPP_{kt} + \rho * large * CPTPP_{kt} + \lambda * X_{ikt} + \gamma_i + \tau_t + \varepsilon_{it}$. In our study, the variable of interest, $CPTPP_{kt} * large$, represents the additional impact of CPTPP on the operational efficiency of large firms (compared to the median of associated industries). Our firm-level control variables include firm size, tangibility, leverage, free cash flow, GDP, delta exchange rate, and lag sales growth while the country-level independent variables are GDP growth, FDI (% GDP), inflation, and political factors as the average of the six dimensions from the WGI. We also add Capital Intensity, Profit, Investment, and Dividend for the regression on short-term operational efficiency. All firm-specific*

*variables have been subjected to a 1% winsorization followed by a logarithmic transformation. In addition, we also control for firm and year fixed effects while clustering by industry (specification 3). Industries are classified by INDC3 from Datastream following Chattopadhyay et al. (2020) and Chlomou and Demirakos (2020). The values in parentheses are p-values. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.*

Table A14: Interaction test to assess CPTPP's additional effects on operational efficiency in large firms in Vietnam (Specification 4)

| | ln(TAT) | ln(FAT) | ln(CCC) | ln(OC) | ln(DIO) | ln(DRO) | ln(DPO) | |
|-----------------------------|-----------------------------|----------------------|---------------------|---------------------|-------------------|--------------------|--------------------|--------------------|
| 1 year | <i>CPTPP * large</i> | -0.009 (0.748) | -0.012 (0.677) | 0.032 (0.411) | 0.012 (0.768) | 0.039 (0.257) | -0.027 (0.551) | 0.093 (0.159) |
| | <i>CPTPP</i> | -0.211** (0.033) | -0.258** (0.033) | 0.217* (0.076) | 0.235* (0.062) | 0.164 (0.329) | 0.292** (0.011) | 0.123 (0.467) |
| | Firm fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Year*Industry fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Cluster by industry | Y | Y | Y | Y | Y | Y | Y |
| | Controls | Y | Y | Y | Y | Y | Y | Y |
| | N | 2,120 | 2,120 | 2,120 | 2,120 | 2,120 | 2,120 | 2,120 |
| | R-squared | 0.406 | 0.204 | 0.191 | 0.199 | 0.12 | 0.184 | 0.113 |
| | 2 years | <i>CPTPP * large</i> | 0.029 (0.244) | 0.037 (0.107) | 0.006 (0.861) | -0.005 (0.891) | 0.024 (0.429) | -0.038 (0.364) |
| <i>CPTPP</i> | | -0.0814* (0.067) | -0.0652 (0.185) | 0.0145 (0.786) | 0.0492 (0.287) | -0.0683 (0.302) | 0.122* (0.072) | -0.0785 (0.401) |
| Firm fixed effects | | Y | Y | Y | Y | Y | Y | Y |
| Year*Industry fixed effects | | Y | Y | Y | Y | Y | Y | Y |
| Cluster by industry | | Y | Y | Y | Y | Y | Y | Y |
| Controls | | Y | Y | Y | Y | Y | Y | Y |
| N | | 2,840 | 2,840 | 2,840 | 2,840 | 2,840 | 2,840 | 2,840 |
| R-squared | | 0.256 | 0.339 | 0.207 | 0.219 | 0.189 | 0.218 | 0.098 |
| 3 years | | <i>CPTPP * large</i> | 0.061** (0.014) | 0.064*** (0.004) | -0.019 (0.616) | -0.024 (0.575) | 0.003 (0.921) | -0.061 (0.183) |
| | <i>CPTPP</i> | -0.142*** (0.006) | -0.161** (0.018) | 0.0554 (0.326) | 0.0753 (0.104) | 0.0244 (0.752) | 0.133* (0.067) | -0.0219 (0.796) |
| | Firm fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Year*Industry fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Cluster by industry | Y | Y | Y | Y | Y | Y | Y |
| | Controls | Y | Y | Y | Y | Y | Y | Y |
| | N | 3,532 | 3,532 | 3,532 | 3,532 | 3,532 | 3,532 | 3,532 |
| | R-squared | 0.203 | 0.413 | 0.222 | 0.231 | 0.2 | 0.241 | 0.097 |

*Note: The results of the Difference-in-Differences regression from Equation (2): Operational efficiency_{it} = α + μ * CPTPP_{kt} + ρ * large * CPTPP_{kt} + λ * X_{ikt} + γ_i + τ_t + ε_{it}. In our study, the variable of interest, CPTPP_{kt} * large, represents the additional impact of CPTPP on the operational efficiency of large firms (compared to the median of associated industries). Our firm-level control variables include firm size, tangibility, leverage, free cash flow, GDP, delta exchange rate, and lag sales growth while the country-level independent variables are GDP growth, FDI (% GDP), inflation, and political factors as the average of the six dimensions from the WGI. We also add Capital Intensity, Profit, Investment, and Dividend for the regression on short-term operational efficiency. All firm-specific*

*variables have been subjected to a 1% winsorization followed by a logarithmic transformation. In addition, we also control for firm and year*industry fixed effects while clustering by industry (specification 4). Industries are classified by INDC3 from Datastream following Chattopadhyay et al. (2020) and Chlomou and Demirakos (2020). The values in parentheses are p-values. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.*

Table A15: Interaction test to assess CPTPP's additional effects on operational efficiency in financially constrained firms in Vietnam (Specification 2)

| | | ln(TAT) | ln(FAT) | ln(CCC) | ln(OC) | ln(DIO) | ln(DRO) | ln(DPO) |
|---------|--------------------|----------------------|----------------------|---------------------|---------------------|--------------------|---------------------|--------------------|
| 1 year | CPTPP*constrained | -0.0165 (0.682) | -0.0451 (0.334) | 0.0372 (0.342) | 0.0325 (0.407) | 0.0509 (0.309) | -0.0109 (0.814) | 0.0954* (0.085) |
| | CPTPP | -0.236*** (0.004) | -0.290*** (0.003) | 0.225*** (0.005) | 0.233*** (0.004) | 0.187* (0.068) | 0.292*** (0.002) | 0.133 (0.241) |
| | Firm fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Year fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Controls | Y | Y | Y | Y | Y | Y | Y |
| | N | 2,120 | 2,120 | 2,120 | 2,120 | 2,120 | 2,120 | 2,120 |
| | R-squared | 0.383 | 0.16 | 0.158 | 0.165 | 0.086 | 0.165 | 0.084 |
| 2 years | CPTPP*constrained | 0.0168 (0.648) | 0.00214 (0.961) | 0.0189 (0.599) | 0.0208 (0.573) | 0.0361 (0.430) | -0.0246 (0.558) | 0.0345 (0.484) |
| | CPTPP | -0.0677 (0.150) | -0.048 (0.387) | 0.00454 (0.922) | 0.0306 (0.517) | -0.0695 (0.237) | 0.108** (0.044) | -0.0667 (0.291) |
| | Firm fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Year fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Controls | Y | Y | Y | Y | Y | Y | Y |
| | N | 2,840 | 2,840 | 2,840 | 2,840 | 2,840 | 2,840 | 2,840 |
| | R-squared | 0.219 | 0.299 | 0.179 | 0.191 | 0.167 | 0.199 | 0.073 |
| 3 years | CPTPP*constrained | 0.0261 (0.461) | 0.0134 (0.754) | 0.00928 (0.789) | 0.0105 (0.770) | 0.0151 (0.744) | -0.0381 (0.354) | 0.0215 (0.647) |
| | CPTPP | -0.114*** (0.005) | -0.133*** (0.006) | 0.0373 (0.343) | 0.0541 (0.185) | 0.0213 (0.685) | 0.116** (0.013) | -0.0241 (0.651) |
| | Firm fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Year fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Controls | Y | Y | Y | Y | Y | Y | Y |
| | N | 3,532 | 3,532 | 3,532 | 3,532 | 3,532 | 3,532 | 3,532 |
| | R-squared | 0.153 | 0.367 | 0.187 | 0.195 | 0.176 | 0.218 | 0.073 |

Note: The results of the Difference-in-Differences regression from Equation (2): $Operational\ efficiency_{it} = \alpha + \mu * CPTPP_{kt} + \rho * constrained * CPTPP_{kt} + \lambda * X_{ikt} + \gamma_i + \tau_t + \varepsilon_{it}$. In our study, the variable of interest, $CPTPP_{kt} * constrained$, represents the additional impact of CPTPP on the operational efficiency of financially constrained firms (compared to the median of associated industries). Our firm-level control variables include firm size, tangibility, leverage, free cash flow, GDP, delta exchange rate, and lag sales growth while the country-level independent variables are GDP growth, FDI (% GDP), inflation, and political factors as the average of the six dimensions from the WGI. We also add Capital Intensity, Profit, Investment, and Dividend for the regression on short-term operational efficiency. All firm-specific variables have been subjected to a 1% winsorization followed by a logarithmic transformation. In addition, we also control for firm and year fixed effects (specification 2). The values in parentheses are p-values. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Table A16: Interaction test to assess CPTPP's additional effects on operational efficiency in financially constrained firms in Vietnam (Specification 3)

| | | ln(TAT) | ln(FAT) | ln(CCC) | ln(OC) | ln(DIO) | ln(DRO) | ln(DPO) |
|---------|---------------------|---------------------|---------------------|--------------------|-------------------|--------------------|---------------------|--------------------|
| 1 year | CPTPP*constrained | -0.0165 (0.371) | -0.0451* (0.071) | 0.0372 (0.312) | 0.0325 (0.401) | 0.0509 (0.159) | -0.0109 (0.796) | 0.0954* (0.095) |
| | CPTPP | -0.236** (0.043) | -0.290* (0.051) | 0.225* (0.060) | 0.233* (0.058) | 0.187 (0.279) | 0.292*** (0.007) | 0.133 (0.418) |
| | Firm fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Year fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Cluster by industry | Y | Y | Y | Y | Y | Y | Y |
| | Controls | Y | Y | Y | Y | Y | Y | Y |
| | N | 2,120 | 2,120 | 2,120 | 2,120 | 2,120 | 2,120 | 2,120 |
| | R-squared | 0.383 | 0.16 | 0.158 | 0.165 | 0.086 | 0.165 | 0.084 |
| 2 years | CPTPP*constrained | 0.0168 (0.446) | 0.00214 (0.949) | 0.0189 (0.640) | 0.0208 (0.665) | 0.0361 (0.363) | -0.0246 (0.640) | 0.0345 (0.561) |
| | CPTPP | -0.0677 (0.152) | -0.048 (0.419) | 0.00454 (0.941) | 0.0306 (0.563) | -0.0695 (0.343) | 0.108 (0.165) | -0.0667 (0.532) |
| | Firm fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Year fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Cluster by industry | Y | Y | Y | Y | Y | Y | Y |
| | Controls | Y | Y | Y | Y | Y | Y | Y |
| | N | 2,840 | 2,840 | 2,840 | 2,840 | 2,840 | 2,840 | 2,840 |
| | R-squared | 0.219 | 0.299 | 0.179 | 0.191 | 0.167 | 0.199 | 0.073 |
| 3 years | CPTPP*constrained | 0.0261 (0.195) | 0.0134 (0.659) | 0.00928 (0.769) | 0.0105 (0.813) | 0.0151 (0.730) | -0.0381 (0.439) | 0.0215 (0.626) |
| | CPTPP | -0.114** (0.014) | -0.133* (0.061) | 0.0373 (0.554) | 0.0541 (0.283) | 0.0213 (0.781) | 0.116 (0.153) | -0.0241 (0.793) |
| | Firm fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Year fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Cluster by industry | Y | Y | Y | Y | Y | Y | Y |
| | Controls | Y | Y | Y | Y | Y | Y | Y |
| | N | 3,532 | 3,532 | 3,532 | 3,532 | 3,532 | 3,532 | 3,532 |
| | R-squared | 0.153 | 0.367 | 0.187 | 0.195 | 0.176 | 0.218 | 0.073 |

*Note: The results of the Difference-in-Differences regression from Equation (2): Operational efficiency_{it} = α + μ * CPTPP_{kt} + ρ * constrained * CPTPP_{kt} + λ * X_{ikt} + γ_i + τ_t + ε_{it}. In our study, the variable of interest, CPTPP_{kt} * constrained, represents the additional impact of CPTPP on the operational efficiency of financially constrained firms (compared to the median of associated industries). Our firm-level control variables include firm size, tangibility, leverage, free cash flow, GDP, delta exchange rate, and lag sales growth while the country-level independent variables are GDP growth, FDI (% GDP), inflation, and political factors as the average of the six dimensions from the WGI. We also add Capital Intensity, Profit, Investment, and Dividend for the regression on short-term*

*operational efficiency. All firm-specific variables have been subjected to a 1% winsorization followed by a logarithmic transformation. In addition, we also control for firm and year fixed effects while clustering by industry (specification 3). Industries are classified by INDC3 from Datastream following Chattopadhyay et al. (2020) and Chlomou and Demirakos (2020). The values in parentheses are p-values. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.*

Table A17: Interaction test to assess CPTPP’s additional effects on operational efficiency in financially constrained firms in Vietnam (Specification 4)

| | | ln(TAT) | ln(FAT) | ln(CCC) | ln(OC) | ln(DIO) | ln(DRO) | ln(DPO) |
|---------|-----------------------------|---------------------|---------------------|--------------------|-------------------|--------------------|---------------------|-------------------|
| 1 year | CPTPP*constrained | -0.019 (0.296) | -0.0474* (0.064) | 0.0376 (0.318) | 0.0331 (0.399) | 0.0513 (0.146) | -0.00826 (0.851) | 0.0956 (0.103) |
| | CPTPP | -0.206** (0.046) | -0.241** (0.047) | 0.215* (0.069) | 0.225* (0.061) | 0.158 (0.344) | 0.283*** (0.008) | 0.123 (0.464) |
| | Firm fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Year*Industry fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Cluster by industry | Y | Y | Y | Y | Y | Y | Y |
| | Controls | Y | Y | Y | Y | Y | Y | Y |
| | N | 2,120 | 2,120 | 2,120 | 2,120 | 2,120 | 2,120 | 2,120 |
| | R-squared | 0.406 | 0.204 | 0.191 | 0.199 | 0.121 | 0.184 | 0.113 |
| 2 years | CPTPP*constrained | 0.0134 (0.561) | -0.00025 (0.994) | 0.0219 (0.603) | 0.0242 (0.625) | 0.0391 (0.322) | -0.0201 (0.712) | 0.0364 (0.553) |
| | CPTPP | -0.0734 (0.135) | -0.0467 (0.440) | 0.00692 (0.913) | 0.035 (0.525) | -0.0754 (0.318) | 0.114 (0.148) | -0.065 (0.542) |
| | Firm fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Year*Industry fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Cluster by industry | Y | Y | Y | Y | Y | Y | Y |
| | Controls | Y | Y | Y | Y | Y | Y | Y |
| | N | 2,840 | 2,840 | 2,840 | 2,840 | 2,840 | 2,840 | 2,840 |
| | R-squared | 0.255 | 0.338 | 0.207 | 0.219 | 0.189 | 0.218 | 0.097 |
| 3 years | CPTPP*constrained | 0.0232 (0.267) | 0.0114 (0.715) | 0.0127 (0.698) | 0.014 (0.757) | 0.0164 (0.701) | -0.0337 (0.507) | 0.0236 (0.608) |
| | CPTPP | -0.123** (0.016) | -0.135* (0.066) | 0.0396 (0.540) | 0.0566 (0.284) | 0.0177 (0.823) | 0.12 (0.149) | -0.022 (0.815) |
| | Firm fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Year*Industry fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Cluster by industry | Y | Y | Y | Y | Y | Y | Y |
| | Controls | Y | Y | Y | Y | Y | Y | Y |
| | N | 3,532 | 3,532 | 3,532 | 3,532 | 3,532 | 3,532 | 3,532 |
| | R-squared | 0.202 | 0.413 | 0.222 | 0.231 | 0.2 | 0.241 | 0.097 |

*Note: The results of the Difference-in-Differences regression from Equation (2): $Operational\ efficiency_{it} = \alpha + \mu * CPTPP_{kt} + \rho * constrained * CPTPP_{kt} + \lambda * X_{ikt} + \gamma_i + \tau_t + \varepsilon_{it}$. In our study, the variable of interest, $CPTPP_{kt} * constrained$, represents the additional impact of CPTPP on the operational efficiency of financially constrained firms (compared to the median of associated industries). Our firm-level control variables include firm size, tangibility, leverage, free cash flow, GDP, delta exchange rate, and lag sales growth while the country-level independent variables are GDP growth, FDI (% GDP), inflation, and political factors as the average of the six dimensions from the WGI. We also add Capital Intensity, Profit, Investment, and Dividend for the regression on short-term*

*operational efficiency. All firm-specific variables have been subjected to a 1% winsorization followed by a logarithmic transformation. In addition, we also control for firm and year*industry fixed effects while clustering by industry (specification 4). Industries are classified by INDC3 from Datastream following Chattopadhyay et al. (2020) and Chlomou and Demirakos (2020). The values in parentheses are p-values. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.*

Table A18: Interaction test to assess CPTPP's additional effects on operational efficiency in firms listed on HOSE (Specification 2)

| | | ln(TAT) | ln(FAT) | ln(CCC) | ln(OC) | ln(DIO) | ln(DRO) | ln(DPO) |
|---------|--------------------|----------------------|----------------------|---------------------|---------------------|--------------------|---------------------|---------------------|
| 1 year | CPTPP*HOSE | -0.127*** (0.002) | -0.171*** (0.000) | 0.121*** (0.002) | 0.102*** (0.009) | 0.0952* (0.057) | 0.061 (0.189) | 0.167*** (0.002) |
| | CPTPP | -0.180** (0.030) | -0.226** (0.018) | 0.182** (0.023) | 0.198** (0.014) | 0.164 (0.110) | 0.256*** (0.007) | 0.095 (0.400) |
| | Firm fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Year fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Controls | Y | Y | Y | Y | Y | Y | Y |
| | N | 2,120 | 2,120 | 2,120 | 2,120 | 2,120 | 2,120 | 2,120 |
| | R-squared | 0.388 | 0.168 | 0.163 | 0.169 | 0.087 | 0.166 | 0.088 |
| 2 years | CPTPP*HOSE | -0.0627* (0.088) | -0.0965** (0.026) | 0.0797** (0.027) | 0.0572 (0.121) | 0.0629 (0.170) | 0.00587 (0.889) | 0.112** (0.023) |
| | CPTPP | -0.028 (0.561) | 0.002 (0.967) | -0.027 (0.558) | 0.011 (0.815) | -0.085 (0.155) | 0.094* (0.085) | -0.108* (0.091) |
| | Firm fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Year fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Controls | Y | Y | Y | Y | Y | Y | Y |
| | N | 2,840 | 2,840 | 2,840 | 2,840 | 2,840 | 2,840 | 2,840 |
| | R-squared | 0.221 | 0.301 | 0.181 | 0.191 | 0.168 | 0.198 | 0.075 |
| 3 years | CPTPP*HOSE | -0.0298 (0.400) | -0.0742* (0.082) | 0.0714** (0.039) | 0.0533 (0.137) | 0.0445 (0.336) | -0.00463 (0.910) | 0.0769 (0.101) |
| | CPTPP | -0.086** (0.034) | -0.088* (0.070) | 0.005 (0.897) | 0.032 (0.441) | 0.006 (0.914) | 0.099** (0.034) | -0.053 (0.323) |
| | Firm fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Year fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Controls | Y | Y | Y | Y | Y | Y | Y |
| | N | 3,532 | 3,532 | 3,532 | 3,532 | 3,532 | 3,532 | 3,532 |
| | R-squared | 0.153 | 0.367 | 0.188 | 0.196 | 0.176 | 0.217 | 0.074 |

*Note: The results of the Difference-in-Differences regression from Equation (2): $Operational\ efficiency_{it} = \alpha + \mu * CPTPP_{kt} + \rho * hose * CPTPP_{kt} + \lambda * X_{ikt} + \gamma_i + \tau_t + \varepsilon_{it}$. In our study, the variable of interest, $CPTPP_{kt} * hose$, represents the additional impact of CPTPP on the operational efficiency of firms listed on HOSE (Hochiminh Stock Exchange). Our firm-level control variables include firm size, tangibility, leverage, free cash flow, GDP, delta exchange rate, and lag sales growth while the country-level independent variables are GDP growth, FDI (% GDP), inflation, and political factors as the average of the six dimensions from the WGI. We also add Capital Intensity, Profit, Investment, and Dividend for the regression on short-term operational efficiency. All firm-specific variables have been subjected to a 1% winsorization followed by a logarithmic transformation. In addition, we also control for firm and year fixed effects (specification 2). The values in parentheses are p-values. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.*

Table A19: Interaction test to assess CPTPP's additional effects on operational efficiency in firms listed on HOSE (Specification 3)

| | | ln(TAT) | ln(FAT) | ln(CCC) | ln(OC) | ln(DIO) | ln(DRO) | ln(DPO) |
|-----------|---------------------|----------|-----------|----------|----------|----------|----------|---------|
| 1 year | CPTPP*HOSE | -0.127** | -0.171*** | 0.121*** | 0.102*** | 0.095*** | 0.061 | 0.167* |
| | | (0.018) | (0.010) | (0.001) | (0.002) | (0.005) | (0.139) | (0.050) |
| | CPTPP | -0.180* | -0.226 | 0.182* | 0.198* | 0.164 | 0.256*** | 0.095 |
| | | (0.067) | (0.106) | (0.085) | (0.088) | (0.350) | (0.008) | (0.476) |
| | Firm fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Year fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Cluster by industry | Y | Y | Y | Y | Y | Y | Y |
| | Controls | Y | Y | Y | Y | Y | Y | Y |
| N | | 2,120 | 2,120 | 2,120 | 2,120 | 2,120 | 2,120 | 2,120 |
| R-squared | | 0.388 | 0.168 | 0.163 | 0.169 | 0.087 | 0.166 | 0.088 |
| 2 years | CPTPP*HOSE | -0.063 | -0.097 | 0.079* | 0.057 | 0.063* | 0.006 | 0.112 |
| | | (0.276) | (0.144) | (0.054) | (0.101) | (0.051) | (0.900) | (0.231) |
| | CPTPP | -0.028 | 0.002 | -0.027 | 0.011 | -0.085 | 0.094 | -0.108 |
| | | (0.526) | (0.970) | (0.527) | (0.754) | (0.201) | (0.107) | (0.251) |
| | Firm fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Year fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Cluster by industry | Y | Y | Y | Y | Y | Y | Y |
| | Controls | Y | Y | Y | Y | Y | Y | Y |
| N | | 2,840 | 2,840 | 2,840 | 2,840 | 2,840 | 2,840 | 2,840 |
| R-squared | | 0.221 | 0.301 | 0.181 | 0.191 | 0.168 | 0.198 | 0.075 |
| 3 years | CPTPP*HOSE | -0.029 | -0.074 | 0.071** | 0.053* | 0.045 | -0.005 | 0.077 |
| | | (0.560) | (0.256) | (0.042) | (0.090) | (0.142) | (0.921) | (0.346) |
| | CPTPP | -0.086* | -0.088 | 0.005 | 0.032 | 0.006 | 0.098 | -0.053 |
| | | (0.078) | (0.269) | (0.925) | (0.460) | (0.936) | (0.109) | (0.512) |
| | Firm fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Year fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Cluster by industry | Y | Y | Y | Y | Y | Y | Y |
| | Controls | Y | Y | Y | Y | Y | Y | Y |
| N | | 3,532 | 3,532 | 3,532 | 3,532 | 3,532 | 3,532 | 3,532 |
| R-squared | | 0.153 | 0.367 | 0.188 | 0.196 | 0.176 | 0.217 | 0.074 |

