THE REPUBLIC OF TURKİYE
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THE IMPACT OF BEING PUBLIC ON FIRM PERFORMANCE DURING COVID-19: A QUASI-EXPERIMENTAL STUDY FOR TURKİYE

Master's Thesis

Kadir GÜRCİ

Master of Science in Economics

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بِسْمِ اللهِ الرَّحْمنِ الرَّحِيمِ

(In the Name of Allah, The Beneficent, The Merciful)

1. “Read (Proclaim!) In the Name of your Lord Who created"

2. “Created man, out of a clot (of congealed blood).”

3. “Read (Proclaim), and your Lord is the Most Generous,"

4. “Who taught by the Pen,”

5. “Taught man that which he knew not.”

(*The Qur’an,* 96:1-5)

First and above all, I would like to express my endless praise and gratitude to Allah, who created me and taught me how to read, think, and write thanks to which I have been able to finish this study. It was only with His help and wish that I could finish this thesis.

On the true path sent by Allah for all humanity; I would like to express my sincere gratitude to our Prophet Muhammad (PBUH), all our past Prophets, martyrs, scholars, and all our elders and ancestors who taught us to always stand by the oppressed and walk tall with justice and honor.

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ÖZ

Yakın tarihimizde eşi benzeri görülmemiş bir şok olan COVID-19, bir virüsün ötesinde ekonomi, ticaret ve ticaret dahil olmak üzere yaşamın tüm yönlerini ve özellikle ekonominin reel sektöründeki firmaların yönetimsel faaliyetlerinin dinamiklerini etkilemiştir. Bu çalışmada, Türkiye'de Pandemi döneminde halka açık olmanın firma performansı üzerindeki etkisi analiz edilmiştir. Firma performansı likidite, karlılık, kaldıraç ve verimlilik olmak üzere 4 ana kategori altında ölçülmüştür. Halka açık bir firma olmanın etkisini analiz etmek için, halka açık olmayan firmalar (özel firmalar) arasından bir eşleştirme grubu örneklemi oluşturmak için Probit spesifikasyonu ile eğilim puanı eşleştirme (PSM) yöntemi kullanılmıştır. Daha sonra, halka açık firmaların göreceli performansını görmek amacıyla farklı performans ölçütleri üzerindeki net nedensel etkiyi analiz etmek için farklar farkı (DID) regresyonları kullanılmıştır. (i) COVID-19 döneminde halka açık firmaların net likidite pozisyonunun eşleşen özel firmalara kıyasla daha iyi olduğu ve bu etkinin KOBİ'ler ve imalat dışı firmalar için daha büyük olduğu görülmüştür. (ii) Karlılık açısından bakıldığında bu etki, aktif karlılığı için anlamlı olmasa da, net kar marjı için güçlü ve pozitiftir. (iii) Halka açık olmanın, özel firmalara kıyasla firmaların finansal kaldıracı üzerinde salgın sırasında negatif bir net etkisi vardır. (iv) Etkinlilikle ilgili olarak, halka açık firmaların pandemi döneminde eşleşen özel firmalardan daha iyi performans gösterdiği ortaya çıkmıştır. (v) Bu çalışmanın sonucunda, halka açık olmanın COVID-19 döneminde KOBİ'lerin genel finansal performansı üzerinde güçlü ve olumlu bir net etkiye sahip olduğuna ve bu etkinin büyük firmalar için anlamlı olmadığına dair kanıtlar bulunmuştur. Dolayısıyla bu çalışma, halka açık firmaların performanslarının pandemi yıllarında borsaya kote olmayan eşleştirilmiş firmalardan önemli ölçüde daha iyi olduğunu ortaya koymuştur. Bu çalışmanın politika yapıcılar için önemli bulgusu, KOBİ'leri halka açılmaya teşvik etmenin şirketlerin performansını ve dolayısıyla ekonomiyi COVID-19 gibi şoklara karşı daha dirençli hale getireceğidir.

ANAHTAR KELİMELER: Uygulamalı Ekonometri, COVID-19, Yarı-Deneysel Yontem, Kurumsal Finans

ABSTRACT

COVID-19, being an unprecedented shock in our recent history, was beyond a virus that affected all aspects of life including economics, commerce and trade and in particular dynamics of the managerial operations of firms in the real sector of the economy. In this study, impact of being public on firm performance has been analyzed, during the Pandemic period in Turkiye. Firm performance is measured under 4 main categories: liquidity, profitability, leverage, and efficiency. In order to analyze impact of a being public firm, propensity score matching (PSM) method with Probit specification is utilized to construct sample of a matching group among the firms that are not publicly listed (private firms). Afterwards, difference-in-differences (DID) regressions are employed to analyze the net causal impact on different measures of performance, to see the relative performance of the publicly listed firms. It has been found that (i), public firms' net liquidity position was better with regard to matched private firms during covid-19 and this impact is observed to be greater for SMEs and non-manufacturing firms. (ii) From the profitability perspective, although the impact was not significant in terms of return on assets, it was strongly positive for the net profit margin. (iii) Being public has a negative net effect on financial leverage of firms in comparison to the private firms during the pandemic. (iv) Regarding the efficiency, it is revealed that public firms performed better than matched private firms amidst the pandemic period. (v) As a result of this study, evidence was found that being a public firm has a strong and positive net impact on the overall financial performance of SMEs during the COVID-19 period and this impact was not significant for large firms. Thus, this study revealed that public firms' performances are significantly better than the matched non-listed firms amidst the pandemic years. The important finding of this study for policymakers is that encouraging SMEs to go public will make the companies' performance, and therefore the economy, more resilient to shocks such as COVID-19.

Keywords: Applied Econometrics, COVID-19, Quasi-Experimental Design, Corporate Finance

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1. INTRODUCTION

COVID-19 was beyond a virus that affected many aspects of life including economics and finance. It caused an extraordinary adverse economic shock that led the World's annual gross domestic product (GDP) to decrease sharply by 3.1% in 2020 and this was the highest decrease in annual economic output since 1961 (World Bank, 2023). Despite the contraction in the world's GDP in 2020, the Turkish economy continued to grow in terms of its GDP as it increased yearly by 1.8% at the end of the year. However, Turkiye's -10.3% contraction in its 2020 2nd quarter GDP compared to the previous year's shows how much COVID-19 affected the Turkish economy drastically. (TURKSTAT, 2023)

As the world grappled with unprecedented challenges that came with COVID-19, non-financial companies which are one of the key fundamental building blocks of economic growth, faced disruptions in their operations, access to finance, profitability, and supply chains both globally and nationally. Therefore, it has become essential for companies to quickly adapt to new conditions by making the necessary transformations in their business models in line with sector-specific requirements during the pandemic. This also has led to ensuing debate among academics, investors, and regulators regarding which corporate governance setup, features, and facets of companies enable them to perform financially better during the pandemic shock. A broad survey of work related to this area of research shows that the analyses have been carried out by categorizing the firms into four main groups: Sector, Size, Financial