*Note: The results of the Difference-in-Differences regression from Equation (2): $Operational\ efficiency_{it} = \alpha + \mu * CPTPP_{kt} + \rho * hose * CPTPP_{kt} + \lambda * X_{ikt} + \gamma_i + \tau_t + \varepsilon_{it}$. In our study, the variable of interest, $CPTPP_{kt} * hose$, represents the additional impact of CPTPP on the operational efficiency of firms listed on HOSE (Hochiminh Stock Exchange). Our firm-level control variables include firm size, tangibility, leverage, free cash flow, GDP, delta exchange rate, and lag sales growth while the country-level independent variables are GDP growth, FDI (% GDP), inflation, and political factors as the average of the six dimensions from the WGI. We also add Capital Intensity, Profit, Investment, and Dividend for the regression on short-term operational efficiency. All firm-specific*

*variables have been subjected to a 1% winsorization followed by a logarithmic transformation. In addition, we also control for firm and year fixed effects while clustering by industry (specification 3). Industries are classified by INDC3 from Datastream following Chattopadhyay et al. (2020) and Chlomou and Demirakos (2020). The values in parentheses are p-values. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.*

Table A20: Interaction test to assess CPTPP's additional effects on operational efficiency in firms listed on HOSE (Specification 4)

| | | ln(TAT) | ln(FAT) | ln(CCC) | ln(OC) | ln(DIO) | ln(DRO) | ln(DPO) |
|---------|-----------------------------|---------------------|----------------------|---------------------|----------------------|----------------------|---------------------|-------------------|
| 1 year | CPTPP*HOSE | -0.118** (0.035) | -0.170*** (0.009) | 0.118*** (0.001) | 0.0957*** (0.001) | 0.0907*** (0.003) | 0.0515 (0.190) | 0.167* (0.067) |
| | CPTPP | -0.155* (0.074) | -0.177 (0.110) | 0.173* (0.088) | 0.193* (0.083) | 0.137 (0.418) | 0.252*** (0.006) | 0.0839 (0.529) |
| | Firm fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Year*Industry fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Cluster by industry | Y | Y | Y | Y | Y | Y | Y |
| | Controls | Y | Y | Y | Y | Y | Y | Y |
| | N | 2,120 | 2,120 | 2,120 | 2,120 | 2,120 | 2,120 | 2,120 |
| | R-squared | 0.41 | 0.211 | 0.196 | 0.202 | 0.122 | 0.185 | 0.117 |
| 2 years | CPTPP*HOSE | -0.0503 (0.408) | -0.091 (0.175) | 0.0768* (0.077) | 0.0511 (0.151) | 0.0656** (0.041) | -0.00683 (0.885) | 0.114 (0.262) |
| | CPTPP | -0.0409 (0.414) | 0.000314 (0.996) | -0.0225 (0.610) | 0.02 (0.589) | -0.0907 (0.185) | 0.108** (0.049) | -0.107 (0.254) |
| | Firm fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Year*Industry fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Cluster by industry | Y | Y | Y | Y | Y | Y | Y |
| | Controls | Y | Y | Y | Y | Y | Y | Y |
| | N | 2,840 | 2,840 | 2,840 | 2,840 | 2,840 | 2,840 | 2,840 |
| | R-squared | 0.256 | 0.34 | 0.209 | 0.219 | 0.19 | 0.218 | 0.1 |
| 3 years | CPTPP*HOSE | -0.0116 (0.824) | -0.0633 (0.330) | 0.0625* (0.079) | 0.0414 (0.173) | 0.0458 (0.145) | -0.0213 (0.646) | 0.0791 (0.378) |
| | CPTPP | -0.106* (0.072) | -0.0962 (0.255) | 0.0131 (0.816) | 0.0417 (0.361) | 0.00172 (0.982) | 0.115* (0.065) | -0.052 (0.529) |
| | Firm fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Year*Industry fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Cluster by industry | Y | Y | Y | Y | Y | Y | Y |
| | Controls | Y | Y | Y | Y | Y | Y | Y |
| | N | 3,532 | 3,532 | 3,532 | 3,532 | 3,532 | 3,532 | 3,532 |
| | R-squared | 0.202 | 0.413 | 0.223 | 0.231 | 0.2 | 0.241 | 0.098 |

*Note: The results of the Difference-in-Differences regression from Equation (2): $Operational\ efficiency_{it} = \alpha + \mu * CPTPP_{kt} + \rho * hose * CPTPP_{kt} + \lambda * X_{ikt} + \gamma_i + \tau_t + \varepsilon_{it}$. In our study, the variable of interest, $CPTPP_{kt} * hose$, represents the additional impact of CPTPP on the operational efficiency of firms listed on HOSE (Hochiminh Stock Exchange). Our firm-level control variables include firm size, tangibility, leverage, free cash flow, GDP, delta exchange rate, and lag sales growth while the country-level independent variables are GDP growth, FDI (% GDP), inflation, and political factors as the average of the six dimensions from the WGI. We also add Capital Intensity, Profit, Investment, and Dividend for the regression on short-term operational efficiency. All firm-specific variables have been subjected to a*

*1% winsorization followed by a logarithmic transformation. In addition, we also control for firm and year*industry fixed effects while clustering by industry (specification 4). Industries are classified by INDC3 from Datastream following Chattopadhyay et al. (2020) and Chlomou and Demirakos (2020). The values in parentheses are p-values. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.*

Table A21: Industries with the lowest increase in probability of default

| Industries | January 2, 2020 | January 15, 2022 | PD Change |
|----------------------------------|-----------------|------------------|-----------|
| Distributors | 1.46% | 1.47% | +1% |
| Containers & Packaging | 1.13% | 1.12% | -0% |
| Oil, Gas & Consumable Fuels | 1.40% | 1.36% | -3% |
| Food Products | 1.21% | 1.11% | -8% |
| Textiles, Apparel & Luxury Goods | 1.61% | 1.29% | -20% |
| Metal & Mining | 1.53% | 1.21% | -21% |

Note: Data from S&P Global Market Intelligence as of January 15, 2022 for the probability of default (PD) and the change of PD during the COVID-19 period.

Table A22: Interaction test to assess CPTPP's additional effects on operational efficiency in firms least affected by COVID in Vietnam (Specification 2)

| | | ln(TAT) | ln(FAT) | ln(CCC) | ln(OC) | ln(DIO) | ln(DRO) | ln(DPO) |
|---------|----------------------|----------------------|----------------------|---------------------|----------------------|---------------------|---------------------|----------------------|
| 1 year | CPTPP*least_affected | 0.0604 (0.141) | 0.063 (0.184) | -0.0211 (0.596) | -0.00473 (0.906) | -0.0705 (0.166) | 0.0284 (0.547) | -0.0813 (0.149) |
| | CPTPP | -0.279*** (0.001) | -0.348*** (0.000) | 0.256*** (0.002) | 0.252*** (0.002) | 0.253** (0.015) | 0.270*** (0.005) | 0.227** (0.049) |
| | Firm fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Year fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Controls | Y | Y | Y | Y | Y | Y | Y |
| | N | 2,120 | 2,120 | 2,120 | 2,120 | 2,120 | 2,120 | 2,120 |
| | R-squared | 0.384 | 0.16 | 0.157 | 0.165 | 0.086 | 0.165 | 0.083 |
| 2 years | CPTPP*least_affected | 0.0739** (0.048) | 0.0683 (0.121) | -0.0276 (0.451) | -0.000114 (0.998) | -0.0605 (0.194) | 0.0307 (0.473) | -0.0858* (0.087) |
| | CPTPP | -0.103** (0.034) | -0.0873 (0.129) | 0.0297 (0.535) | 0.0406 (0.407) | -0.0168 (0.783) | 0.0787 (0.159) | 0.0000452 (0.999) |
| | Firm fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Year fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Controls | Y | Y | Y | Y | Y | Y | Y |
| | N | 2,840 | 2,840 | 2,840 | 2,840 | 2,840 | 2,840 | 2,840 |
| | R-squared | 0.221 | 0.3 | 0.179 | 0.19 | 0.168 | 0.199 | 0.074 |
| 3 years | CPTPP*least_affected | 0.0890** (0.013) | 0.0935** (0.031) | -0.0547 (0.120) | -0.0283 (0.438) | -0.0823* (0.080) | 0.0159 (0.704) | -0.0955** (0.046) |
| | CPTPP | -0.154*** (0.000) | -0.181*** (0.000) | 0.0740* (0.072) | 0.0758* (0.076) | 0.0771 (0.160) | 0.0881* (0.072) | 0.0425 (0.446) |
| | Firm fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Year fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Controls | Y | Y | Y | Y | Y | Y | Y |
| | N | 3,532 | 3,532 | 3,532 | 3,532 | 3,532 | 3,532 | 3,532 |
| | R-squared | 0.154 | 0.368 | 0.188 | 0.195 | 0.177 | 0.217 | 0.074 |

Note: The results of the Difference-in-Differences regression from Equation (2): $Operational\ efficiency_{it} = \alpha + \mu * CPTPP_{kt} + \rho * least_affected * CPTPP_{kt} + \lambda * X_{ikt} + \gamma_i + \tau_t + \varepsilon_{it}$. In our study, the variable of interest, $CPTPP_{kt} * least_affected$, represents the additional impact of CPTPP on the operational efficiency of firms in industries that are least affected by COVID-19. Our firm-level control variables include firm size, tangibility, leverage, free cash flow, GDP, delta exchange rate, and lag sales growth while the country-level independent variables are GDP growth, FDI (% GDP), inflation, and political factors as the average of the six dimensions from the WGI. We also add Capital Intensity, Profit, Investment, and Dividend for the regression on short-term operational efficiency. All firm-specific variables have been subjected to a 1% winsorization followed by a logarithmic transformation. In addition, we also control for firm and year fixed effects (specification 2). The values in parentheses are p-values. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Table A23: Interaction test to assess CPTPP's additional effects on operational efficiency in firms least affected by COVID in Vietnam (Specification 3)

| | ln(TAT) | ln(FAT) | ln(CCC) | ln(OC) | ln(DIO) | ln(DRO) | ln(DPO) | |
|---------------------|----------------------|----------------------|---------------------|--------------------|---------------------|---------------------|----------------------|---------------------|
| 1 year | CPTPP*least_affected | 0.0604 (0.150) | 0.063 (0.238) | -0.0211 (0.695) | -0.00473 (0.926) | -0.0705 (0.123) | 0.0284 (0.606) | -0.0813 (0.349) |
| | CPTPP | -0.279** (0.028) | -0.348** (0.026) | 0.256* (0.053) | 0.252* (0.058) | 0.253 (0.166) | 0.270** (0.010) | 0.227 (0.206) |
| | Firm fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Year fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Cluster by industry | Y | Y | Y | Y | Y | Y | Y |
| | Controls | Y | Y | Y | Y | Y | Y | Y |
| | N | 2,120 | 2,120 | 2,120 | 2,120 | 2,120 | 2,120 | 2,120 |
| | R-squared | 0.384 | 0.16 | 0.157 | 0.165 | 0.086 | 0.165 | 0.083 |
| | 2 years | CPTPP*least_affected | 0.0739* (0.066) | 0.0683 (0.171) | -0.0276 (0.576) | -0.00011 (0.998) | -0.0605 (0.106) | 0.0307 (0.588) |
| CPTPP | | -0.103* (0.089) | -0.0873 (0.113) | 0.0297 (0.621) | 0.0406 (0.397) | -0.0168 (0.804) | 0.0787 (0.156) | 4.52E-05 (1.000) |
| Firm fixed effects | | Y | Y | Y | Y | Y | Y | Y |
| Year fixed effects | | Y | Y | Y | Y | Y | Y | Y |
| Cluster by industry | | Y | Y | Y | Y | Y | Y | Y |
| Controls | | Y | Y | Y | Y | Y | Y | Y |
| N | | 2,840 | 2,840 | 2,840 | 2,840 | 2,840 | 2,840 | 2,840 |
| R-squared | | 0.221 | 0.3 | 0.179 | 0.19 | 0.168 | 0.199 | 0.074 |
| 3 years | | CPTPP*least_affected | 0.0890* (0.056) | 0.0935 (0.107) | -0.0547 (0.274) | -0.0283 (0.581) | -0.0823** (0.015) | 0.0159 (0.778) |
| | CPTPP | -0.154** (0.023) | -0.181** (0.021) | 0.074 (0.303) | 0.0758 (0.191) | 0.0771 (0.264) | 0.0881 (0.166) | 0.0425 (0.696) |
| | Firm fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Year fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Cluster by industry | Y | Y | Y | Y | Y | Y | Y |
| | Controls | Y | Y | Y | Y | Y | Y | Y |
| | N | 3,532 | 3,532 | 3,532 | 3,532 | 3,532 | 3,532 | 3,532 |
| | R-squared | 0.154 | 0.368 | 0.188 | 0.195 | 0.177 | 0.217 | 0.074 |

*Note: The results of the Difference-in-Differences regression from Equation (2): Operational efficiency_{it} = α + μ * CPTPP_{kt} + ρ * least_affected * CPTPP_{kt} + λ * X_{ikt} + γ_i + τ_t + ε_{it}. In our study, the variable of interest, CPTPP_{kt} * least_affected, represents the additional impact of CPTPP on the operational efficiency of firms in industries that are least affected by COVID-19. Our firm-level control variables include firm size, tangibility, leverage, free cash flow, GDP, delta exchange rate, and lag sales growth while the country-level independent variables are GDP growth, FDI (% GDP), inflation, and political factors as the average of the six dimensions from the WGI. We also add Capital Intensity, Profit, Investment, and Dividend for the regression on short-term operational*

*efficiency. All firm-specific variables have been subjected to a 1% winsorization followed by a logarithmic transformation. In addition, we also control for firm and year fixed effects while clustering by industry (specification 3). Industries are classified by INDC3 from Datastream following Chattopadhyay et al. (2020) and Chlomou and Demirakos (2020). The values in parentheses are p-values. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.*

Table A24: Interaction test to assess CPTPP's additional effects on operational efficiency in firms least affected by COVID in Vietnam (Specification 4)

| | ln(TAT) | ln(FAT) | ln(CCC) | ln(OC) | ln(DIO) | ln(DRO) | ln(DPO) | |
|---------|-----------------------------|---------------------|---------------------|--------------------|--------------------|---------------------|---------------------|---------------------|
| 1 year | CPTPP*least_affected | -0.0357 (0.509) | 0.032 (0.508) | -0.0091 (0.874) | -0.021 (0.687) | -0.157** (0.025) | 0.0396 (0.563) | -0.098 (0.382) |
| | CPTPP | -0.194** (0.030) | -0.283** (0.011) | 0.239* (0.059) | 0.254** (0.034) | 0.276 (0.112) | 0.255*** (0.009) | 0.227 (0.214) |
| | Firm fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Year*Industry fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Cluster by industry | Y | Y | Y | Y | Y | Y | Y |
| | Controls | Y | Y | Y | Y | Y | Y | Y |
| | N | 2,120 | 2,120 | 2,120 | 2,120 | 2,120 | 2,120 | 2,120 |
| | R-squared | 0.406 | 0.204 | 0.191 | 0.199 | 0.123 | 0.184 | 0.112 |
| 2 years | CPTPP*least_affected | -0.0407 (0.442) | 0.0027 (0.952) | 0.0282 (0.490) | 0.0252 (0.484) | -0.0799 (0.140) | 0.104* (0.094) | -0.0381 (0.700) |
| | CPTPP | -0.0437 (0.274) | -0.0483 (0.294) | 0.00137 (0.981) | 0.0322 (0.517) | -0.0113 (0.864) | 0.0447 (0.421) | -0.0259 (0.808) |
| | Firm fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Year*Industry fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Cluster by industry | Y | Y | Y | Y | Y | Y | Y |
| | Controls | Y | Y | Y | Y | Y | Y | Y |
| | N | 2,840 | 2,840 | 2,840 | 2,840 | 2,840 | 2,840 | 2,840 |
| | R-squared | 0.255 | 0.338 | 0.207 | 0.219 | 0.189 | 0.219 | 0.097 |
| 3 years | CPTPP*least_affected | -0.0397 (0.488) | 0.000153 (0.998) | 0.0152 (0.731) | 0.013 (0.768) | -0.101 (0.228) | 0.105 (0.147) | -0.0112 (0.915) |
| | CPTPP | -0.0887* (0.054) | -0.129** (0.038) | 0.037 (0.554) | 0.0558 (0.300) | 0.084 (0.388) | 0.0427 (0.509) | -0.00416 (0.970) |
| | Firm fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Year*Industry fixed effects | Y | Y | Y | Y | Y | Y | Y |
| | Cluster by industry | Y | Y | Y | Y | Y | Y | Y |
| | Controls | Y | Y | Y | Y | Y | Y | Y |
| | N | 3,532 | 3,532 | 3,532 | 3,532 | 3,532 | 3,532 | 3,532 |
| | R-squared | 0.202 | 0.413 | 0.222 | 0.231 | 0.201 | 0.241 | 0.097 |

*Note: The results of the Difference-in-Differences regression from Equation (2): $Operational\ efficiency_{it} = \alpha + \mu * CPTPP_{kt} + \rho * least_affected * CPTPP_{kt} + \lambda * X_{ikt} + \gamma_i + \tau_t + \varepsilon_{it}$. In our study, the variable of interest, $CPTPP_{kt} * least_affected$, represents the additional impact of CPTPP on the operational efficiency of firms in industries that are least affected by COVID-19. Our firm-level control variables include firm size, tangibility, leverage, free cash flow, GDP, delta exchange rate, and lag sales growth while the country-level independent variables are GDP growth, FDI (% GDP), inflation, and political factors as the average of the six dimensions from the WGI. We also add Capital Intensity, Profit, Investment, and Dividend for the regression on short-term operational*

*efficiency. All firm-specific variables have been subjected to a 1% winsorization followed by a logarithmic transformation. In addition, we also control for firm and year*industry fixed effects while clustering by industry (specification 4). Industries are classified by INDC3 from Datastream following Chattopadhyay et al. (2020) and Chlomou and Demirakos (2020). The values in parentheses are p-values. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.*

Table A25: Impact of CPTPP on short-term operational ratios of firms in Vietnam

| | | (2) | | | (3) | | | (4) | | |
|-----------|-----------------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| | | ln(inv_turn) | ln(rec_turn) | ln(pay_turn) | ln(inv_turn) | ln(rec_turn) | ln(pay_turn) | ln(inv_turn) | ln(rec_turn) | ln(pay_turn) |
| 1 year | <i>CPTPP</i> | -0.201** | -0.281*** | -0.155 | -0.201 | -0.281*** | -0.155 | -0.168 | -0.277*** | -0.144 |
| | | (0.033) | (0.002) | (0.141) | (0.233) | (0.006) | (0.284) | (0.289) | (0.007) | (0.326) |
| | Firm fixed effects | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| | Year fixed effects | Y | Y | Y | Y | Y | Y | N | N | N |
| | Year*Industry fixed effects | N | N | N | N | N | N | Y | Y | Y |
| | Cluster by industry | N | N | N | Y | Y | Y | Y | Y | Y |
| | Controls | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| | N | 2,120 | 2,120 | 2,120 | 2,120 | 2,120 | 2,120 | 2,120 | 2,120 | 2,120 |
| R-squared | 0.094 | 0.167 | 0.086 | 0.094 | 0.167 | 0.086 | 0.134 | 0.187 | 0.116 | |
| 2 years | <i>CPTPP</i> | 0.0762 | -0.0798 | 0.0734 | 0.0762 | -0.0798 | 0.0734 | 0.0811 | -0.0863 | 0.0721 |
| | | (0.148) | (0.105) | (0.193) | (0.207) | (0.160) | (0.375) | (0.196) | (0.132) | (0.381) |
| | Firm fixed effects | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| | Year fixed effects | Y | Y | Y | Y | Y | Y | N | N | N |
| | Year*Industry fixed effects | N | N | N | N | N | N | Y | Y | Y |
| | Cluster by industry | N | N | N | Y | Y | Y | Y | Y | Y |
| | Controls | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| | N | 2,840 | 2,840 | 2,840 | 2,840 | 2,840 | 2,840 | 2,840 | 2,840 | 2,840 |
| R-squared | 0.182 | 0.199 | 0.075 | 0.182 | 0.199 | 0.075 | 0.205 | 0.219 | 0.1 | |
| 3 years | <i>CPTPP</i> | -0.0202 | -0.0575 | 0.00651 | -0.0202 | -0.0575 | 0.00651 | -0.0144 | -0.0567 | 0.00981 |
| | | (0.615) | (0.115) | (0.872) | (0.757) | (0.254) | (0.923) | (0.831) | (0.261) | (0.886) |
| | Firm fixed effects | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| | Year fixed effects | Y | Y | Y | Y | Y | Y | N | N | N |
| | Year*Industry fixed effects | N | N | N | N | N | N | Y | Y | Y |
| | Cluster by industry | N | N | N | Y | Y | Y | Y | Y | Y |
| | Controls | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| | N | 3,532 | 3,532 | 3,532 | 3,532 | 3,532 | 3,532 | 3,532 | 3,532 | 3,532 |
| R-squared | 0.191 | 0.218 | 0.081 | 0.191 | 0.218 | 0.081 | 0.217 | 0.241 | 0.104 | |

*Note: The results of the Difference-in-Differences regression from Equation (1): $Operational\ efficiency_{it} = \beta_1 * Post_{it} + \beta_2 * Treat_{it} + \mu * CPTPP_{kt} + \lambda * X_{ikt} + \gamma_i + \tau_t + \varepsilon_{it}$. In this regression, the variable of interest, CPTPP, represents the impact of Vietnam's participation in the agreement on the country's operational efficiency. Our firm-level control variables include firm size, tangibility, leverage, free cash flow, Capital Intensity, Profit, Investment, Dividend, GDP, delta exchange rate, and lag sales growth while the country-level independent variables are GDP growth, FDI (% GDP), inflation, and political factors as the average of the six dimensions from the WGI. All firm-specific variables have been subjected to a 1% winsorization followed by a logarithmic transformation. Furthermore, we employed various fixed effects and clustering approaches in our regression analysis. In Specification (2), we incorporated both firm and year fixed effects to account for firm-specific characteristics and temporal variations. In Specification (3), we extended our control variables to include firm and year fixed effects while also clustering by industry to account for industry-specific characteristics and correlations. Finally, in Specification (4), we controlled for firm and year*industry fixed effects providing a more refined control for the interaction between temporal variations and industry-specific factors. Clustering by industry was also maintained in this specification to account for potential correlations within industries. Industries are classified by INDC3 from Datastream following Chattopadhyay et al. (2020) and Chlomou and Demirakos (2020). The values in parentheses are p-values. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.*

| | Ln (Assets) | Ln (Tangibility) | Ln(Capital intensity) | Ln (Profit) | Ln (Leverage) | Ln (Investment) | Ln (Dividend) | Free Cash Flow | Ln (GDP) | Ln(D_Exchange rate) | Ln(L.Sale growth) | Ln (FDI(%GDP)) | Ln(GDP Growth) | Ln (Inflation) |
|--------------------------|----------------|---------------------|--------------------------|----------------|------------------|--------------------|------------------|----------------------|-------------|------------------------|----------------------|-------------------|-------------------|-------------------|
| Ln(Assets) | 1.00 | | | | | | | | | | | | | |
| Ln(Tangibility) | -0.06 | 1.00 | | | | | | | | | | | | |
| Ln(Capital intensity) | -0.04 | 0.67 | 1.00 | | | | | | | | | | | |
| Ln(Profit) | -0.03 | 0.07 | -0.02 | 1.00 | | | | | | | | | | |
| Ln(Leverage) | -0.22 | 0.03 | -0.14 | -0.13 | 1.00 | | | | | | | | | |
| Ln(Investment) | -0.12 | 0.47 | 0.31 | 0.27 | -0.09 | 1.00 | | | | | | | | |
| Ln(Dividend) | -0.22 | 0.01 | 0.01 | 0.19 | -0.13 | 0.14 | 1.00 | | | | | | | |
| Free Cash Flow | -0.03 | -0.13 | -0.09 | 0.35 | -0.12 | -0.24 | -0.02 | 1.00 | | | | | | |
| Ln(GDP) | -0.45 | -0.12 | -0.06 | -0.05 | -0.13 | 0.09 | 0.23 | 0.00 | 1.00 | | | | | |
| Ln(D_Exchange rate) | -0.03 | 0.01 | -0.02 | 0.07 | 0.02 | 0.02 | -0.03 | 0.02 | -0.04 | 1.00 | | | | |
| Ln(L.Sale growth) | -0.04 | -0.03 | -0.07 | 0.21 | -0.01 | 0.16 | 0.07 | 0.04 | 0.09 | 0.21 | 1.00 | | | |
| Ln(FDI(%GDP)) | -0.44 | -0.02 | -0.04 | 0.03 | 0.11 | -0.12 | -0.12 | -0.02 | -0.57 | -0.09 | -0.08 | 1.00 | | |
| Ln(GDP Growth) | -0.03 | -0.07 | -0.07 | 0.04 | -0.02 | 0.04 | 0.02 | 0.00 | 0.27 | 0.02 | 0.08 | -0.02 | 1.00 | |
| Ln(Inflation) | -0.13 | -0.03 | -0.06 | 0.12 | 0.07 | -0.03 | -0.12 | 0.02 | -0.07 | 0.42 | 0.09 | 0.33 | 0.01 | 1.00 |

Figure A1: Correlation matrix of all independent variables

Note: Correlation matrix of all independent variables in this study.

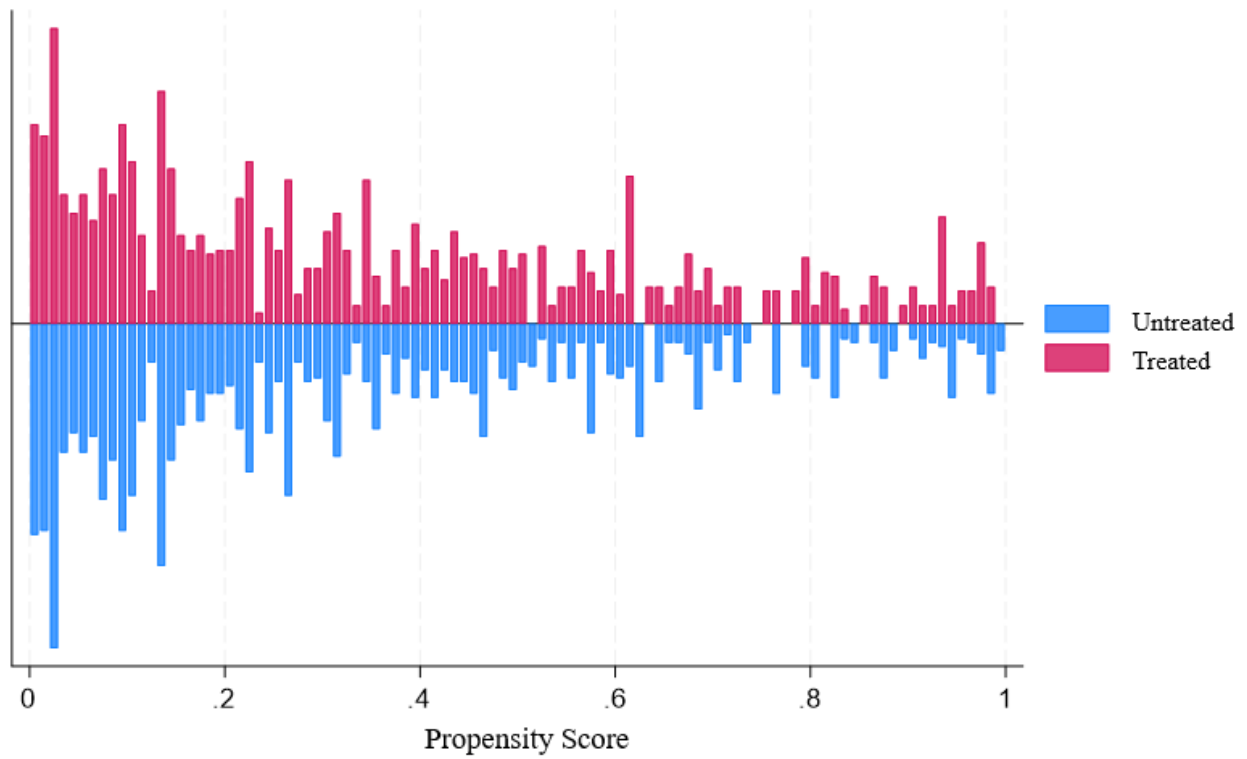


Figure A2: Propensity score distribution

Note: Visualization of the overlap, density, and balance between the treated and untreated groups.

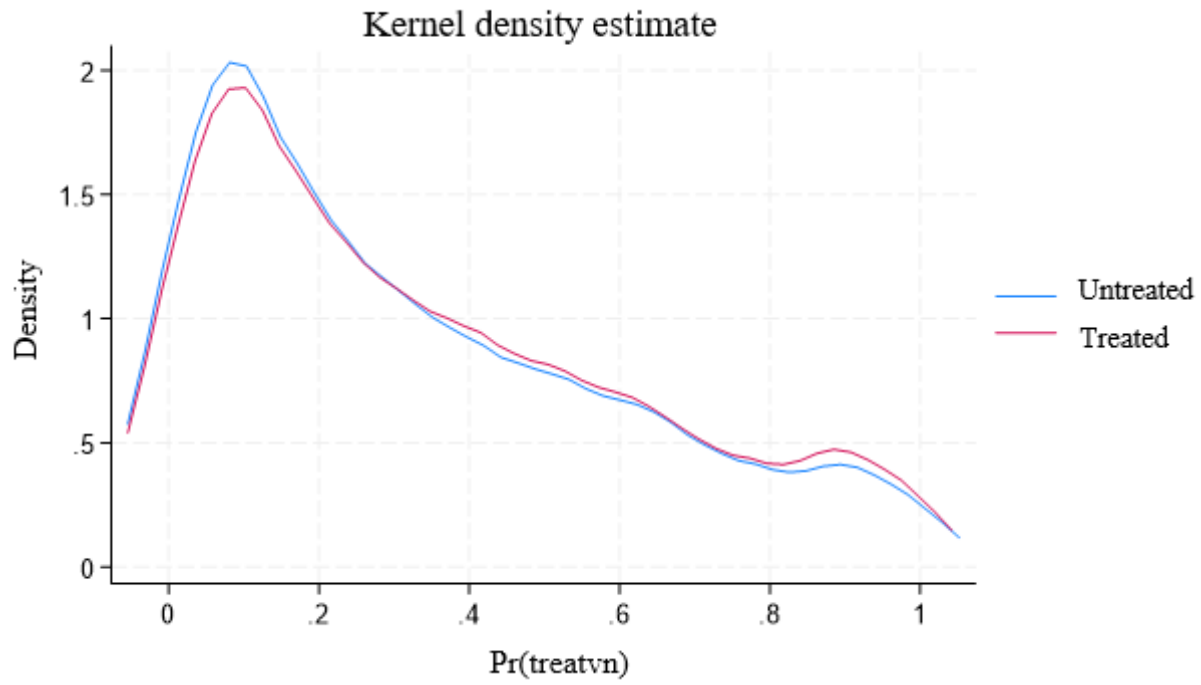


Figure A3: Kernel density estimate

Note: Kernel density estimate representing the density of the probability of being treated (firms in Vietnam) for both treated and untreated groups in the matched sample.

Chapter Four - Essay Three: Long-term orientation and innovation: Influence of CPTPP on R&D investment in Japanese firms

Abstract

Free Trade Agreements (FTAs) have significantly influenced global economic landscapes, yet their detailed impact on firm-level R&D investment remains less explored. This paper delves into the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP), with a particular focus on its Chapter 18 provisions regarding intellectual property rights, to understand their influence on R&D activities within Japanese firms. Employing a PSM-DiD framework to compare Japan with other East Asian economies from 2015-2022, our study finds that enhanced intellectual property protections under the CPTPP encourage R&D investments. However, this positive effect is balanced by the effects of market expansion leading to a mixed overall impact on R&D intensity and efficiency. The research also uncovers sector-specific responses. Manufacturing firms, in line with Japan's cultural focus on long-term planning, experience an increase in R&D activities. Service and technology sectors initially decrease their R&D investments, a trend that shifts positively with strategic adjustments. Financially constrained firms show a reduction in R&D investments initially, which lessens over time, while high sales growth firms consistently increase their R&D activities buoyed by strong internal financing. These dynamics are interpreted within the context of the Pecking Order Theory and Japan's cultural inclination toward long-term planning providing insights into the complex relationships between international trade agreements and corporate R&D strategies.

Keywords: Research and Development, CPTPP, PSM-DID, multi-regional competition, long-term orientation

4.1. Introduction

Free Trade Agreements (FTAs) are the cornerstones in international economic policy reducing trade barriers to catalyze growth across member nations. Among these, the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP) stands out as a transformative multilateral FTA that significantly alters the economic landscape for its participants. Broadly, FTAs like the CPTPP serve as catalysts for economic expansion by fostering trade, increasing national welfare, and facilitating overall economic development (Goodman & Kaempfer, 1993; Shah et al., 2022; Sohn & Lee, 2010). Moreover, these agreements provide platforms to negotiate and harmonize trade-related regulations and standards (Lim et al., 2012). While the existing literature delves into FTA impacts on an array of firm-level metrics, such as trade balance, productivity, and profitability (Baggs & Brander, 2006; Hussain & Ali Shah, 2022; Lin, 2015; Shah et al., 2022; Zhou et al., 2023), the impact on R&D investment remains notably underexplored. This study seeks to fill this gap by investigating the influence of the CPTPP on R&D investment within Japanese firms, a vital aspect for a long-term competitive advantage in today's knowledge-based economies (Aaboen et al., 2006; Adomako & Nguyen, 2023; Holmstrom, 1989).

Distinct from conventional Free Trade Agreements, the CPTPP represents a significant evolution in the scope and nature of international economic policy. In an era increasingly dominated by digitalization and technological advancements, traditional FTAs often fall short in addressing the complexities of the digital economy. The CPTPP, as one of the most recent and forward-thinking FTAs, fills this crucial gap by incorporating comprehensive provisions that cater to the digital age (Burri, 2018; Nakatomi, 2019). It goes beyond the traditional focus of reducing trade barriers encompassing regulations that are pivotal in the digital era, such as digital trade, e-commerce, and the digitalization of services (Mishra & Valencia, 2023). This expanded focus makes the CPTPP a critical instrument in shaping the economic strategies of its member countries by aligning them with the realities of a rapidly evolving global economy. By integrating regulations that address the digital aspects of trade, the CPTPP sets the stage for a more holistic approach to international trade, one that is attuned to the needs of modern economies and fosters an environment conducive to innovation and digital advancement.

Chapter 18 of the CPTPP, a 75-page document, serves as a foundational cornerstone for intellectual property rights protection among member countries¹¹. Notably, the chapter has specific implications for a wide range of industries. For instance, in the realm of digital services, it sets a framework for protecting proprietary algorithms and software designs, crucial elements in sectors like fintech and healthcare technology. In manufacturing, the chapter safeguards the rights to proprietary designs and technologies serving as a boon for industries like automotive engineering and advanced robotics. The chapter comprehensively covers multiple forms of intellectual property, such as patents, trademarks, and copyrights, balancing the rights of intellectual property holders against public interests. By standardizing registration procedures, fortifying protection mechanisms, and extending the life of copyrights, Chapter 18 creates an environment that encourages technological and creative innovation across diverse sectors. Additionally, the chapter has provisions for the protection of trade secrets and prescribes civil, administrative, and criminal enforcement measures to ensure these rights are respected (Wang, 2022).

From its rapid economic recovery in the aftermath of World War II to its ascent as a technological giant by the 1980s, Japan has had a remarkable course. Economic initiatives like the “income-doubling plan” of the 1960s yielded impressive annual growth rates, soaring well above 10%, which helped catapult Japan into a position of global technological leadership (Kotabe, 2020). However, as the world transitioned into the digital age from the 1990s onward, Japan found it challenging to keep pace with the fast-evolving information technology landscapes. Unlike U.S. firms, which adopted flexible, “asset-light” strategies (i.e., they minimized ownership of physical assets like factories), Japanese companies remained tied to their traditional, asset-heavy approaches (Kotabe, 2020). This put Japanese firms at a disadvantage, especially in an era characterized by rapid technological changes and unstable global economic growth. In contrast to the rise of “factoryless” manufacturers like Apple, Japan has been a leader in sectors that heavily invest in R&D, such as robotics and automotive

¹¹ Zip file of all 30 chapters, which are listed separately can be found here (<https://www.mfat.govt.nz/en/trade/free-trade-agreements/free-trade-agreements-in-force/cptpp/comprehensive-and-progressive-agreement-for-trans-pacific-partnership-text-and-resources/>)

technology. Companies like Toyota and Sony have been at the forefront of innovation in these areas, continuing to advance in fields like autonomous vehicles and consumer electronics. Despite this, the overall trend in Japan has been a struggle to maintain the pace of technological innovation seen in earlier decades (Usui et al., 2017). Against this backdrop, the CPTPP offers Japan a unique opportunity. With its robust Chapter 18 focusing on intellectual property rights, the agreement could serve as a catalyst for Japan to revitalize its capacity for technological innovation. Given the country's historical prowess and its recent slump in patent registrations, the CPTPP could help Japan reclaim its lost brilliance and a greater share of global patent registrations.

Japan's R&D landscape, once a beacon of global technological leadership, has faced challenges in maintaining its innovative edge, particularly since the 1990s. The advent of the CPTPP, however, presents a unique opportunity for rejuvenation. The agreement's stringent focus on patent protection, as encapsulated in Chapter 18, is not just about safeguarding existing patents; it's about fostering an environment conducive to new innovations and R&D investment. Despite a current lull in patent registrations, the enhanced IP framework of the CPTPP can act as a catalyst for Japanese firms to reinvigorate their R&D strategies, particularly in fast-evolving sectors like digital technology. The CPTPP's robust IP rights protection reassures firms that their innovations will be safeguarded, thus incentivizing them to invest in new research and development initiatives. Furthermore, the agreement opens avenues for international collaboration and technology transfer providing Japanese firms with access to new ideas and technologies that can be crucial for developing groundbreaking patents. In this way, the CPTPP can help Japan to not only reclaim its position in global patent registrations, but also to adapt its R&D approaches to the demands of the contemporary digital economy.

In academic circles, Japan, Korea, and Taiwan are often considered in tandem due to their analogous cultural, economic, and industrial profiles (Hamilton et al., 1988; Dahlgaard et al., 1998; Hung et al., 2008). While Japan is a participant in the CPTPP, Korea and Taiwan serve as peers in this study. Situated in East Asia and distinguished by their technological prowess, these nations provide an insightful comparative backdrop for evaluating the CPTPP's impact on

Japan.¹² Though sometimes labeled as emerging markets, they feature high per capita incomes, cutting-edge technologies, and robust Human Development Index (HDI) scores. Existing research commonly groups these countries because of their similar economic trajectories and industrial landscape. Crucially, all three nations score the highest on Hofstede's long-term orientation dimension underscoring societal values that favor future readiness and long-term planning (Hofstede, 2011). This cultural homogeneity fortifies the methodological rigor of the study, thereby reducing selection bias and enhancing the credibility of employing a DiD framework as an alternative for RCT. In summary, examining Japan while contrasting it with peer nations like Korea and Taiwan within the CPTPP context offers a rich platform for exploring the agreement's broader implications in a methodologically sound and culturally consistent manner.

In this study, we utilize a comprehensive firm-level dataset spanning from 2015-2022 to examine the impact of the CPTPP on R&D operations in Japanese firms. The methodology employed is the PSM-DiD model, a robust approach to establish causal inference in scenarios where RCTs are impractical, such as in the realm of international trade agreements. This model allows for a detailed analysis by matching Japanese firms with counterparts in non-CPTPP countries like South Korea creating a control group for comparison. Additionally, the DiD technique enables a longitudinal assessment examining the changes in R&D activities before and after the implementation of CPTPP. Key metrics in our analysis include R&D Intensity, the ratio of R&D expenditures to total assets, and R&D Efficiency, the R&D expenditures-to-sales ratio. These measures, as highlighted by Chun et al. (2014) and Alam et al. (2019), respectively, are integral in evaluating the depth and effectiveness of the firms' R&D endeavors. By focusing on these metrics, we seek to provide a comprehensive assessment as to how the CPTPP influences the R&D landscape among Japanese firms in comparison to their counterparts in culturally and economically analogous nations like South Korea and Taiwan.

Our study reveals a complex interaction between the CPTPP and the R&D dynamics of Japanese firms. The primary finding of our investigation reveals an indeterminate aggregate impact on R&D operations. While the CPTPP's increased intellectual property protections serve to elevate R&D investment, this positive influence is counterbalanced by the challenges of simultaneous

¹² Geographical proximity in choosing control countries following Jayaraman (2012).

market expansion. This results in a complex effect on key metrics like R&D intensity and efficiency highlighting the multifaceted nature of the CPTPP's impact on corporate R&D activities in Japan. This core result underscores the balance between enhanced legal protections for intellectual property and the broadened market exposure brought about by the CPTPP.

Our study's sector-specific analysis of the CPTPP's impact on Japanese firms yields strikingly divergent patterns of R&D investment across asset-intense and asset-light industries providing novel insights into the multifaceted role of modern FTAs. Traditionally, FTAs are perceived to influence primarily asset-intense industries, such as manufacturing, which, in our study, aligns with Japan's long-term orientation toward technological innovation showing an increase in R&D activities post-CPTPP. However, a compelling narrative emerges with the asset-light sectors, technology-oriented and service-oriented industries, which initially demonstrate a reduction in R&D expenditures, a trend that eventually reverses, indicating that other are firms catching up and the future-focused characteristics of long-term orientation culture. This initial decline, followed by recovery in R&D investment among asset-light industries, suggests a complex and possibly transformative impact of the CPTPP. Contrary to traditional FTAs, the CPTPP showcases its influence on these modern, less tangible sectors reflecting its broader economic implications. Furthermore, financially constrained firms exhibit a similar pattern of initial decline and subsequent recovery in R&D activities, while high sales growth firms consistently expand their R&D operations underscoring the diverse responses elicited by the CPTPP across various corporate segments. These findings, contextualized within frameworks like the Pecking Order Theory and cultural dimensions, not only complement our primary results, but also significantly contribute to the understanding of how contemporary trade agreements like the CPTPP affect R&D operations in both asset-intense and asset-light sectors, challenging and expanding the traditional view of FTAs' role in global trade and industry.

The remainder of this paper is organized as follows. Section 2 provides a comprehensive literature review. Section 3 presents the development of our hypotheses. Section 4 outlines the data, methodology, and empirical results for this study. Finally, Section 5 concludes the paper, summarizing the findings and discussing their implications. The references supporting this study are listed in Section 6.

4.2. Literature review

4.2.1. Japanese business model and the climate of time

The Japanese business model of the 1950s and 1960s was marked by a visionary macroeconomic policy and unique management practices that fueled rapid growth. Initiated by Prime Minister Hayato Ikeda in 1960, the famous "income-doubling plan" aimed to double the national income level within a decade requiring an ambitious annual growth rate of approximately 7.2% (Bytheway, 2023; Okita, 1989; Tsuda, 2023). This policy was diligently pursued by his successor, Eisaku Sato, and resulted in an average annual growth rate exceeding 10% during the latter half of the 1960s (Hoshiro, 2022; Masumi, 1988; Smith, 1995). These strategies elevated Japan to an economic powerhouse comparable to China's rapid ascent since the 1990s. Alongside these macroeconomic policies, distinctive management concepts, such as "lifetime commitment" and "nenkō system" (seniority-based wages), took shape (Hashimoto, 1979). Coined by James Abegglen in his 1958 book (Abegglen, 1958), "The Japanese Factory," these practices reflected a unique corporate culture that emphasized long-term employment and incremental salary increases (Levine, 1958). Together, these elements coalesced to form a business model that excelled in a growth-oriented economic environment after World War II.

The global economy's robust growth during the 1980s provided a fertile backdrop for Japanese firms, whose management philosophies were highly regarded and emulated worldwide. Companies like Sony, Panasonic, and Toyota became household names, not only due to their focus on manufacturing excellence and innovation, but also due to their distinct management styles (Asakawa et al., 2013). These firms largely belonged to major industrial "keiretsu" groups, such as Mitsui, Sumitomo, and Mitsubishi, which represented only about 25% of Japan's top-tier labor force, but had a disproportionate impact on global perceptions of Japanese business (Kotabe, 2020). The practices within these firms, such as lifetime employment and seniority-based wages, were mistaken as universally Japanese though they were confined primarily to these large conglomerates. Management scholars like Ezra Vogel legitimized the effectiveness of these practices in works like "Japan as Number One: Lessons for America" further solidifying the world's admiration for Japanese management (Whyte, 2023). Numerous Japanese management principles gained international recognition including concepts like stakeholder orientation, just-in-time inventory systems, lean manufacturing, collaborative teamwork,

employee suggestion mechanisms, keiretsu business networks, continuous improvement (kaizen), consensus-building (nemawashi), and the ringi decision-making system, as well as the lifetime employment and seniority-based wage structures (Kotabe, 2020). On a macro level, Japan's economic policies and business practices led to an almost unstoppable asset appreciation exemplified by the fact that by 1988, Japan's land value was reported to be four times that of all the land in the United States (Kotabe, 2020). The confluence of these factors made Japanese technology firms seemingly invincible competitors on the global stage until the early 1990s.

In the aftermath of the 1990s, Japan faced substantial challenges in adapting to the fast-paced, ever-evolving landscape of information technology. While the country had been a leader in technology and innovation until the early 1990s, its reluctance to depart from traditional business models and practices created an inertia that slowed its ability to pivot toward the new digital age (Kotabe, 2020). American firms, in contrast, were quick to adopt “asset-light” strategies and integrated information technology comprehensively into their operations, thereby gaining a competitive edge in efficiency and scalability (Hoppe & Nedzhvetskaya, 2023). One factor that further hindered Japan's transition was its high-context culture that emphasized stable and close personal relationships (Bush, 1991). This cultural characteristic made Japanese firms less inclined to adopt the impersonal modes of communication and operation that were facilitated by information technology. Furthermore, Japanese companies often mistook their early successes in fields like personal computers as indicators that their traditional approaches could seamlessly transition into the new digital era. In this sense, the very strengths that had made Japan a technological giant, like lifetime employment, seniority-based pay, and close-knit corporate families or “keiretsu,” became liabilities in a global environment that started to value agility, adaptability, and disruptive innovation.

While the West, particularly the United States, saw the advent of companies like Google, Apple, and Amazon that redefined the contours of technology and commerce, Japan struggled to produce equivalents that could compete on a global stage. Even NEC, which had introduced its first personal computer system two years before IBM did in the United States and had set the standard for PCs in Japan in the 1980s (West & Dedrick, 2000), was slow to capitalize on the sweeping changes brought about by the digital age. Despite having first-mover advantages in several areas of technology, Japanese firms found themselves culturally and structurally ill-

equipped to harness the transformative power of IT fully. Thus, Japan's failure to adapt quickly to the new digital paradigm can be seen as a byproduct of both cultural inertia and a certain degree of corporate hubris stemming from past successes that led to an underestimation of the disruptive changes that were reshaping the global economic landscape.

In the current era marked by globalization and rapid technological shifts, new business paradigms are even challenging traditional approaches. Companies like Apple and Uniqlo stand as testament to this transformation operating as "factoryless" manufacturers who outsource production, but maintain stringent quality control and high customer satisfaction (Bernard & Fort, 2015; Kotabe, 2020; Xing, 2020). This adaptability is emblematic of modern global business and poses a significant challenge to Japan's traditional, asset-heavy firms (Cha, 2020). For example, as of December 2014, Xiaomi Inc., a Chinese consumer electronics company that operates on a factoryless model and was founded in 2010, held the title of the world's most highly valued startup (Cha, 2020). At this pivotal juncture, the CPTPP offers Japan a unique opportunity for revitalization. Chapter 18 of the CPTPP focuses intensely on intellectual property rights and could serve as a catalyst for reigniting Japan's innovative capacity and is especially relevant given the country's recent decline in patent registrations. By capitalizing on the protections and opportunities provided by the CPTPP, Japanese firms have the chance to transform their strategies, reclaim their global standing in innovation, and navigate the complexities of today's fast-paced business environment.

4.2.2. Economic impacts of the CPTPP

The CPTPP evolved from the original Trans-Pacific Partnership (TPP) after the U.S. withdrew its participation. The accord was formally signed by the remaining 11 members including Australia, Canada, and Japan on March 8, 2018 in Santiago, Chile. Grounded in the theory of Comparative Advantage, the agreement sought to optimize the allocation of resources across countries by allowing each to specialize in sectors where they hold a relative advantage. This was expected to stimulate both trade and capital flows by offering potentially higher returns on investments and new opportunities in the financial markets. By the end of that year, the agreement had been implemented among the first eight signatories, one of which was Japan. Collectively, the CPTPP countries account for 13% of the global GDP amassing a combined £11 trillion as of 2023 (UK Government, 2023). The CPTPP continues to grow as evidenced by the

UK initiating its accession process in 2021. As New Zealand assumes the chairmanship of the CPTPP in 2023, the agreement's influence on global trade appears poised to expand further (New Zealand Ministry of Foreign Affairs and Trade, 2023).

Extant research provides robust evidence regarding the macro and microeconomic implications of Free Trade Agreements (FTAs), insights that are critical to understanding the impact of the CPTPP. On the macroeconomic front, Goodman and Kaempfer (1993) offer seminal work illustrating how FTAs, exemplified by the Canada-U.S. agreement, enhance both domestic and global welfare with a particular focus on the role of quotas. In a similar vein, Shah et al. (2022) corroborates these welfare gains in their examination of the China-Pakistan FTA. Utilizing the “trade structure” framework conceived by Lederman and Maloney (2003), Sohn and Lee (2010) employ panel estimations to affirm that such agreements unequivocally promote economic growth.

Turning to microeconomic dimensions, Baggs and Brander (2006) demonstrate how tariff adjustments following the Canada-U.S. FTA have direct repercussions on firm profits and capital structure contingent on export orientation. This notion is extended by Hussain and Ali Shah (2022) who find that shifts in trade policy can have a double-edged impact on firm profitability and dividend distribution, especially when firms encounter heightened competition. Finally, Lin (2015) alerts us to the potential dark side of FTAs showing an increased incidence of financial restatements and earnings manipulation post-tariff reductions. Their findings echo the “Fraud Triangle” theory of Cressey (1954) and are in concert with Shleifer’s (2004) argument that intensified competition can sometimes prompt unethical corporate behavior.

4.2.3. Technology and culture in East Asian countries

In the realm of international trade agreements, the impact of the CPTPP varies significantly across diverse economic landscapes. While the focus of emerging countries like Vietnam may lie primarily in enhancing operational efficiency as it shifts from an agrarian to a manufacturing-based economy, the heart of this paper is an in-depth exploration of Japan, a developed nation with a robust R&D infrastructure. Japan provides a rich context for studying the implications of the CPTPP, especially in terms of intellectual property rights. Given its historical prominence in patent registrations and technological innovation (Kiyota & Okazaki, 2005), an examination of

Japan's R&D policies in the post-CPTPP environment becomes particularly salient. Investigating how the CPTPP reshapes Japan's approach to innovation incentives, IP norms, and regulatory frameworks can yield critical insight into the evolving incentives and constraints facing developed economies.

In exploring the dimension of long-term cultural orientation, Halder et al. (2020) argue that such a perspective shapes consumer values toward green consumption, fostering ethical sustainable consumption choices, and innovation with an eye on future benefits. Similarly, Boubakri et al. (2021), Pelau and Pop (2018), and Durach and Wiengarten (2017) demonstrate that environmental management practices, when aligned with a long-term cultural dimension, enhance a country's environmental efficiency. Consequently, the long-term orientation index appears to correlate positively with the advancement of a green innovation and technology (Okereke et al., 2019, Chen et al., 2017).

In selecting suitable control countries for our quasi-natural experiment using the DiD method, Taiwan and South Korea emerge as particularly apt control groups in juxtaposition with Japan. Both countries are geographically proximate to Japan and are renowned for their contributions to high technology sectors. More importantly, neither Taiwan nor South Korea are members of the CPTPP, thereby establishing them as suitable counterfactuals for assessing the impact of the agreement on Japan's R&D sector. This is congruent with the methodological framework employed by prior studies such as Jayaraman (2012) where geographical proximity was the primary factor in selecting control countries. Existing scholarly discourse further underscores comparative analyses between Japan and South Korea, as well as Taiwan, in the context of R&D and innovation-related topics (Hu, 2012; Hung & Tang, 2008; K. Lee & Yoon, 2010; Nakata et al., 2006; Sakakibara & Cho, 2002).

Moreover, it is essential to consider the diverse economic statuses of Taiwan and South Korea. Although occasionally classified as emerging markets, both nations exhibit advanced stages of economic development comparable to Japan including robust technology sectors, high per capita income, and sophisticated infrastructures. Furthermore, as delineated by Hofstede's (2011) cultural dimensions framework, Japan, Taiwan, and South Korea are all classified as long-term orientation countries, introducing another layer of cultural congruence that enhances their

suitability as control countries. These elements render Taiwan and South Korea as more than just nominal controls; they establish them as fundamentally comparable counterparts for studying how the CPTPP affects technological innovation and intellectual property rights in Japan. Consequently, the selection of Taiwan and South Korea as control groups enriches scholarly dialogue and offers pivotal policy insights into the impacts of the CPTPP on developed economies.

4.3. Hypothesis development

4.3.1. General impact of CPTPP on R&D operations of Japanese firms

As we explore the ramifications of the CPTPP on the R&D operations of Japanese firms, particular attention is paid to Chapter 18 focused on Intellectual Property Rights (IPR) protections. Given Japan's historical role as a technological powerhouse from the 1950s to the early 1990s, the CPTPP, and its enhanced IPR framework, may serve as a strategic lever for rejuvenating its R&D landscape.

However, the CPTPP acts as a double-edged sword exerting complex effects on key R&D metrics, such as R&D intensity and R&D efficiency. The bolstered IPR protections in Chapter 18 could catalyze increased R&D investments (Sanyal, 2004; Varsakelis, 2001) potentially augmenting the numerator in R&D-related ratios. Conversely, the expanded market access granted by the FTA like CPTPP (Shadlen, 2005) could amplify firm revenues and total assets affecting the denominators in these same ratios. This dynamic is further complicated by the growing prominence of “factoryless” production models (Bernard & Fort, 2015; Kotabe, 2020; Xing, 2020). As emerging manufacturing hubs become part of the CPTPP (e.g., Vietnam, Indonesia) (Lee & Wong, 2004), Japanese firms may consider international subsidiaries necessitating further fixed asset investments and subsequently inflating total assets.

Considering these counterbalancing forces, we postulate the following hypothesis:

H1: The net impact of the CPTPP on R&D operations in Japanese firms is indeterminate due to opposing forces.

4.3.2. Additional impact of CPTPP on R&D operations of manufacturing firms

Building upon the foundational “neoclassical growth theory” from Solow (1979), which posits technological innovation as a key driver of economic growth, we argue that the manufacturing sector in Japan serves as more than just an economic participant. It acts as a catalyst for technological advancements that underpin productivity and economic development. This perspective is further enriched by Hofstede's (2011) concept of Long-Term Orientation suggesting that cultures like Japan, which prioritize long-term strategic planning, are predisposed to invest in R&D. In this context, the CPTPP, particularly its Chapter 18, emerges as a critical factor shaping Japan's manufacturing strategies.

Notably, Chapter 18 of the CPTPP provides a unique opportunity for Japan to reassert its technological leadership in a global landscape increasingly dominated by Western nations. Beyond its role as a trade accord, the CPTPP functions as a multifaceted ecosystem that not only facilitates market expansion, but also inherently mandates innovation and product adaptation. Within this complex milieu, elements ranging from regulatory policies to consumer behavior and environmental considerations compel targeted R&D investments. Specifically, Chapter 18 includes provisions that safeguard proprietary designs and technologies (Mishra & Valencia, 2023) offering a significant advantage to industries like automotive engineering and advanced robotics. These shifts are expected to manifest in key financial ratios, such as R&D-to-sales and R&D-to-assets, which serve as indicators of a firm's innovation focus relative to market presence and asset management. Given this alignment of economic theories, cultural predispositions, and specific provisions within Chapter 18, we postulate that the CPTPP will stimulate increased R&D activities among Japanese manufacturing firms consonant with their long-term strategic focus and ambitions to reclaim technological leadership.

The strong IP protections enshrined in the CPTPP serve as a catalyst for innovation within the manufacturing sector. By ensuring that patents, trademarks, and copyrights are rigorously protected, the agreement incentivizes firms to invest in research and development (R&D). For a country like Japan, where the manufacturing industry is closely intertwined with technological advancement, the CPTPP's IP protections can facilitate a resurgence in innovation. This is critical for maintaining competitiveness in an era where technological capabilities are a key

determinant of industrial success. Moreover, the CPTPP also includes provisions for digital trade, which are increasingly relevant for manufacturing firms as they adopt Industry 4.0 technologies. These provisions ensure that data can flow freely across borders without unjustified restrictions, which is vital for the integration of digital technologies in manufacturing processes.

H2: CPTPP leads to an increase in R&D operations of manufacturing firms in Japan.

4.3.3. Additional impact of CPTPP on R&D operations of technology firms

R&D serves as a pivotal enabler of innovation and a source of sustainable competitive advantage, particularly in technology-intensive sectors. In the milieu of the CPTPP, the accord's potential to unlock new markets and reshape competitive dynamics could wield substantial influence on R&D investment in technology firms.

Our hypothesis draws its theoretical foundation from the Pecking Order Theory in corporate finance that posits that firms tend to prioritize the use of internal financing for new investment opportunities (He et al., 2019). Applied to the CPTPP context, this suggests that technology-intensive firms may temporarily reallocate resources, such as R&D funds, to seize the emerging market openings and altered competitive landscapes engendered by the trade agreement.

Given R&D's cardinal role in technology-driven sectors and the implications of the Pecking Order Theory, we hypothesize that the CPTPP will prompt a resource reallocation in these firms manifesting as an initial decline in R&D investment levels. We formulate the following hypothesis to capture this dynamic:

H3: CPTPP leads to an initial decrease in R&D operations among technology firms in Japan with this phenomenon diminishing over time.

4.3.4. Additional impact of CPTPP on R&D operations of services-oriented firms

Trade agreements, such as the CPTPP, offer unprecedented opportunities for firms to expand into new markets. However, their impact on internal resource allocation, especially within service-oriented industries, remains underexplored. The Pecking Order Theory of corporate finance, which advocates for a hierarchical approach to financing favoring internal funds for

novel projects over external capital, sheds light on this phenomenon (He et al., 2019). According to this theory, the CPTPP would compel service-oriented industries to redirect their internal funds, traditionally reserved for Research & Development (R&D), toward market penetration and customer engagement activities.

For service-oriented firms, this implies a more strategic reallocation of R&D funds to grasp the complexities of varying cultural norms and expectations. While both service-oriented and technology-intensive industries exhibit a decline in R&D investment following the initiation of the CPTPP, the rationales differ significantly. Technology-intensive industries focus on product scalability, whereas service-oriented sectors prioritize market-specific and culturally adaptive strategies (Baldwin & Clark, 2000; Ethiraj et al., 2008; Vargo & Lusch, 2004). The decline in R&D investment, which decreases over time, can be partially explained by Hofstede's (2011) cultural dimensions theory. As firms deepen their understanding of local cultures and successfully adapt their offerings, the initial urgency for market and cultural adaptation diminishes. Consequently, the reallocated resources begin to stabilize, perhaps even indicating a future recommitment to R&D activities, especially in long-term oriented cultures like Japan (Nevins et al., 2007). Based on these theoretical frameworks, we posit the following hypothesis:

H4: CPTPP leads to an initial decrease in R&D operations among services-oriented firms in Japan with this phenomenon diminishing over time.

4.3.5. Additional impact of CPTPP on R&D operations of financially constrained firms

Drawing from the Pecking Order Theory of corporate finance, we posit that financially constrained firms, typically characterized by high leverage (Ding et al., 2013; Livdan et al., 2009; Sharpe, 1994), are more likely to prioritize internal financing mechanisms when accessing new market opportunities, such as those presented by the CPTPP. The benefits from market expansion could lead to increased sales and profits (Blinder, 2019; Bustos, 2011; Krugman, 1987; Puga & Venables, 1997) that would help the firm to service its debt and potentially reduce its financial constraints over time (Collier et al., 2010). According to the theory, firms with limited financial resources are predisposed to allocate capital to projects that offer immediate returns on investment. This is particularly critical for Japanese firms constrained by financial limitations as they require swift revenue inflows to mitigate their budgetary restrictions.

In this context, R&D activities, traditionally considered a long-term investment, may experience a temporary decline as firms reallocate resources toward activities that promise quicker financial gains. These activities might include, but are not limited to, market penetration strategies, customer acquisition, and sales promotions. However, we expect this decline in R&D investment to be transitory. Drawing upon the resource-based view of the firm, as these companies solidify their market positions and stabilize their financial health, they are expected to revert to a more balanced resource allocation that includes R&D investments for long-term competitiveness (Barney, 1991; Penrose, 1995). This phenomenon is further substantiated by Hofstede's (2011) cultural dimensions theory, particularly the long-term orientation index, that indicates that Japanese firms are likely to plan for the future even while navigating immediate financial constraints (Nevins et al., 2007). Therefore, we propose the following hypothesis:

H5: CPTPP leads to an initial decrease in R&D operations among financially constrained firms with this phenomenon diminishing over time.

4.3.6. Additional impact of CPTPP on R&D operations of high sales-growth firms

The role of the CPTPP in influencing firms' R&D investments is not uniform across all corporate landscapes. For high sales growth firms, the CPTPP appears to serve as an enabler rather than a disruptor of R&D activities. The theory that undergirds this observation is the Pecking Order Theory of corporate finance that suggests a preference for internal financing to support new investments (He et al., 2019; Myers, 1984). High sales growth firms, already flush with internal capital due to their strong sales performance, find the CPTPP to be a strategic tool for further amplifying their R&D investments without necessarily compromising their financial stability.

These high growth firms can afford to allocate substantial resources to R&D activities, thereby enhancing both R&D intensity and R&D efficiency measures over time (Hottenrott & Peters, 2012). This is likely due to the strategic financial flexibility that high sales afford them enabling them to invest heavily in long-term innovation while still capitalizing on the immediate opportunities presented by the CPTPP. Therefore, their robust sales growth serves as a catalyst that allows them to navigate the complexities introduced by the CPTPP with a greater focus on innovation and long-term sustainability.

Furthermore, this behavior resonates with the long-term orientation of Japanese firms, a characteristic highlighted in Hofstede's (2011) cultural dimensions. Japanese firms' inclination toward long-term success underpins their strategy to utilize the CPTPP as a platform for future innovation (Lincoln et al., 1986). In this context, the culture not only supports, but also magnifies the strategy derived from financial theory effectively combining economic rationale with sociocultural elements. In light of the above discussion, we formulate the following hypothesis:

H6: The CPTPP leads to an initial increase in R&D Operations metrics of high sales growth firms with this phenomenon increasing over time.

4.4. Data and methodology

4.4.1. Data

The data utilized in this study is retrieved from Refinitiv Datastream, a well-established source for financial information frequently cited in finance research (Dobrick et al., 2023; Fang et al., 2021; Guérin & Suntheim, 2021). Spanning the years 2015-2022, this firm-level dataset forms the foundation of our empirical analysis. To broaden the scope of the study, macro-level variables critical to understanding the overarching economic context are gathered from the World Bank databases (Ngo et al. 2024; Nguyen et al., 2024). For the purposes of methodological transparency and comprehensive disclosure, an exhaustive catalogue of variables, accompanied by their operational definitions and respective data sources, is meticulously delineated in Table A1 in the Appendix. This ensures a transparent and exhaustive overview of the variables that shape the study's empirical framework.

In alignment with established methodologies in the extant literature, our analysis deliberately excludes entities within the financial and utilities sectors. This exclusion is warranted due to the sectors' unique operational attributes as highlighted in prior empirical studies (Garvey & Hanka, 1999; Lee, 1997). To attenuate the potential distortions introduced by outlier observations, particularly those that could skew ratio-based analyses, we employ a data winsorization technique. Specifically, this entails the replacement of the upper and lower 1% of the data distribution for each variable under scrutiny with the immediate non-extreme values. This methodology is corroborated by a wide array of scholarly works, most notably Gompers et al., 2005, and serves to preserve the integrity of the data while obviating complications in

subsequent estimations. In addition, following Masso and Vahter 2015, we exclude all firms that do not have observations during the pre-treatment period (the years 2017 and 2018) so that we can observe the change over time of each company. A detailed table of the summary statistics pertaining to the firm-level variables under investigation is presented in Table 1, while the correlation matrix for the independent variables is delineated in the Appendix, Table A2.

Table 1: Summary statistics

| | N | Max | Min | SD | Median | Mean |
|----------------|--------|--------|---------|--------|--------|--------|
| R&D intensity | 33,558 | -1.198 | -11.295 | 1.641 | -4.09 | -4.31 |
| R&D efficiency | 33,389 | 1.4461 | -11.02 | 1.862 | -3.819 | -3.996 |
| Firm size | 47,669 | 17.003 | 8.335 | 1.755 | 11.874 | 12.037 |
| Cash flow | 47,270 | 42.050 | -29.420 | 49.470 | 7.370 | 3.968 |
| Debt ratio | 46,587 | 73.170 | 0.000 | 18.030 | 16.870 | 20.320 |
| Liquidity | 47,491 | 21.623 | 0.352 | 3.05 | 1.87 | 2.78 |
| MB | 58,472 | 16.010 | 0.111 | 2.528 | 1.170 | 1.946 |
| HHI | 66,174 | 1 | 0 | 0.141 | 0.029 | 0.072 |

Note: The following table provides summary statistics for the primary variables utilized in the subsequent analysis. The definitions and calculations of each variable are presented in the Appendix, Table A1. Variables are winsorized at 1%.

Upon close inspection of the summary statistics outlined in Table 1, one observes that the means and medians of all of the variables are closely juxtaposed indicating a nearly symmetrical distribution. This statistical symmetry is not trivial, but bears significant relevance for the robustness and interpretive clarity of the study. Furthermore, data with symmetrical distributions typically enhance the predictive accuracy of research, an aspect that aligns closely with the objectives of this investigation. For added assurance, our correlation matrix found in the Appendix, Figure A1 reveals minimal evidence of multicollinearity among the variables studied.

4.4.2. Main specifications

In the specific context of examining the impact of the CPTPP on R&D operations in Japanese firms, the PSM-DiD model becomes indispensable. Given that RCTs are not practical in the realm of international trade agreements and firm-level behavior, PSM-DiD offers a methodologically sound approach to causal inference. The PSM component helps in matching

Japanese firms with similar characteristics in non-CPTPP countries like South Korea, thereby creating a comparable control group. Meanwhile, the DiD technique allows for a before-and-after comparison to measure the true impact of CPTPP on R&D activities. This approach gains additional credence given its widespread application in finance and policy studies (Sun et al., 2020; Yuan et al., 2023) serving as a robust framework for evaluating the intricate effects of CPTPP on Japanese firms' R&D investments.

Following Alam et al. (2019) and Chun et al. (2014), we have the baseline regression as below:

$$R\&D\ Operations_{it} = \alpha + \beta_1 * R\&D\ Operations_{i,t-1} + \beta_2 * WGI_{kt} + \beta_3 * Firm\ size_{it} + \beta_4 * Cash\ flow_{it} + \beta_5 * Debt\ ratio_{it} + \beta_6 * GDP\ growth_{kt} + \beta_7 * HHI_{it} + \beta_8 * Liquidity_{it} + \beta_9 * MB_{it} + \mu * CPTPP_{kt} + \lambda * Treat_{it} + \nu * Post_{it} + \gamma_i + \tau_t + \epsilon_{it} \quad (1)$$

where i , k , and t index firms, countries, and years, respectively. In the scholarly discourse and corporate evaluation, the term "R&D Operations" encompasses a multifaceted array of activities and associated metrics that delineate a firm's engagement with innovation. Within this ambit, two specific measures stand out: R&D Intensity defined as the ratio of R&D expenditures to total assets as elaborated by Chun et al. (2014) and R&D Efficiency characterized by the R&D expenditure-to-sales ratio as delineated by Alam et al. (2019). Utilizing the umbrella term "R&D Operations" affords a comprehensive assessment of a firm's dedication to and efficacy in advancing innovative undertakings. In this investigation, we operationalize the concept of R&D Operations by incorporating both R&D Intensity and R&D Efficiency as pivotal metrics. We incorporate a series of control variables to account for various dimensions that may influence R&D Operations in firms. Our controls include an average of the World Governance Indicators (WGI) to represent political factors (Ngo et al., 2022a), GDP growth, the lagged variable of R&D Operations, the Cash Flow to Sales Ratio, the Debt Ratio as a proportion of debt to assets, and the natural logarithm of total assets as a proxy for firm size as outlined by Alam et al. (2019). Additionally, we include Liquidity, defined as the ratio of current assets to current liabilities, as delineated by Chun et al. (2014). Our variable of interest, $CPTPP_{kt}$, takes a value of one for firms in Japan post-CPTPP and zero otherwise as prescribed by Bertrand and Mullainathan (2003). The coefficient of this variable serves as our focal point indicating the influence of the CPTPP membership on R&D operations for Japanese firms relative to their counterparts in other nations. Methodologically, our main specification follows Dasgupta and

Žaldokas (2019) incorporating both firm and year fixed effects and clustering standard errors by country-industry.

4.4.3. Matching sample progress

In the employment of matching techniques, it is essential to include variables that have empirically demonstrated influence over both the treatment assignment and the corresponding outcome as affirmed by prior research (Glazer et al., 2003; Heckman et al., 1998; Rubin & Thomas, 1996). Nevertheless, when confronted with the limitations of small sample sizes, the scope of included variables may need to be narrowed. Under these circumstances, the focus should be reoriented toward those variables that are expected to be most closely related to the outcome variable. This minimizes the risk of increased variance that occurs when irrelevant variables, albeit correlated with treatment, are incorporated (Brookhart et al., 2006). Additionally, any variables that may be directly affected by the treatment under study should be deliberately omitted from the matching process (Frangakis & Rubin, 2002; Rosenbaum, 1984).

In relation to the CPTPP, it is evident that its implementation leads to immediate shifts in macroeconomic indicators, such as tariff structures, regulatory frameworks, and trade impediments, all of which carry substantial ramifications for the broader economy. Nonetheless, the influence of the CPTPP on the R&D operations at the firm level is more gradually manifested. Firms require a period of adaptation to realign their operational strategies and resource deployment in reaction to the transformed trade landscape. In light of this, our PSM methodology is tailored to focus strictly on firm-level variables intentionally omitting macroeconomic factors. This strategy, aligned with the inclusion of industry fixed effects in accordance with prior studies (Howell, 2016; Tang et al., 2021; Yang et al., 2012) enables us to rigorously and precisely examine the intricate effects of the CPTPP on firm-level R&D operations. This eliminates the risk of introducing excessive variance or bias providing a more credible and specialized assessment of this monumental trade agreement's impact.

To ascertain the individual impact of the treatment on each participating firm, we utilize a logistic regression model to calculate the propensity score. This score consolidates information from the firm-level control variables along with the industry fixed effects quantifying the probability that a particular firm (specifically Japanese firms in our study) receives the treatment

based on its pre-event attributes. In essence, the generated propensity score condenses the multidimensional information harvested from all pre-treatment observations across the control variables following previous studies (Caliendo & Kopeinig, 2008; Crinò, 2010; Dehejia & Wahba, 1999; Rosenbaum, 1984; Tang et al., 2021; Yang et al., 2012). To facilitate the matching process, we compute the mean of all pertinent firm-level characteristics related to operational efficiency using data from the pre-treatment phase (Howell, 2017; Masso & Vahter, 2015). The results of the logistics in the Appendix, Table A2 show that the firm-level covariates added are mostly statistically significant. In general, firms exhibiting characteristics including larger size, lower debt ratios, higher liquidity, and higher market-to-book ratios are more likely to be categorized as “treated” (representing firms in Japan).

In this study, we employ a nearest-neighbor matching approach that pairs each treated firm with its most similar counterpart based on their calculated propensity scores, a methodology corroborated by existing studies (Chen et al., 2023; Florackis & Sainani, 2018). A critical procedure within Propensity Score Matching (PSM) is the trimming process that entails the exclusion of observations exhibiting extreme propensity scores in order to attenuate bias. To this end, we eliminate 2% of the observations from the tails of the propensity score distribution, specifically 1% from each extremity, concentrating our analysis on the “common support” region where the propensity scores for both the treated and the control units are overlapping (Austin, 2022; Millimet & Tchernis, 2012). Moreover, we implement a caliper width of 0.01 to ensure exact matching between paired units, thereby constraining the absolute discrepancy in their propensity scores within this predetermined boundary in line with recommendations from Cao et al., 2022 and Li and Wang, 2023.

After the matching procedure, it is essential to ensure that the pre-treatment characteristics are balanced across both the treated and the control groups as emphasized by Caliendo and Kopeinig (2008). To corroborate this balance visually, Figure A2 in the Appendix graphically delineates the propensity score overlap between the two groups. The congruence in density (height) and distribution (along the x-axis) confirms effective matching between the treated and the control units. Additionally, we employ kernel density estimates to validate the balance illustrated as Figure A3 in the Appendix. Moreover, we execute statistical tests to scrutinize the equality in the

distribution of the independent variables, pre-CPTPP enactment, across the treated and the control samples. These empirical evaluations are comprehensively presented in Table 2.

Table 2: Balancing test for matching using PSM

| | | Mean | | t-test | |
|---------------------------------|-----------|---------|---------|-------------|---------|
| | | Treated | Control | T-statistic | p-Value |
| R&D Operations _{i,t-1} | Unmatched | 0.0227 | 0.041 | -13.55 | 0.000 |
| | Matched | 0.0242 | 0.026 | -1.37 | 0.169 |
| Firm size | Unmatched | 12.342 | 11.569 | 20.05 | 0.000 |
| | Matched | 12.342 | 12.374 | -0.57 | 0.567 |
| Cash flow | Unmatched | 4.894 | -3.1427 | 7.51 | 0.000 |
| | Matched | 3.359 | 0.02875 | 2.02 | 0.043 |
| Debt ratio | Unmatched | 18.267 | 20.93 | -6.87 | 0.000 |
| | Matched | 17.341 | 17.567 | -0.43 | 0.667 |
| Liquidity | Unmatched | 2.564 | 3.009 | -6.74 | 0.000 |
| | Matched | 2.883 | 3.027 | -1.39 | 0.164 |
| MB | Unmatched | 1.8665 | 1.8807 | -0.32 | 0.752 |
| | Matched | 1.8778 | 1.9869 | -1.49 | 0.137 |

Note: The matching method is applied to test whether there is a significant difference between the treated and matched groups on potential determinants of Japan entering the CPTPP at the end of 2018.

From the data presented in Table 2, it is evident that the employment of propensity score matching has succeeded in generating a control group that is statistically indistinguishable from the treated firms with regard to key observable attributes at the pre-treatment stage. Post-matching, the variances in productivity and other relevant covariates between the treatment and the control groups have been rendered statistically non-significant. Rigorous efforts have been undertaken to ascertain the balance of the matched cohorts as validated by the application of Rubin's (2001) guidelines on Standardized Mean Differences (SMD).

The SMD values for each control variable, documented in Appendix Table A3, are all notably below the 0.1 threshold. These figures align well with Rubin's (2001) recommendation that for regression adjustments to yield credible results, the absolute standardized differences in means should not exceed 0.25. Moreover, these SMD metrics fall within Cohen's (2013) demarcation

for a “small” effect size affirming that the observed mean differences between our matched treatment and control samples are inconsequential in relation to the combined standard deviation. Therefore, the rigorous propensity score matching employed herein substantiates the validity of our subsequent empirical findings as both robust and reliable.

The validity of our matched sample gains further credence through a meticulous breakdown of its representation across industries and countries as elaborated in Tables A4 and Table A5 in the Appendix. Similarly, Table A5 assures us that this geographic diversity is mirrored in the control group. Furthermore, when we scrutinize the distribution of firms across various industries on an annual basis, we find a remarkable symmetry between the control and treatment groups. This balance, both across sectors and over time, fortifies the robustness of our sample making it an ideal foundation upon which to build our study.

4.5. Results

4.5.1. General results

After deriving the matched sample, we applied two-way fixed effects DiD to examine the impact of CPTPP on R&D operations of firms in Japan surrounding the entry to the CPTPP. We examine Equation (1) with four different specifications. Building upon the fundamental controls of two-way fixed effects and other crucial variables, we further refine our analysis by adopting a multi-faceted specification approach in line with existing literature where clustering plays a pivotal role. For our most stringent and also main specification, we control for firm and year fixed effects, in addition to other variables, while also clustering at the country-industry level in Table 3 as suggested by Dasgupta and Žaldokas (2019). This approach provides a robust framework for our analysis allowing us to navigate complex interactions between firm, industry, and country-specific factors. Additionally, we conduct supplementary specification tests integrating a variety of fixed effects and clustering methodologies. These tests not only enable us to assess the sensitivity of our findings, but also act as robustness checks to reinforce the validity of our results.

For the second specification, we commence with the standard procedure controlling for firm and year fixed effects along with the consideration of other variables in Table A6. Regarding the third specification, we subsequently introduce clustering by industry to mitigate potential

correlation of error terms within the same sector in Table A7. This step is essential given that firms within the same industry often operate under analogous economic conditions and trends. We utilize the Datastream's Industry Level 3 Name (INDC3) for industry classifications in line with the methodological precedent set by Chattopadhyay et al. (2020) and Chlomou and Demirakos (2020).

For our fourth specification, we maintain control over firm-level and industry*year fixed effects in conjunction with industry clustering in Table A8. The introduction of industry*year fixed effects affords a finer level of control enabling us to account for shocks or trends that affect different industries in diverse ways over time. This includes industry-specific fluctuations in technology, market conditions, and regulatory landscapes. Such a level of specificity and control surpasses what can be achieved with year fixed effects alone, which only account for trends that uniformly impact all industries within a given year.

Table 3: Impact of CPTPP on R&D operations of firms in Japan

| | 1 year | | 2 years | | 3 years | |
|-----------------------------|-------------------|-------------------|--------------------|---------------------|---------------------|--------------------|
| | R&D intensity | R&D efficiency | R&D intensity | R&D efficiency | R&D intensity | R&D efficiency |
| CPTPP | 0.0055 (0.880) | -0.016 (0.683) | -0.0139 (0.678) | -0.0630* (0.061) | -0.00419 (0.911) | -0.0302 (0.392) |
| Firm fixed effects | Y | Y | Y | Y | Y | Y |
| Year fixed effects | Y | Y | Y | Y | Y | Y |
| Cluster by country-industry | Y | Y | Y | Y | Y | Y |
| Controls | Y | Y | Y | Y | Y | Y |
| N | 11,008 | 11,004 | 13,749 | 13,741 | 16,640 | 16,632 |
| R-squared | 0.029 | 0.047 | 0.033 | 0.05 | 0.044 | 0.042 |

*Note: The results of the DiD regression from Equation (1): $R\&D\ Operations_{it} = \alpha + \beta_1 * R\&D\ Operations_{i,t-1} + \beta_2 * WGI_{kt} + \beta_3 * Firm\ size_{it} + \beta_4 * Cash\ flow_{it} + \beta_5 * Debt\ ratio_{it} + \beta_6 * GDP\ growth_{kt} + \beta_7 * HHI_{it} + \beta_8 * Liquidity_{it} + \beta_9 * MB_{it} + \mu * CPTPP_{kt} + \lambda * Treat_{it} + \nu * Post_{it} + \gamma_i + \tau_t + \epsilon_{it}$. In our study, the variable of interest, CPTPP, represents the impact of Japan's participation in the agreement on the country's R&D operations. Our firm-level control variables include firm size, cash flow, debt ratio, liquidity, and MB, while the industry-control is HHI and the country-level independent variables are GDP growth and political factors as the average of the six dimensions from the WGI. All firm-specific variables have been subjected to a 1% winsorization. In addition, we also control for firm and year fixed effects while clustering by country-industry following Dasgupta and Žaldokas (2019). Industries are classified by INDC3 from Datastream following Chattopadhyay et al. (2020) and Chlomou and Demirakos (2020). *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.*

Our empirical findings, substantiated in Table 3 and further validated by robustness checks delineated in Appendix Tables A6, A7, and A8, manifest an inconsequential influence of the CPTPP on the R&D Operations of Japanese firms, particularly when comparing to their counterparts in Taiwan and South Korea. These results resonate closely with our initial Hypothesis H1 positing an indeterminate net impact of the CPTPP on R&D operations in Japanese firms due to various countervailing factors.

To explore further, our analysis intimates that the negligible outcomes observed could be attributed to various factors associated with the CPTPP's impact on Japanese firms. These factors, operating through diverse mechanisms, might inadvertently counterbalance each other. For example, enhanced Intellectual Property Rights (IPR) protections detailed in Chapter 18 could incentivize increased R&D investments, thereby potentially raising the R&D Operations ratios' numerator. This drive towards heightened R&D investments could be seen as Japan's strategic endeavor to recapture its erstwhile technological dominance, which spanned from the 1950s until the early 1990s, before it was eclipsed by Western innovation. On the other hand, the CPTPP's role in broadening market access could boost sales and assets, thereby expanding the denominator of these ratios. The adoption of “factoryless” management models introduces further complexity. Given that the CPTPP encompasses several rising manufacturing hubs, Japanese corporations might contemplate relocating their production to these areas, necessitating additional capital expenditure in fixed assets. These actions could lead to a concurrent increase in both the numerator and denominator of the R&D Operations ratios, rendering the overall effect on these ratios ambiguous. Therefore, in the absence of direct empirical evidence linking the CPTPP to these channels within Japanese firms, it is prudent to approach these interpretations with caution, suggesting that they may underpin the observed insignificant results.

In Table 4, we present the regression coefficients table that details the impact of independent variables on the dependent variables in this study. This multivariate regression table offers a comprehensive view of the relationships providing coefficients, standard errors, and other pertinent statistics. Given the incorporation of both firm and country-level variables in our analysis, we will initially direct our attention to the firm-level variables to isolate their specific impact on the dependent variables. In presenting our results, we adopt the approach used by Lu et al., (2023a) who also employ a PSM-DiD framework in their research.

Table 4: Coefficients of the control variables in the regressions

| | (1) R&D intensity | (2) R&D efficiency |
|-----------------------------|----------------------|-----------------------|
| CPTPP | -0.00419 (0.911) | -0.0302 (0.392) |
| Lag R&D intensity | 0.0430*** (0.002) | |
| Lag R&D efficiency | | 0.001* (0.067) |
| Firm Size | -0.320*** (0.000) | -0.135*** (0.004) |
| Cash flow | -0.0005 (0.349) | -0.0049*** (0.000) |
| Debt ratio | -0.0019 (0.178) | 0.0025 (0.140) |
| Liquidity | -0.0002** (0.034) | 0.0001 (0.517) |
| M/B | -0.0035 (0.380) | -0.0195*** (0.002) |
| HHI | 0.883 (0.281) | 0.971 (0.305) |
| WGI | -0.203 (0.296) | -0.272 (0.217) |
| GDP growth | -0.0043 (0.528) | 0.0089 (0.224) |
| Firm fixed effects | Y | Y |
| Year fixed effects | Y | Y |
| Cluster by country-industry | Y | Y |
| Controls | Y | Y |
| Observations | 16,640 | 16,632 |
| R-squared | 0.044 | 0.042 |

*Note: The results of the DiD regression from Equation (1): $R\&D\ Operations_{it} = \alpha + \beta_1 * R\&D\ Operations_{i,t-1} + \beta_2 * WGI_{kt} + \beta_3 * Firm\ size_{it} + \beta_4 * Cash\ flow_{it} + \beta_5 * Debt\ ratio_{it} + \beta_6 * GDP\ growth_{kt} + \beta_7 * HHI_{it} + \beta_8 * Liquidity_{it} + \beta_9 * MB_{it} + \mu * CPTPP_{kt} + \lambda * Treat_{it} + \nu * Post_{it} + \gamma_i + \tau_t + \varepsilon_{it}$. In our study, the variable of interest, CPTPP, represents the impact of Japan's participation in*

*the agreement on the country's R&D operations. Our firm-level control variables include firm size, cash flow, debt ratio, liquidity, and MB, while the industry-control is HHI and the country-level independent variables are GDP growth and political factors as the average of the six dimensions from the WGI. All firm-specific variables have been subjected to a 1% winsorization. In addition, we also control for firm and year fixed effects while clustering by country-industry following Dasgupta and Žaldokas (2019). Industries are classified by INDC3 from Datastream following Chattopadhyay et al. (2020) and Chlomou and Demirakos (2020). The values in parentheses are p-values. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.*

From the Table 4, while lag R&D intensity change by one standard deviation, the R&D intensity change by 0.0688, which is the interaction of coefficient of lag R&D intensity (0.043) and standard deviation of R& D intensity (1.6). The observed not-very-high R-squared can be interpreted as the nature of such an international study. In the corporate finance landscape, the negative correlation between firm size and R&D operations is influenced by a set of complex dynamics. Larger firms, often diversified across various business activities, distribute resources to multiple operational spheres from marketing to production and acquisitions (Rego, 2003). This broad allocation results in a relatively lower proportion of spending on R&D in relation to either sales or total assets thereby reducing R&D intensity. Simultaneously, these larger firms leverage economies of scale in R&D activities gaining access to more extensive resources, advanced technologies, and a wider talent pool (Silberston, 1972). This allows them to execute R&D efforts more efficiently further diminishing the expenditures on R&D per unit of output or asset value. Consequently, this combination of resource dilution and inherent operational efficiency leads to a decline in both R&D intensity and R&D efficiency metrics for larger firms.

In examining the observed negative correlation between Cash Flow/Sales and R&D Expenditures/Sales, multiple factors warrant consideration. First and foremost, R&D investments are generally long-term strategic commitments that do not yield immediate returns in the form of enhanced sales or cash flow thereby engendering a time-lag effect that can manifest as a negative correlation (Deng & Zhao, 2022; Kafouros & Wang, 2008). In addition, firms adept at converting sales into cash may also excel in other operational efficiencies including R&D. This operational prowess could be a reflection of effective managerial practices and cross-functional teams facilitating the achievement of R&D objectives without necessitating proportional increases in R&D spending relative to sales. As such, these multi-faceted efficiencies contribute

to the observed negative relationship between Cash Flow/Sales and R&D Expenditures/Sales. The temporal disparity between R&D investments and their impact on operational cash flow further underscores this negative association.

In dissecting the negative relationship between Liquidity (Current Assets/Current Liabilities) and R&D Intensity (R&D Investment/Total Assets), a multifaceted interplay of financial strategies and managerial biases emerges. Firms with higher liquidity often find themselves in a comfortable position to meet short-term obligations fostering a risk-averse corporate culture (Chatjuthamard et al., 2023; Low, 2009; Smith & Stulz, 1985). This risk aversion manifests in several ways. Managers, inclined toward stable returns and quick gains, prioritize immediate financial needs to meet shareholder expectations and quarterly metrics (Chatjuthamard et al., 2023). This short-term focus is further cemented by a "safety first" mindset that high liquidity naturally engenders among decision-makers. Additionally, the principles of Agency Theory suggest that these managers might prioritize their job security choosing to maintain a high liquidity buffer as a short-term safeguard against the uncertainties that come with long-term R&D commitments.

This overarching corporate culture, characterized by an amalgamation of managerial conservatism and psychological biases, nudges firms toward short-term, less risky endeavors often at the expense of long-term strategic investments like R&D. The result is an effective, albeit myopic, working capital management that skews resource allocation away from innovation. Consequently, even though firms might excel in maintaining a robust liquidity position, this comes at the cost of diminished R&D intensity evidenced by a lower ratio of R&D investment to total assets. Thus, in high liquidity firms, the intricate balance between immediate financial prudence and long-term innovative risk tends to tilt toward the former leading to a negative association between liquidity and R&D intensity.

The observed negative relationship between the Market-to-Book (MB) Ratio and R&D efficiency offers intriguing insights into how market valuations may influence a firm's strategic focus. A high MB ratio typically reflects strong growth expectations from the market, and companies facing these expectations may feel pressure to deliver immediate results (Bushee, 2001; Demirag, 1995; Groot, 1998). Consequently, firms may strategically prioritize activities

that yield rapid increases in sales over long-term R&D commitments that generally take longer to materialize as revenue. Such a tactical realignment could result in a decrease in R&D spending relative to sales creating a negative correlation with the MB ratio. In essence, the MB ratio serves as a gauge of market sentiment. When it indicates high growth expectations, firms might opt to bolster short-term sales at the cost of long-term, yet potentially rewarding, R&D initiatives. This behavioral adjustment accounts for the negative relationship between the MB ratio and R&D efficiency.

4.5.2. Further extension

Upon analyzing the time-sensitive implications of the CPTPP on R&D activities, our next step is to investigate whether the agreement has further diverse effects on distinct categories of the firms. Guided by the extant literature and rational analysis, we focus on how the CPTPP influences firms across different sectors, such as manufacturing, technology-intensive, and service-oriented industries, as well as those characterized by financial constraints or high sales growth. Our aim is to offer a comprehensive insight into how the CPTPP affects the R&D landscape for Japanese firms. The specification is as below:

$$R\&D\ Operations_{it} = \alpha + \mu * CPTPP_{kt} + \rho * Chosen_{dimension} * CPTPP_{kt} + \beta_1 * Chosen_{dimension} + \lambda * X_{ikt} + \gamma_i + \tau_t + \varepsilon_{it} \quad (2)$$

where i , k , and t index firms, countries, and years, respectively. The dependent variable $R\&D\ Operations_{it}$ is represented through R&D intensity (R&D investment/Total Assets) and R&D efficiency (R&D investment/Total Sales). We incorporate a series of control variables to account for various dimensions that may influence R&D Operations in firms. Our controls include an average of the World Governance Indicators (WGI) to represent political factors, GDP growth, the lagged variable of R&D Operations, the Cash Flow to Sales Ratio, the Debt Ratio as a proportion of debt to assets, and the natural logarithm of total assets as a proxy for firm size as outlined by Alam et al. (2019). Additionally, we include Liquidity, defined as the ratio of current assets to current liabilities, as delineated by Chun et al. (2014). $Treat_{i,t}$ receives a value of one for firms in Japan and zero otherwise. $Post_{i,t}$ is equal to one for observations after the implementation of CPTPP. $CPTPP_{kt}$ is the interaction of $Treat_{i,t}$ and $Post_{i,t}$.

Chosen_dimension, a binary variable, is the dimension of interest we want to examine further classified by comparison with the median value of the associated industry. The variable of interest is $Chosen_dimension * CPTPP_{kt}$, the interaction between *Chosen_dimension* and $CPTPP_{kt}$, that indicates whether there is an additional effect of the CPTPP on specific groups of firms. Also, similar to the main specification, we control for firm and year fixed effects along with clustering by country-industry. The chosen dimension variable is included when running the DDD regression but are omitted in this table due to potential collinearity issues.

4.5.2.1. Additional impact of CPTPP on firms in manufacturing intensive industries

The CPTPP has had far-reaching implications for R&D initiatives within the manufacturing sectors of its member countries, particularly Japan. As corroborated by the tenets of the Solow Growth Model, technological innovation is a key driver of economic growth and finds notable application in the manufacturing sector (Solow, 1979). This sector is often cited as a crucial arena for technological innovations leading to productivity gains, from process improvements to new product designs, all necessitating significant R&D investment.

In our tests, we followed established methodologies that employ two-digit Standard Industrial Classification (SIC) codes to categorize various industries and sectors (Akhigbe & Martin, 2000; Cebenoyan et al., 1992; Kallunki et al., 2009; Levinson, 2009; Shi, 2003). More importantly, the application of SIC codes extends beyond the U.S. market having been employed in diverse global markets including the UK, Japan, Korea, South and Southeast Asia, and Oceania (Indro & Richards, 2007; Souder et al., 1998). To gain a comprehensive understanding of the sector-specific effects, our study focuses on industries classified as manufacturing corresponding to the following two-digit Standard Industrial Classification (SIC) codes: 10 (mining), 13 (oil/gas), 14 (non-metallic minerals), 20 and 39 (general manufacturing), 22 (textile mills), 26 (paper production), 27 (printing/publishing), 29 (petroleum/coal), 30 (rubber/plastics), 32 (stone/clay/glass), and 37 (transportation equipment). This classification is in line with previous research (Akhigbe & Martin, 2000; Cebenoyan et al., 1992).

Table 5: Interaction test to assess CPTPP's additional effects on R&D operations in manufacturing industries in Japan

| | | R&D/assets | R&D/sales |
|-----------------------------|-----------------------------|----------------------|----------------------|
| 1 year | CPTPP* manufacturing | 0.0780*** (0.000) | 0.0699*** (0.007) |
| | <i>CPTPP</i> | -0.0093 (0.791) | -0.0293 (0.449) |
| | Firm fixed effects | Y | Y |
| | Year fixed effects | Y | Y |
| | Cluster by country-industry | Y | Y |
| | Controls | Y | Y |
| | N | 11,008 | 11,004 |
| | R-squared | 0.029 | 0.048 |
| | 2 years | CPTPP* manufacturing | 0.0806*** (0.000) |
| <i>CPTPP</i> | | -0.0293 (0.377) | -0.0771** (0.022) |
| Firm fixed effects | | Y | Y |
| Year fixed effects | | Y | Y |
| Cluster by country-industry | | Y | Y |
| Controls | | Y | Y |
| N | | 13,749 | 13,741 |
| R-squared | | 0.033 | 0.05 |
| 3 years | | CPTPP* manufacturing | 0.0588*** (0.000) |
| | <i>CPTPP</i> | -0.0155 (0.679) | -0.0428 (0.225) |
| | Firm fixed effects | Y | Y |
| | Year fixed effects | Y | Y |
| | Cluster by country-industry | Y | Y |
| | Controls | Y | Y |
| | N | 16,640 | 16,632 |
| | R-squared | 0.044 | 0.042 |

*Note: The results of the DiD regression from equation (2) $R\&D\ Operations_{it} = \alpha + \mu * CPTPP_{kt} + \rho * manufacturing * CPTPP_{kt} + \beta_1 Treat_{i,t} * manufacturing + \beta_2 Post_{i,t} * manufacturing + \lambda * X_{ikt} + \gamma_i + \tau_t + \epsilon_{it}$. In our study, the variable of interest, $CPTPP_{kt} * manufacturing$, represents the additional impact of the CPTPP on the R&D operations of firms in manufacturing industries. Our controls include an average of the WGI to represent political factors, GDP growth, the lagged variable of R&D Operations, the Cash Flow to Sales Ratio, the Debt Ratio as a proportion of debt to assets, and the natural logarithm of total assets as a proxy for firm size as outlined by Alam et al. (2019). Additionally,*

*we include Liquidity, defined as the ratio of current assets to current liabilities, as delineated by Chun et al. (2014). We also control for firm and year fixed effects while clustering by country-industry following Dasgupta and Žaldokas (2019). The values in parentheses are p-values. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.*

From Table 5, the tendency to focus on long-term qualitative growth over short-term quantitative gains is also supported by Hofstede's Long-Term Orientation cultural dimension. According to Hofstede's (2011) cultural dimension of Long-Term Orientation, Japanese firms have been observed to lean toward long-term strategic planning investing in R&D initiatives that focus on qualitative improvements over quantitative sales increases. In addition, Chapter 18 includes provisions that safeguard proprietary designs and technologies (Mishra & Valencia, 2023), offering a significant advantage to industries like automotive engineering and advanced robotics. In particular, in the first year after CPTPP, the positive significant result suggests that R&D intensity of Japanese manufacturing firms increase by 8.32% comparing to other companies. The investment in R&D of these firms are consistent over years after CPTPP by the stable increase by 8.44% and 6.18% during the second and third year accordingly comparing to firms in other industries. The results of R&D operational efficiency show the same pattern with the stable increase by 7.24% and 7.41% and 6.6% during the three years after CPTPP in that order.

These shifts are expected to manifest in R&D operations measures that serve as indicators of a firm's innovation focus relative to their market presence and asset management. This implies that Japanese manufacturing firms are aligning their R&D initiatives not just to meet the immediate market demands, but to adapt their products for long-term success, especially their previous leading position in technology globally. This strategic outlook is also substantiated by the complexity of tangible goods that often require more region-specific customization due to regulatory, consumer preference, or environmental factors.

In our robustness tests, we adhere to the existing literature, employing two-digit Standard Industrial Classification (SIC) codes to segment manufacturing industries. Specifically, we classify firms with two-digit SIC codes ranging from 21 to 39 as manufacturing entities in line with Levinson (2009)'s categorization. These findings, detailed in Appendix Table A9, resonate with the Solow Growth Model's emphasis on technological innovation as a driver of economic

growth. The empirical results suggest that Japanese manufacturers, guided by a cultural predilection for long-term strategic planning, appear to leverage the opportunities engendered by the CPTPP to prioritize qualitative enhancements in their products over quantitative sales expansion.

4.5.2.2. Additional impact of CPTPP on firms in technology-oriented industries

In our empirical analysis, we also employ a refined classification of technology-intensive industries updating the list of two-digit Standard Industrial Classification (SIC) codes in line with the extant research (Akhigbe & Martin, 2000; Kallunki et al., 2009; Shi, 2003). While it is suggested by Shi (2003) and Akhigbe and Martin (2000) that industries having SIC codes 28, 33, 34,35,36, and 38 are technology intensive industries, we updated the list further by adding three more industries that have been recognized as technology-intensive industries including 48, 73, and 87 following a study regarding R&D spending by Kallunki et al. (2009). This detailed classification enables us to assess the specific impact of the CPTPP on R&D investment patterns within Japan's technology-oriented sectors.

Table 6: Interaction test to assess CPTPP's additional effects on R&D operations in technology intensive industries in Japan

| | | R&D/assets | R&D/sales |
|---------|-----------------------------|-----------------------|-----------------------|
| 1 year | CPTPP*tech_intense | -0.0801*** (0.000) | -0.0688*** (0.002) |
| | <i>CPTPP</i> | 0.058 (0.102) | 0.0291 (0.448) |
| | Firm fixed effects | Y | Y |
| | Year fixed effects | Y | Y |
| | Cluster by country-industry | Y | Y |
| | Controls | Y | Y |
| | N | 11,008 | 11,004 |
| | R-squared | 0.029 | 0.048 |
| 2 years | CPTPP*tech_intense | -0.0756*** (0.004) | -0.0608** (0.038) |
| | <i>CPTPP</i> | 0.0356 (0.310) | -0.0232 (0.525) |
| | Firm fixed effects | Y | Y |
| | Year fixed effects | Y | Y |
| | Cluster by country-industry | Y | Y |
| | Controls | Y | Y |
| | N | 13,749 | 13,741 |
| | R-squared | 0.033 | 0.05 |
| 3 years | CPTPP*tech_intense | -0.0659** (0.025) | -0.0558* (0.097) |
| | <i>CPTPP</i> | 0.0389 (0.324) | 0.00628 (0.873) |
| | Firm fixed effects | Y | Y |
| | Year fixed effects | Y | Y |
| | Cluster by country-industry | Y | Y |
| | Controls | Y | Y |
| | N | 16,640 | 16,632 |
| | R-squared | 0.044 | 0.042 |

*Note: The results of the DiD regression from Equation (2) $R\&D\ Operations_{it} = \alpha + \mu * CPTPP_{kt} + \rho * tech_intense * CPTPP_{kt} + \beta_1 Treat_{i,t} * tech_intense + \beta_2 Post_{i,t} * tech_intense + \lambda * X_{ikt} + \gamma_i + \tau_t + \varepsilon_{it}$. In our study, the variable of interest, $CPTPP_{kt} * tech_intense$, represents the additional impact of the CPTPP on the R&D operations of firms in technology intense industries. Our controls include an average of the WGI to represent political factors, GDP growth, the lagged variable of R&D Operations, the Cash Flow to Sales Ratio, the Debt Ratio as a proportion of debt to assets, and the natural logarithm of total assets as a proxy for firm size as outlined by Alam et al. (2019). Additionally,*

*we include Liquidity, defined as the ratio of current assets to current liabilities, as delineated by Chun et al. (2014). We also control for firm and year fixed effects while clustering by country-industry following Dasgupta and Žaldokas (2019). The values in parentheses are p-values. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.*

From Table 6, in the immediate aftermath of the CPTPP's enactment, our results indicate a significant contraction in R&D expenditures among technology-oriented firms, a trend more pronounced in these sectors than in other industrial areas. This suggests a reallocation of internal funds that are traditionally earmarked for R&D toward new market opportunities opened up by the CPTPP. This observed shift in financing aligns closely with the Pecking Order Theory of corporate finance that posits that firms prefer to utilize internal financing for new investment avenues.

Over time, however, the rate of this R&D expenditure contraction diminishes. In particular, in the first year after CPTPP, the negative significant result suggests that R&D intensity of Japanese technology intensity firms decrease by 7.7% comparing to other companies. The investment in R&D of these firms increase over years after CPTPP by the attenuated decline gradually by 7.28% and 6.38% during the second and third year accordingly comparing to firms in other industries. The results of R&D operational efficiency show the same pattern with the decreasing negative effects by 6.65% and 5.9% and 5.43% during the three years after CPTPP in that order.

This attenuation can be attributed to two interrelated factors. First, firms in other sectors start to benefit from the CPTPP thereby diluting the initial sector-specific impact. In addition, the long-term orientation of Japanese corporate culture, substantiated by Hofstede's cultural dimensions, seems to facilitate a recalibration of R&D investment strategies. According to Hofstede's research, Japan ranks highly in long-term orientation suggesting a proclivity for future-focused strategic planning (Hofstede, 2011). Therefore, while technology-oriented firms leverage the immediate market opportunities offered by the CPTPP, they simultaneously prepare for a gradual reinstatement of R&D investments aimed at future growth and technological advancements.

In summary, our findings echo the central tenet of the Solow Growth Model that accentuates the role of technological innovation as a vital driver of economic development. Our data implies that

technology-oriented firms in Japan, propelled by a cultural emphasis on long-term planning, are strategically utilizing the CPTPP to recalibrate their R&D investment priorities offering a deeper understanding of the agreement's long-term implications for R&D intensity and efficiency within this sector.

4.5.2.3. Additional impact of CPTPP on firms in services-oriented industries

Building on the industrial categorizations from Akhigbe and Martin (2000), our study scrutinizes service-oriented industries as identified by two-digit SIC codes such as 47, 73, 80, 82, 87, 48, 50, 51, 53, 54, 70, and 78. Our objective is to examine the intricate impact of the CPTPP on these industries, particularly with regard to metrics like the R&D-to-sales and R&D-to-assets ratios. Our empirical data lends strong credence to Hypothesis H4 revealing a statistically significant decline in R&D investment following the CPTPP's initiation. Interestingly, this decline displays a monotonic reduction over time, a phenomenon that warrants further exploration.

Table 7: Interaction test to assess CPTPP's additional effects on R&D operations in services-oriented industries in Japan

| | | R&D/assets | R&D/sales |
|---------|-----------------------------|-----------------------|----------------------|
| 1 year | CPTPP*services | -0.0571*** (0.005) | -0.0446** (0.020) |
| | <i>CPTPP</i> | 0.0201 (0.554) | -0.00465 (0.900) |
| | Firm fixed effects | Y | Y |
| | Year fixed effects | Y | Y |
| | Cluster by country-industry | Y | Y |
| | Controls | Y | Y |
| | N | 11,008 | 11,004 |
| | R-squared | 0.029 | 0.047 |
| 2 years | CPTPP*services | -0.0409* (0.095) | -0.0319 (0.284) |
| | <i>CPTPP</i> | -0.00371 (0.907) | -0.0550* (0.087) |
| | Firm fixed effects | Y | Y |
| | Year fixed effects | Y | Y |
| | Cluster by country-industry | Y | Y |
| | Controls | Y | Y |
| | N | 13,749 | 13,741 |
| | R-squared | 0.033 | 0.05 |
| 3 years | CPTPP*services | -0.02 (0.436) | -0.0237 (0.419) |
| | <i>CPTPP</i> | 0.000814 (0.982) | -0.0242 (0.475) |
| | Firm fixed effects | Y | Y |
| | Year fixed effects | Y | Y |
| | Cluster by country-industry | Y | Y |
| | Controls | Y | Y |
| | N | 16,640 | 16,632 |
| | R-squared | 0.044 | 0.042 |

*Note: The results of the DiD regression from Equation (2) $R\&D\ Operations_{it} = \alpha + \mu * CPTPP_{kt} + \rho * services * CPTPP_{kt} + \beta_1 Treat_{i,t} * services + \beta_2 Post_{i,t} * services + \lambda * X_{ikt} + \gamma_i + \tau_t + \varepsilon_{it}$. In our study, the variable of interest, $CPTPP_{kt} * services$, represents the additional impact of the CPTPP on the R&D operation of firms in technology intense industries. Our controls include an average of the WGI to represent political factors, GDP growth, the lagged variable of R&D Operations, the Cash Flow to Sales Ratio, the Debt Ratio as a proportion of debt to assets, and the natural logarithm of total assets as a proxy for firm size as outlined by Alam et al. (2019). Additionally, we include Liquidity, defined as*

*the ratio of current assets to current liabilities, as delineated by Chun et al. (2014). We also control for firm and year fixed effects while clustering by country-industry following Dasgupta and Žaldokas (2019). The values in parentheses are p-values. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.*

From Table 7, the behavior observed in service-oriented industries aligns significantly with the Pecking Order Theory of corporate finance. In this theoretical framework, firms are known to prioritize internal financing when new market opportunities present themselves. With the enactment of the CPTPP, service-oriented firms demonstrate a strategic reallocation of R&D capital toward sales and marketing activities, a pivotal move that allows them to meet evolving customer expectations and penetrate new markets efficiently. This is not a mere shift in financial priorities, but a planned strategic decision aimed at harnessing the advantages introduced by the trade agreement. In particular, in the first year after CPTPP, the negative significant result suggests that R&D intensity of Japanese services-oriented firms decrease by 5.55% comparing to other companies. The investment in R&D of these firms increase over years after CPTPP by the attenuated decline gradually during the second and third year accordingly comparing to firms in other industries, indicated by the insignificance of coefficients of CPTPP*services in the second and third year after CPTPP. The results of R&D operational efficiency show the same pattern with the decreasing negative effects during the three years after CPTPP since 4.36% in the first year.

This sustained decline in R&D investment, which decreases over time, can be partially explained by Hofstede's (2011) cultural dimensions theory. As firms deepen their understanding of local cultures and successfully adapt their offerings, the initial urgency for market and cultural adaptation diminishes. Consequently, the reallocated resources begin to stabilize, perhaps even indicating a future recommitment to R&D activities, especially in long-term oriented cultures like Japan (Nevins et al., 2007).

In terms of comparisons with technology-intensive industries, both sectors exhibit similar declines in R&D investment after the initiation of trade agreements like the CPTPP. However, the underlying reasons for this shift differ considerably. While technology-intensive industries may cut R&D expenses to scale their existing innovations, service-oriented industries face

unique challenges that necessitate a greater focus on market adaptation and cultural understanding (Baldwin & Clark, 2000; Ethiraj et al., 2008; Vargo & Lusch, 2004). This compels them to divert funds originally slated for R&D toward market research, customization, and customer engagement.

In summary, our findings offer robust empirical support for Hypothesis H4 suggesting that the CPTPP significantly alters the R&D investment strategies of service-oriented industries. This is not a mere realignment of financial numbers. It reflects the complex, multifaceted strategic decisions these firms make as they navigate the novel challenges and opportunities ushered in by international trade agreements like the CPTPP.

4.5.2.4. Additional impact of CPTPP on financially constrained firms

Table 8: Interaction test to assess CPTPP's additional effects on R&D operations in highly financially constrained firms in Japan

| | | R&D/assets | R&D/sales |
|---------|--------------------------------|-----------------------|-----------------------|
| 1 year | CPTPP*Financially_constrained | -0.0645*** (0.009) | -0.0629** (0.020) |
| | <i>CPTPP</i> | 0.0364 (0.322) | 0.0141 (0.738) |
| | Firm fixed effects | Y | Y |
| | Year fixed effects | Y | Y |
| | Cluster by country-industry | Y | Y |
| | Controls | Y | Y |
| | N | 11,008 | 11,004 |
| | R-squared | 0.029 | 0.048 |
| 2 years | CPTPP* Financially_constrained | -0.0571*** (0.003) | -0.0565*** (0.007) |
| | <i>CPTPP</i> | 0.0135 (0.683) | -0.0358 (0.302) |
| | Firm fixed effects | Y | Y |
| | Year fixed effects | Y | Y |
| | Cluster by country-industry | Y | Y |
| | Controls | Y | Y |
| | N | 13,749 | 13,741 |
| | R-squared | 0.033 | 0.05 |
| 3 years | CPTPP* Financially_constrained | -0.0483*** (0.008) | -0.0494** (0.012) |
| | <i>CPTPP</i> | 0.019 (0.608) | -0.00648 (0.860) |
| | Firm fixed effects | Y | Y |
| | Year fixed effects | Y | Y |
| | Cluster by country-industry | Y | Y |
| | Controls | Y | Y |
| | N | 16,640 | 16,632 |
| | R-squared | 0.044 | 0.042 |

*Note: The results of the DiD regression from Equation (2) $R\&D\ Operations_{it} = \alpha + \mu * CPTPP_{kt} + \rho * financially_constrained * CPTPP_{kt} + \beta_1 Treat_{i,t} * financially_constrained + \beta_2 Post_{i,t} * financially_constrained + \lambda * X_{ikt} + \gamma_i + \tau_t + \epsilon_{it}$. Firms with a financial leverage ratio higher than the median of its industry in the year before the event date is classified as a financially constrained firm. In our study, the variable of interest, $CPTPP_{kt} * financially_constrained$, represents the additional impact of the CPTPP on the R&D operations of financially constrained firms. Our controls include an average of the WGI to represent political factors, GDP growth, the lagged variable of R&D*

*Operations, the Cash Flow to Sales Ratio, the Debt Ratio as a proportion of debt to assets, and the natural logarithm of total assets as a proxy for firm size as outlined by Alam et al. (2019). Additionally, we include Liquidity, defined as the ratio of current assets to current liabilities, as delineated by Chun et al. (2014). We also control for firm and year fixed effects while clustering by country-industry following Dasgupta and Žaldokas (2019). The values in parentheses are p-values. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.*

For financially constrained firms in Japan, the CPTPP poses a double-edged sword. On the one hand, it offers new market opportunities that are too lucrative to pass up. Alternatively, these firms operate under stringent budget limitations making it challenging to allocate resources to R&D without compromising immediate financial stability (Brealey et al., 2020; Myers & Majluf, 1984). Here, the Pecking Order Theory of corporate finance becomes salient. These firms, already struggling with financial constraints, will prioritize immediate revenue-generating activities that could ease their liquidity issues (Blinder, 2019; Bustos, 2011; Collier et al., 2010; Krugman, 1987; Puga & Venables, 1997). Hence, the observed initial decline in R&D intensity and efficiency found in Table 8 can be attributed to a strategic shift in resource allocation aimed at rapidly capturing new market opportunities opened by the CPTPP.

As time progresses, the phenomenon shows signs of attenuation. This diminishing impact can be interpreted through the lens of resource-based theory (Barney, 1991; Penrose, 1995). As these financially constrained firms gain a firmer foothold in new markets and their financial positions stabilize, they are likely to revert to their original strategic orientation that often includes R&D for long-term competitiveness. In particular, in the first year after CPTPP, the negative significant result suggests that R&D intensity of financially constrained firms in Japan decrease by 6.25% comparing to other companies. The investment in R&D of these firms increase over years after CPTPP by the attenuated decline gradually by 5.55% and 4.72% during the second and third year accordingly comparing to firms in other industries. The results of R&D operational efficiency show the same pattern with the decreasing negative effects by 6.1% and 5.49% and 4.82% during the three years after CPTPP in that order.

From a cultural standpoint, Hofstede's (2011) long-term orientation index further complements this explanation. Despite facing financial constraints, Japanese firms are culturally inclined to take a longer-term view. So, while the immediate pressures of the CPTPP may compel these

firms to cut back on R&D temporarily, their deeply ingrained cultural norms advocate for a balanced, sustainable approach that would eventually see a resumption of R&D activities.

In summary, the CPTPP has a pronounced initial impact on diminishing R&D activities in financially constrained Japanese firms. However, this trend tends to wane over time as these firms stabilize their financial conditions and as cultural influences nudge them back toward a more balanced allocation of resources inclusive of R&D investments for long-term sustainability. The results, in general, confirm the Hypothesis 5.

4.5.2.5. Additional impact of CPTPP on high sales growth firms

Table 9: Interaction test to assess CPTPP's additional effects on R&D operations in high sales growth firms in Japan

| | | R&D/assets | R&D/sales |
|-----------|-----------------------------|------------|-----------|
| 1 year | CPTPP*high_sale_growth | 0.0438* | -0.0252 |
| | | (0.054) | (0.221) |
| | <i>CPTPP</i> | -0.0171 | -0.00303 |
| | | (0.654) | (0.940) |
| | Firm fixed effects | Y | Y |
| | Year fixed effects | Y | Y |
| | Cluster by country-industry | Y | Y |
| | Controls | Y | Y |
| N | 11,008 | 11,004 | |
| R-squared | 0.029 | 0.047 | |
| 2 years | CPTPP*high_sale_growth | 0.0532*** | -0.00207 |
| | | (0.006) | (0.919) |
| | <i>CPTPP</i> | -0.0412 | -0.0619* |
| | | (0.234) | (0.068) |
| | Firm fixed effects | Y | Y |
| | Year fixed effects | Y | Y |
| | Cluster by country-industry | Y | Y |
| | Controls | Y | Y |
| N | 13,749 | 13,741 | |
| R-squared | 0.033 | 0.05 | |
| 3 years | CPTPP*high_sale_growth | 0.0707*** | 0.022 |
| | | (0.001) | (0.338) |
| | <i>CPTPP</i> | -0.0408 | -0.0416 |
| | | (0.283) | (0.230) |
| | Firm fixed effects | Y | Y |
| | Year fixed effects | Y | Y |
| | Cluster by country-industry | Y | Y |
| | Controls | Y | Y |
| N | 16,640 | 16,632 | |
| R-squared | 0.045 | 0.042 | |

*Note: The results of the DiD regression from Equation (2) $R\&D\ Operations_{it} = \alpha + \mu * CPTPP_{kt} + \rho * high_sales_growth * CPTPP_{kt} + \beta_1 Treat_{i,t} * high_sales_growth + \beta_2 Post_{i,t} * high_sales_growth + \lambda * X_{ikt} + \gamma_i + \tau_t + \varepsilon_{it}$. A firm with sales growth higher than the median of its industry in the year before event date is classified as a high sales growth firm. In our study, the variable of interest, $CPTPP_{kt} * high_sales_growth$, represents the additional impact of the CPTPP on the R&D operations of high sales growth firms. Our controls include an average of the WGI to represent political factors, GDP growth, the lagged variable of R&D Operations, the Cash Flow to Sales Ratio, the Debt*

*Ratio as a proportion of debt to assets, and the natural logarithm of total assets as a proxy for firm size as outlined by Alam et al. (2019). Additionally, we include Liquidity, defined as the ratio of current assets to current liabilities, as delineated by Chun et al. (2014). We also control for firm and year fixed effects while clustering by country-industry following Dasgupta and Žaldokas (2019). The values in parentheses are p-values. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.*

For companies already experiencing robust sales growth, the CPTPP serves as a springboard to intensify their focus further on R&D activities as reflected by a marked increase in both R&D intensity and efficiency over time. Unlike financially constrained firms that initially divert resources away from R&D to meet immediate market opportunities, high growth firms find themselves in a unique strategic position. With ample internal resources already in place due to their strong sales performance, these firms are not compelled to make a trade-off between short-term market penetration and long-term innovation. Instead, they choose to double down on R&D investments leveraging their financial leeway to bolster their innovation capabilities and aligning with the results from Table 9. In doing so, they seek to secure a sustainable competitive advantage that will serve them well beyond the immediate opportunities presented by the CPTPP. In particular, in the first year after CPTPP, the negative significant result suggests that R&D intensity of Japanese high sales growth firms increase by 4.48% comparing to other companies. The investment in R&D of these firms increase over years after CPTPP by the increases by 5.46% and 7.33% during the second and third year accordingly comparing to firms in other industries. The results of R&D operational efficiency show insignificant results across three years after CPTPP.

From a theoretical vantage point, our observations are consistent with the Pecking Order Theory. According to this theory, companies generally favor internal financing over external sources for new investments. For firms already experiencing robust sales growth, this internal financing capability is not merely a default preference, but a strategic advantage. These organizations have the latitude to allocate a significant portion of their abundant internal resources toward R&D reinforcing their competitive edge for the long term (Hottenrott & Peters, 2012). In the context of the CPTPP, this strategic financial flexibility allows high sales growth firms to not just adapt, but thrive channeling their internal funds into R&D to maximize the long-term benefits of new market opportunities presented by the trade agreement.

This substantial investment in R&D is also in harmony with Japan's cultural attributes, particularly its high score in Long-term Orientation as per Hofstede's (2011) cultural dimensions. This is indicative of a preference for long-term planning and delayed gratification that manifests in these firms' willingness to invest heavily in R&D even when immediate, less risky opportunities are available. They appear to interpret the CPTPP as an opportunity to solidify their future market position through enhanced innovation and efficiency (Lincoln et al., 1986).

To summarize, high sales growth firms are leveraging the opportunities presented by the CPTPP to invest aggressively in R&D activities amplifying their R&D intensity and efficiency. This is far from a straightforward financial decision. It represents a complex interplay of strategic foresight, financial theory, and cultural influence. These firms are not just reacting to market changes. They are proactively shaping their long-term future in response to them. The results, in general, confirm the Hypothesis 6.

Robustness checks were conducted to validate the findings concerning high sales growth firms' intensified focus on R&D post-CPTPP. Interestingly, from Table A10 in Appendix, similar patterns emerged when focusing on firms with high free cash flows (FCF), classified as having an FCF greater than the industry median in the year prior to the CPTPP. Our robustness check revealed that high FCF firms, much like their high sales growth counterparts, escalated their R&D intensity and efficiency following the CPTPP's implementation. This finding suggests that independent of the primary revenue growth engine, firms with strong internal financing capabilities, either through robust sales growth or high FCF, seem to be strategically directing these resources toward bolstering their R&D activities.

From a theoretical standpoint, this robustness check aligns well with the Pecking Order Theory. The theory suggests that firms with abundant internal resources, whether those come from high sales growth or high free cash flow, are likely to reinvest in value-adding activities such as R&D. This new evidence strengthens the argument that internal financing capability, regardless as to its source, serves as a strategic advantage in firms' decisions to intensify R&D activities.

In summary, the robustness check offers further validation of our Hypothesis 6 and suggests that the strategic redirection of internal financing toward R&D is not merely a characteristic of high sales growth firms. Firms with high FCF also appear to be leveraging the CPTPP to make similar

strategic commitments to long-term innovation. This additional layer of empirical support adds depth to our understanding of how internal financing capabilities enable firms to adapt and thrive in the changing landscape created by international trade agreements like the CPTPP.

4.5. Conclusion

Our study offers a comprehensive view as to how the CPTPP impacts R&D operations across different types of Japanese firms. At the aggregate level, the net influence remains equivocal, a complexity attributed to interplay of divergent forces. The heightened intellectual property safeguards embedded in the CPTPP act as catalysts for R&D capital allocation. Alternatively, market augmentation engenders a concomitant expansion in both revenue streams and asset bases, which, in turn, exerts an influence on key R&D Operations metrics like R&D intensity and efficiency. This dual effect is further complicated by the rise of “factoryless” management approaches that could necessitate additional fixed asset investments.

Regarding sector-specific impact, the manufacturing sector experiences an increase in R&D operations aligning with Japan's historical emphasis on technological innovation and long-term orientation. In contrast, service-oriented and technology firms initially display a reduction in R&D activities following the CPTPP's enactment. This trend diminishes over time, potentially due to a combination of strategic resource reallocation in line with the Pecking Order Theory of corporate finance and Japan's cultural emphasis on long-term orientation. The latter could motivate firms to reassess and gradually reinstate their commitment to R&D, aligning with a broader, future-oriented strategy even as they capitalize on immediate market expansion opportunities. High sales growth firms stand out by showing an initial and sustained increase in R&D operations, possibly powered by their robust internal financing capabilities. On a different note, financially constrained firms experience an initial decline in R&D activities, although this trend wanes over time, influenced by different financial dynamics and perhaps cultural factors affecting resource allocation.

These varying impacts can be understood within the framework of Japan's efforts to reclaim its position as a technological leader, its cultural dimension of long-term orientation, firm characteristics, and the theoretical underpinnings of the Pecking Order Theory. Collectively,

these findings underscore the complexity of international trade agreements like the CPTPP on corporate R&D strategies necessitating a multifaceted policy approach for maximal benefit.

Appendix

Table A1: Source and definition of variables in our sample

| Variables | Calculation | Sources |
|--------------------------------|--|------------|
| R&D Intensity | R&D Investment/Total Assets | Datastream |
| R&D Efficiency | R&D Investment/Total Sales or Revenues | Datastream |
| Firm size | Ln(Total Assets) | Datastream |
| Tangibility | Net property, plant, and equipment/Total assets | Datastream |
| Cash flow | Cash flow/Sales | Datastream |
| Debt ratio | Debts/Total Assets | Datastream |
| Liquidity | Current Assets/ Current Liabilities | Datastream |
| MB | Market value over book value | Datastream |
| Profits | Operating profit before taxes and depreciation/Total Assets | Datastream |
| GDP growth | Annual percentage growth rate of GDP at market prices based on constant local currency. | WorldBank |
| Worldwide Governance Indicator | Average of the six dimensions: Control of Corruption, Government Effectiveness, Political Stability and Absence of Violence, Regulatory Quality, Rule of Laws, and Voice and Accountability. | WorldBank |
| Herfindahl-Hirschman Index | Squaring the market share of each firm competing in the market and then summing the resulting squares. | Datastream |

Note: These are all of the variables used in this paper. The sources are Refinitiv Datastream for the firm-level variables and World Bank for the country-level ones.

Table A2: Logistic regression for calculating propensity score

| Variables | Treat | |
|--------------------------------|-------------|---------|
| | Coefficient | p-value |
| R&D Intensity _{i,t-1} | -6.4*** | 0.000 |
| Firm size | 0.368*** | 0.000 |
| Cash flow | -0.001 | 0.239 |
| Debt ratio | -0.024*** | 0.000 |
| Liquidity | 0.03** | 0.048 |
| MB | 0.068*** | 0.000 |
| No. of obs | 5,324 | |
| R-squared | 0.1176 | |

*Note: This logistic regression is employed for propensity score calculation utilizing the average pre-treatment characteristics for each firm. The dependent variable in this analysis is “Treat” denoting firms in Japan with a value of one and others with a value of zero. Industry-fixed effects have been accounted for in this regression. Significance levels are denoted as follows: *** signifies 1%, ** indicates 5%, and * represents 10%.*

Table A3: Standardized Mean Differences test for matched sample

| Variable | Standardized Mean Differences |
|--------------------------------|-------------------------------|
| R&D Intensity _{i,t-1} | -0.009 |
| Firm size | -0.043 |
| Cash flow | 0.073 |
| Debt ratio | -0.096 |
| Liquidity | 0.001 |
| MB | -0.068 |

Note: Standardized Mean Differences for the firm characteristics in the matched sample.

Table A4: Details of firms by countries per year in the matched sample

| Year | Japan | South Korea | Taiwan |
|------|-------|-------------|--------|
| 2017 | 1,613 | 934 | 679 |
| 2018 | 1,613 | 934 | 679 |
| 2019 | 1,613 | 934 | 679 |
| 2020 | 1,613 | 934 | 679 |
| 2021 | 1,613 | 934 | 679 |

Note: The number of firms per year for each country in the matched sample.

Table A5: Number of firms in each industry in the matched sample for the treatment and control groups per year**Panel A: Number of firms in each industry in the matched sample for the treatment group (Japan)**

| YEAR | AUTMB | BRESR | CHMCL | CNSTM | CONPS | ENEGY | FDBEV | HLTHC | INDGS | MEDIA | PCDGS | RTAIL | TECNO | TELCM | TRLES |
|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 2016 | 95 | 107 | 103 | 104 | 131 | 13 | 87 | 131 | 366 | 21 | 17 | 12 | 383 | 32 | 11 |
| 2017 | 95 | 107 | 103 | 104 | 131 | 13 | 87 | 131 | 366 | 21 | 17 | 12 | 383 | 32 | 11 |
| 2018 | 95 | 107 | 103 | 104 | 131 | 13 | 87 | 131 | 366 | 21 | 17 | 12 | 383 | 32 | 11 |
| 2019 | 95 | 107 | 103 | 104 | 131 | 13 | 87 | 131 | 366 | 21 | 17 | 12 | 383 | 32 | 11 |
| 2020 | 95 | 107 | 103 | 104 | 131 | 13 | 87 | 131 | 366 | 21 | 17 | 12 | 383 | 32 | 11 |
| 2021 | 95 | 107 | 103 | 104 | 131 | 13 | 87 | 131 | 366 | 21 | 17 | 12 | 383 | 32 | 11 |

Panel B: Number of firms in each industry in the matched sample for the treatment group**Panel B.1: Number of firms in each industry in Taiwan**

| YEAR | AUTMB | BRESR | CHMCL | CNSTM | CONPS | ENEGY | FDBEV | HLTHC | INDGS | MEDIA | PCDGS | RTAIL | TECNO | TELCM | TRLES |
|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 2016 | 26 | 39 | 44 | 28 | 43 | 11 | 32 | 47 | 163 | 3 | 6 | 2 | 215 | 14 | 6 |
| 2017 | 26 | 39 | 44 | 28 | 43 | 11 | 32 | 47 | 163 | 3 | 6 | 2 | 215 | 14 | 6 |
| 2018 | 26 | 39 | 44 | 28 | 43 | 11 | 32 | 47 | 163 | 3 | 6 | 2 | 215 | 14 | 6 |
| 2019 | 26 | 39 | 44 | 28 | 43 | 11 | 32 | 47 | 163 | 3 | 6 | 2 | 215 | 14 | 6 |
| 2020 | 26 | 39 | 44 | 28 | 43 | 11 | 32 | 47 | 163 | 3 | 6 | 2 | 215 | 14 | 6 |
| 2021 | 26 | 39 | 44 | 28 | 43 | 11 | 32 | 47 | 163 | 3 | 6 | 2 | 215 | 14 | 6 |

Panel B.2: Number of firms in each industry in South Korea

| YEAR | AUTMB | BRESR | CHMCL | CNSTM | CONPS | ENEGY | FDBEV | HLTHC | INDGS | MEDIA | PCDGS | RTAIL | TECNO | TELCM | TRLES |
|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 2016 | 69 | 68 | 59 | 76 | 88 | 2 | 55 | 84 | 203 | 18 | 11 | 10 | 168 | 18 | 5 |
| 2017 | 69 | 68 | 59 | 76 | 88 | 2 | 55 | 84 | 203 | 18 | 11 | 10 | 168 | 18 | 5 |
| 2018 | 69 | 68 | 59 | 76 | 88 | 2 | 55 | 84 | 203 | 18 | 11 | 10 | 168 | 18 | 5 |
| 2019 | 69 | 68 | 59 | 76 | 88 | 2 | 55 | 84 | 203 | 18 | 11 | 10 | 168 | 18 | 5 |
| 2020 | 69 | 68 | 59 | 76 | 88 | 2 | 55 | 84 | 203 | 18 | 11 | 10 | 168 | 18 | 5 |
| 2021 | 69 | 68 | 59 | 76 | 88 | 2 | 55 | 84 | 203 | 18 | 11 | 10 | 168 | 18 | 5 |

Note: We utilize the Datastream's Industry Level 3 Name (INDC3) for industry classifications in line with the methodological precedent set by Chattopadhyay et al. (2020) and Chlomou and Demirakos (2020). In particular, "AUTMB:" Automobiles & Parts; "BRESR:" Basic Resources, "CHMCL:" Chemicals; "CNSTM:" Construction & Mats, "CONPS:" Consumer Prod & Services, "ENEGY:" Energy, "FDBEV:" Food and Beverage, "HLTHC:" Health Care, "INDGS:" Ind. Goods & Services, "MEDIA:" Media, "PCDGS:" Drug & Grocery Stores, "RTAIL:" Retailers, "TECNO:" Technology, "TELCM:" Telecommunications, and "TRLES:" Travel and Leisure.

Table A6: Impact of CPTPP on R&D operations of firms in Japan (Specification 2)

| | 1 year | | 2 years | | 3 years | |
|--------------------|-------------------|-------------------|--------------------|---------------------|---------------------|--------------------|
| | R&D intensity | R&D efficiency | R&D intensity | R&D efficiency | R&D intensity | R&D efficiency |
| CPTPP | 0.0055 (0.879) | -0.016 (0.665) | -0.0139 (0.622) | -0.0630* (0.054) | -0.00419 (0.884) | -0.0302 (0.314) |
| Firm fixed effects | Y | Y | Y | Y | Y | Y |
| Year fixed effects | Y | Y | Y | Y | Y | Y |
| Controls | Y | Y | Y | Y | Y | Y |
| N | 11,008 | 11,004 | 13,749 | 13,741 | 16,640 | 16,632 |
| R-squared | 0.029 | 0.047 | 0.033 | 0.05 | 0.044 | 0.042 |

*Note: The results of the Difference-in-Differences regression from Equation (1): $R\&D\ Operations_{it} = \alpha + \beta_1 * R\&D\ Operations_{i,t-1} + \beta_2 * WGI_{kt} + \beta_3 * Firm\ size_{it} + \beta_4 * Cash\ flow_{it} + \beta_5 * Debt\ ratio_{it} + \beta_6 * GDP\ growth_{kt} + \beta_7 * HHI_{it} + \beta_8 * Liquidity_{it} + \beta_9 * MB_{it} + \mu * CPTPP_{kt} + \lambda * Treat_{it} + \nu * Post_{it} + \gamma_i + \tau_t + \varepsilon_{it}$. In our study, the variable of interest, CPTPP, represents the impact of Japan's participation in the agreement on the firms' R&D operations. Our firm-level control variables include firm size, cash flow, debt ratio, liquidity, and MB, while the industry-control is HHI and the country-level independent variables are GDP growth and political factors as the average of the six dimensions from the WGI. All firm-specific variables have been subjected to a 1% winsorization. We also control for firm and year fixed effects following Lu et al., (2023a) (specification 2). The values in parentheses are p-values. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.*

Table A7: Impact of CPTPP on R&D operations of firms in Japan (Specification 3)

| | 1 year | | 2 years | | 3 years | |
|---------------------|-------------------|-------------------|--------------------|---------------------|---------------------|--------------------|
| | R&D intensity | R&D efficiency | R&D intensity | R&D efficiency | R&D intensity | R&D efficiency |
| CPTPP | 0.0055 (0.850) | -0.016 (0.641) | -0.0139 (0.556) | -0.0630* (0.057) | -0.00419 (0.894) | -0.0302 (0.299) |
| Firm fixed effects | Y | Y | Y | Y | Y | Y |
| Year fixed effects | Y | Y | Y | Y | Y | Y |
| Cluster by industry | Y | Y | Y | Y | Y | Y |
| Controls | Y | Y | Y | Y | Y | Y |
| N | 11,008 | 11,004 | 13,749 | 13,741 | 16,640 | 16,632 |
| R-squared | 0.029 | 0.047 | 0.033 | 0.05 | 0.044 | 0.042 |

*Note: The results of the Difference-in-Differences regression from Equation (1): $R\&D\ Operations_{it} = \alpha + \beta_1 * R\&D\ Operations_{i,t-1} + \beta_2 * WGI_{kt} + \beta_3 * Firm\ size_{it} + \beta_4 * Cash\ flow_{it} + \beta_5 * Debt\ ratio_{it} + \beta_6 * GDP\ growth_{kt} + \beta_7 * HHI_{it} + \beta_8 * Liquidity_{it} + \beta_9 * MB_{it} + \mu * CPTPP_{kt} + \lambda * Treat_{it} + \nu * Post_{it} + \gamma_i + \tau_t + \varepsilon_{it}$. In our study, the variable of interest, CPTPP, represents the impact of Japan's participation in the agreement on firms' R&D operations. Our firm-level control variables include firm size, cash flow, debt ratio, liquidity, and MB, while the industry-control is HHI and the country-level independent variables are GDP growth and political factors as the average of the six dimensions from the WGI. All firm-specific variables have been subjected to a 1% winsorization. We also control for firm and year fixed effects clustering by industry (specification 3). Industries are classified by INDC3 from Datastream following Chattopadhyay et al. (2020) and Chlomou and Demirakos (2020). The values in parentheses are p-values. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.*

Table A8: Impact of CPTPP on R&D operations of firms in Japan (Specification 4)

| | 1 year | | 2 years | | 3 years | |
|-----------------------------|--------------------|--------------------|--------------------|---------------------|---------------------|--------------------|
| | R&D intensity | R&D efficiency | R&D intensity | R&D efficiency | R&D intensity | R&D efficiency |
| CPTPP | 0.00948 (0.732) | -0.0144 (0.662) | -0.0102 (0.665) | -0.0579* (0.053) | -0.00135 (0.967) | -0.0267 (0.355) |
| Firm fixed effects | Y | Y | Y | Y | Y | Y |
| Year*Industry fixed effects | Y | Y | Y | Y | Y | Y |
| Cluster by industry | Y | Y | Y | Y | Y | Y |
| Controls | Y | Y | Y | Y | Y | Y |
| N | 11,008 | 11,004 | 13,749 | 13,741 | 16,640 | 16,632 |
| R-squared | 0.034 | 0.053 | 0.039 | 0.057 | 0.049 | 0.048 |

*Note: The results of the Difference-in-Differences regression from Equation (1): $R\&D\ Operations_{it} = \alpha + \beta_1 * R\&D\ Operations_{i,t-1} + \beta_2 * WGI_{kt} + \beta_3 * Firm\ size_{it} + \beta_4 * Cash\ flow_{it} + \beta_5 * Debt\ ratio_{it} + \beta_6 * GDP\ growth_{kt} + \beta_7 * HHI_{it} + \beta_8 * Liquidity_{it} + \beta_9 * MB_{it} + \mu * CPTPP_{kt} + \lambda * Treat_{it} + \nu * Post_{it} + \gamma_i + \tau_t + \varepsilon_{it}$. In our study, the variable of interest, CPTPP, represents the impact of Japan's participation in the agreement on the country's operational efficiency. Our firm-level control variables include firm size, cash flow, debt ratio, liquidity, and MB, while the industry-control is HHI and the country-level independent variables are GDP growth and political factors as the average of the six dimensions from the WGI. All firm-specific variables have been subjected to a 1% winsorization. We also control for firm and year*industry fixed effects clustering by industry (specification 4). Industries are classified by INDC3 from Datastream following Chattopadhyay et al. (2020) and Chlomou and Demirakos (2020). The values in parentheses are p-values. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.*

Table A9: Interaction test to assess CPTPP's additional effects on R&D operations in manufacturing industries in Japan (robustness test)

| | | R&D/assets | R&D/sales |
|---------|-----------------------------|---------------------|----------------------|
| 1 year | CPTPP*manufacturing_robust | 0.0531** (0.031) | 0.0469** (0.013) |
| | <i>CPTPP</i> | -0.0304 (0.434) | -0.0477 (0.234) |
| | Firm fixed effects | Y | Y |
| | Year fixed effects | Y | Y |
| | Cluster by country-industry | Y | Y |
| | Controls | Y | Y |
| | N | 11,008 | 11,004 |
| | R-squared | 0.029 | 0.048 |
| 2 years | CPTPP*manufacturing_robust | 0.0514** (0.039) | 0.0532** (0.028) |
| | <i>CPTPP</i> | -0.0489 (0.204) | -0.0993** (0.011) |
| | Firm fixed effects | Y | Y |
| | Year fixed effects | Y | Y |
| | Cluster by country-industry | Y | Y |
| | Controls | Y | Y |
| | N | 13,749 | 13,741 |
| | R-squared | 0.033 | 0.05 |
| 3 years | CPTPP*manufacturing_robust | 0.0324 (0.165) | 0.0460** (0.029) |
| | <i>CPTPP</i> | 0.0317 (0.351) | 0.136*** (0.001) |
| | Firm fixed effects | Y | Y |
| | Year fixed effects | Y | Y |
| | Cluster by country-industry | Y | Y |
| | Controls | Y | Y |
| | N | 16,640 | 16,632 |
| | R-squared | 0.044 | 0.042 |

*Note: The results of the Difference-in-Differences regression from Equation (2) $R\&D\ Operations_{it} = \alpha + \mu * CPTPP_{kt} + \rho * manufacturing_robust * CPTPP_{kt} + \beta_1 Treat_{i,t} * manufacturing_robust + \beta_2 Post_{i,t} * manufacturing_robust + \lambda * X_{ikt} + \gamma_i + \tau_t + \varepsilon_{it}$. Firms with two-digit SIC codes ranging from 21 to 39 are manufacturing entities. In our study, the variable of interest, $CPTPP_{kt} * manufacturing$, represents the additional impact of the CPTPP on the operational efficiency of firms in manufacturing industries. Our controls include an average of the WGI to represent political factors, GDP growth, the lagged variable of R&D Operations, the Cash*

*Flow to Sales Ratio, the Debt Ratio as a proportion of debt to assets, and the natural logarithm of total assets as a proxy for firm size as outlined by Alam et al. (2019). Additionally, we include Liquidity, defined as the ratio of current assets to current liabilities, as delineated by Chun et al. (2014). We also control for firm and year fixed effects while clustering by country-industry following Dasgupta and Žaldokas (2019). The values in parentheses are p-values. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.*

Table A10: Interaction test to assess CPTPP's additional effects on R&D operations in firms with high FCF

| | | R&D/assets | R&D/sales |
|---------|-----------------------------|---------------------|----------------------|
| 1 year | CPTPP*high_fcf | 0.0414** (0.047) | 0.0551** (0.015) |
| | CPTPP | -0.0181 (0.641) | -0.0474 (0.274) |
| | Firm fixed effects | Y | Y |
| | Year fixed effects | Y | Y |
| | Cluster by country-industry | Y | Y |
| | Controls | Y | Y |
| | N | 11,008 | 11,004 |
| | R-squared | 0.029 | 0.048 |
| 2 years | CPTPP*high_fcf | 0.0336* (0.052) | 0.0516*** (0.001) |
| | CPTPP | -0.033 (0.357) | -0.0924** (0.012) |
| | Firm fixed effects | Y | Y |
| | Year fixed effects | Y | Y |
| | Cluster by country-industry | Y | Y |
| | Controls | Y | Y |
| | N | 13,749 | 13,741 |
| | R-squared | 0.033 | 0.05 |
| 3 years | CPTPP*high_fcf | 0.0375** (0.041) | 0.0682*** (0.000) |
| | CPTPP | -0.0253 (0.524) | -0.0685* (0.071) |
| | Firm fixed effects | Y | Y |
| | Year fixed effects | Y | Y |
| | Cluster by country-industry | Y | Y |
| | Controls | Y | Y |
| | N | 16,640 | 16,632 |
| | R-squared | 0.044 | 0.043 |

*Note: The results of the Difference-in-Differences regression from Equation (2) $R\&D\ Operations_{it} = \alpha + \mu * CPTPP_{kt} + \rho * high_fcf * CPTPP_{kt} + \beta_1 Treat_{i,t} * high_fcf + \beta_2 Post_{i,t} * high_fcf + \lambda * X_{ikt} + \gamma_i + \tau_t + \varepsilon_{it}$. Firms with free cash flows higher than the median of the industry in the year before the event date are classified as high free cash flow firms. In our study, the variable of interest, $CPTPP_{kt} * high_fcf$, represents the additional impact of the CPTPP on the R&D operations of high free cash flow firms. Our controls include an average of the WGI to represent political factors, GDP growth, the lagged variable of R&D Operations, the Cash Flow to Sales Ratio, the Debt Ratio as a proportion of debt to assets, and the natural logarithm of total assets as a proxy for firm size as outlined by Alam et al. (2019). Additionally, we include Liquidity, defined as the ratio of current assets to current liabilities, as delineated by Chun et al. (2014). We also control for firm and year fixed effects while clustering by country-industry following Dasgupta and Žaldokas (2019). The values in parentheses are p-values. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.*

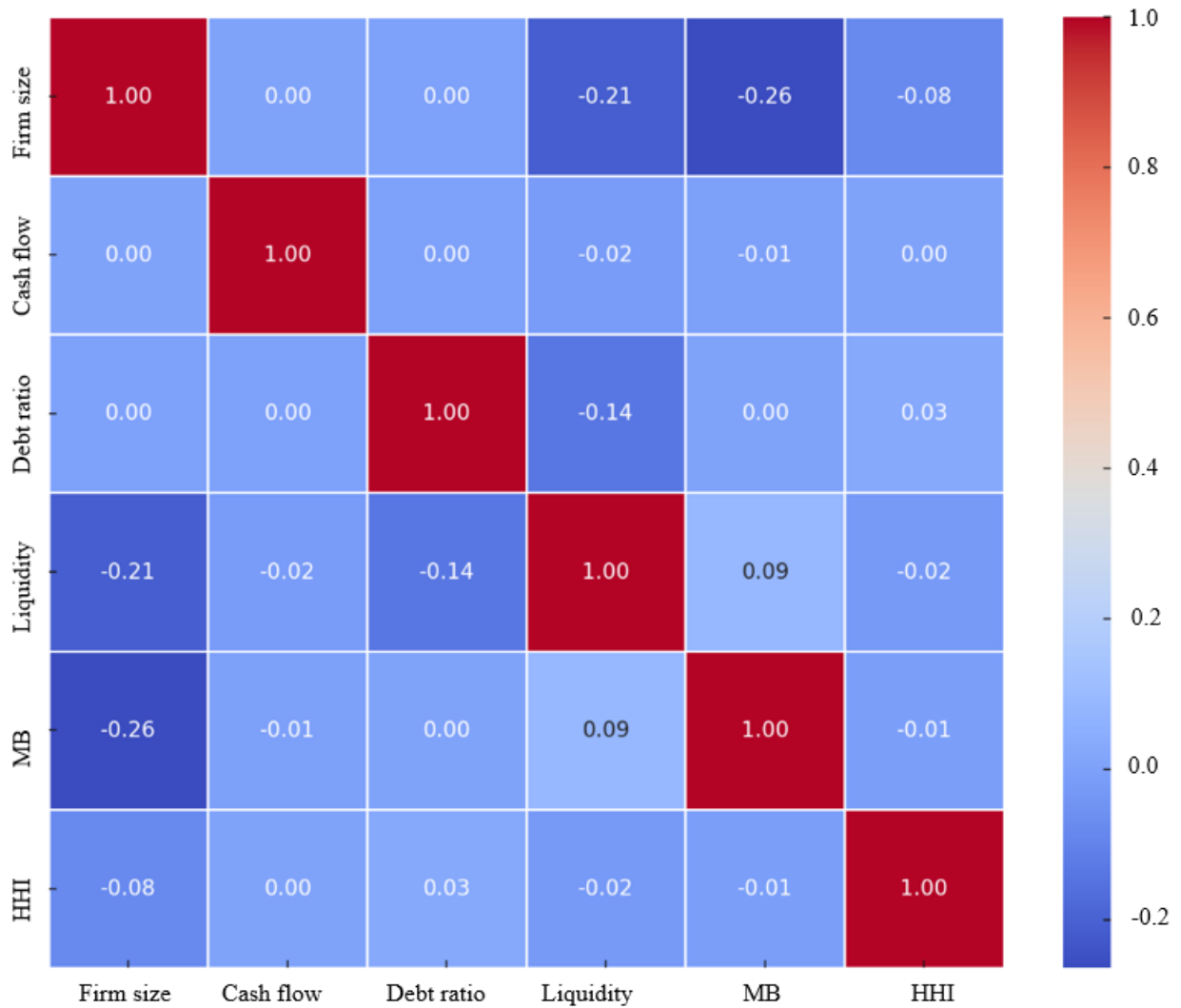


Figure A1: Correlation matrix of all independent variables

Note: Correlation matrix of all of the independent variables in this study. The heatmap illustrates the Pearson correlation coefficients among key financial variables: Firm size, Cash flow, Debt ratio, Liquidity, MB, and HHI. A value close to 1 or -1 indicates a strong positive or negative correlation, respectively, while a value around zero suggests weak or no correlation. This matrix serves as a preliminary step for further empirical analysis aiding in the identification of significant relationships and the avoidance of multicollinearity.

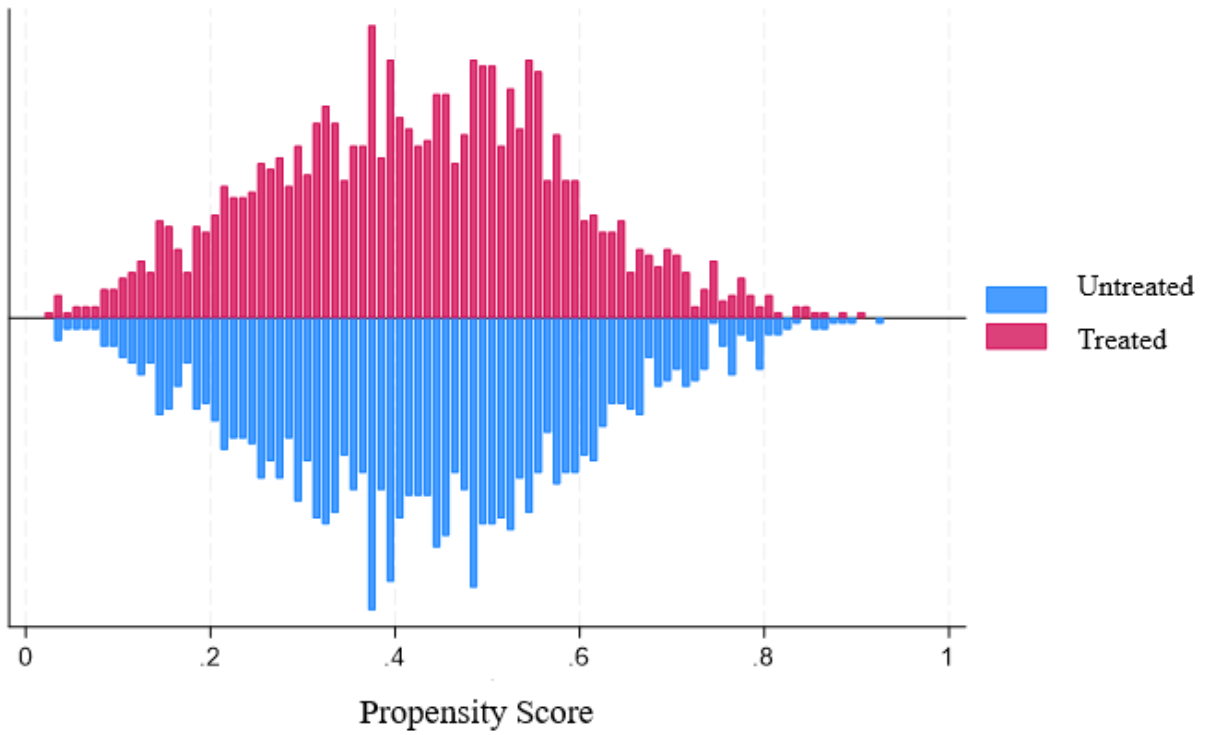


Figure A2: Propensity score distribution

Note: Visualization of the overlap, density, and balance between the treated and untreated groups.

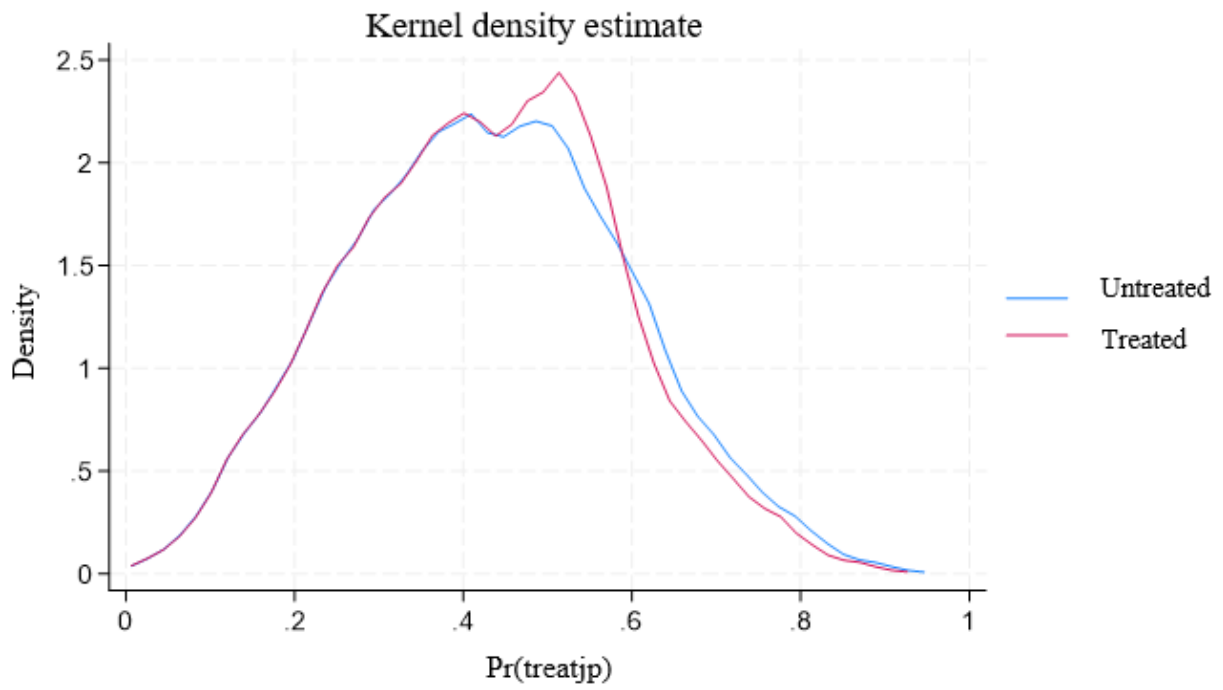


Figure A3: Kernel density estimate

Note: The Kernel density estimate, representing the density of the probability of being treated (firms in Vietnam) for both the treated and untreated groups in the matched sample.

Chapter Five: Summary of hypotheses

This chapter concludes our three essays. This study was motivated by the current research gap concerning the impact of leniency programs as an enhancement of antitrust and multi-region free trade agreements as CPTPP on firms' operations. This section summarizes the hypotheses and results from the three essays.

Table 1: Hypotheses and results for Essay One

| Essay One: Ratting out the cartel: How do corporations operationally react to leniency laws? | Status |
|---|---------|
| Hypothesis 1: The net impact of leniency laws on total assets turnover is indeterminate due to offsetting factors in fixed asset utilization and credit policy. | Support |
| Hypothesis 2: Fixed assets turnover increase after leniency laws. | Support |
| Hypothesis 3: Operating Cycle and Cash Conversion Cycle increase after leniency laws. | Support |
| Hypothesis 4: The net impact of leniency laws on inventory operational efficiency is indeterminate. | Support |
| Hypothesis 5: Receivable operational efficiency of firms decreases after the leniency program. | Support |
| Hypothesis 6: The negative impact of leniency laws on operational efficiency is more pronounced in developing countries compared to developed ones. | Support |
| Hypothesis 7: The impact of leniency laws on operational efficiency is more pronounced in low power distance countries. | Support |
| Hypothesis 8: The impact of leniency laws on operational efficiency is more pronounced in high avoidance uncertainty countries. | Support |
| Hypothesis 9: The impact of leniency laws on operational efficiency is more pronounced in long-term orientation countries. | Support |
| Hypothesis 10: The impact of leniency laws on operational efficiency is less pronounced in Individualistic countries. | Support |
| Hypothesis 11: The impact of leniency laws on operational efficiency is more pronounced in large firms. | Support |
| Hypothesis 12: The impact of leniency laws on operational efficiency is more pronounced in high profitability firms. | Support |

Table 2: Hypotheses and results for Essay Two

| Essay Two: Firm operational adaptation to mega regional trade agreements: Evidence from the impact of CPTPP on Vietnam | Status |
|--|---------|
| Hypothesis 1: Vietnamese firms experience a temporary decrease in operational efficiency after joining CPTPP. | Support |
| Hypothesis 2: High profitability firms experience a greater initial decrease in operational efficiency after joining the CPTPP. | Support |
| Hypothesis 3: Large firms in Vietnam experience superior operational efficiency as they effectively exploit the benefits of the CPTPP. | Support |
| Hypothesis 4: The implementation of the CPTPP does not exert an additional effect on the operational efficiency of high leverage firms in Vietnam. | Support |
| Hypothesis 5: Firms listed on the Ho Chi Minh Stock Exchange (HOSE) initially experience a decrease in operational efficiency. | Support |
| Hypothesis 6: Firm in least-affected industries by COVID-19 will witness outperformance in operational efficiency since the year 2020. | Support |

Table 3: Hypotheses and results for Essay Three

| Essay Three: Long-term orientation and innovation: Influence of CPTPP on R&D investment in Japanese firms | Status |
|---|---------|
| Hypothesis 1: The net impact of the CPTPP on R&D operations in Japanese firms is indeterminate due to opposing forces. | Support |
| Hypothesis 2: CPTPP leads to increased R&D operations of manufacturing firms in Japan. | Support |
| Hypothesis 3: CPTPP leads to an initial decrease in R&D operations among technology firms in Japan with this phenomenon diminishing over time. | Support |
| Hypothesis 4: CPTPP leads to an initial decrease in R&D operations among services-oriented firms in Japan with this phenomenon diminishing over time. | Support |
| Hypothesis 5: CPTPP leads to an initial decrease in R&D operations among financially constrained firms with this phenomenon diminishing over time. | Support |
| Hypothesis 6: The CPTPP leads to an initial increase in R&D operations metrics of high sales growth firms with this phenomenon increases over time. | Support |

Essay One uncovers the intricate operational dynamics of firms in the wake of the staggered implementation of leniency laws globally. Employing an advanced Difference-in-Differences (DiD) estimator by Borusyak et al. (2024), the study transcends traditional two-way fixed-effect models to yield a longitudinal analysis of operational performance under the influence of leniency laws. The dual strategic response of firms, extending credit terms and optimizing fixed asset utilization, reveals a complex interplay between short-term operational adjustments and long-term strategic reorientation. The study extends its analytical purview to a cross-country comparison, discerning cultural and economic variances in firm behavior as prescribed by Hofstede's (2011) dimensions and further delving into the strategic credit policies of varying firm sizes. This multi-dimensional analysis renders new insights into the operational implications of leniency laws and delineates the adaptive measures of firms within a global context.

Essay Two investigates the operational ramifications of Vietnam's engagement with the CPTPP across varying firm archetypes. The temporal efficiency trajectory post-CPTPP adoption reveals an initial inefficiency succeeded by a strategic recalibration and subsequent operational enhancement. The firm-specific analysis delineates a variance in response with high profit firms and large-scale enterprises displaying a more pronounced adaptation leveraging the CPTPP's strategic benefits. In contrast, financially constrained firms and those listed on the Ho Chi Minh

Stock Exchange (HOSE) manifested resilience and eventual efficiency improvement. The study offers critical implications for trade policy formulation, corporate strategy, and investment decision-making underscoring the transformative potential of trade agreements and advocating for a dynamic approach to understanding their effects on firm performance.

The study provides a sectorial and firm-specific dissection of the CPTPP's impact on R&D operations within Japanese firms. The aggregate analysis reveals a complex balance of forces with intellectual property protection serving as a propellant for R&D investment, while market expansion introduces complexities in R&D efficiency metrics. Manufacturing firms align with Japan's technological advancement ethos experiencing an uptick in R&D post-CPTPP. Conversely, service and technology sectors exhibit an initial R&D contraction, potentially offset over time by strategic reallocations, in consonance with the Pecking Order Theory and Japan's cultural proclivity toward long termism. High sales growth firms showcase an augmented commitment to R&D indicative of robust internal funding channels. The fluctuating trends among financially constrained firms imply a complex financial and cultural interplay in R&D investment decisions. This study contributes to the discourse on the strategic R&D responses of Japanese firms within the purview of the CPTPP integrating financial theories and cultural dimensions to explicate the observed patterns.

In summation, the studies present a panoramic view of the operational, strategic, and developmental implications for firms under varying regulatory and economic integrations. The first essay unravels the complex operational shifts undertaken by firms in response to the advent of leniency laws, highlighting a dual strategy of leveraging credit terms and optimizing asset use that transcends geographical and cultural confines. The second essay pivots to the microeconomic landscapes of Vietnamese firms within the CPTPP framework, tracing a trajectory of initial disruption followed by strategic adaptation with implications for diverse firm archetypes and financial resilience. The third essay shifts focus to the R&D investments of Japanese firms dissecting the interplay between sectorial propensities and firm-specific characteristics within the CPTPP's orbit. Collectively, these studies not only underscore the heterogeneity in firm responses to international policy shifts, but also contribute to a richer understanding of the strategic recalibrations within the global business milieu. They affirm the pertinence of strategic agility and the need for a deep appreciation of cultural and economic

diversity in shaping corporate policy and academic discourse in international business and finance.

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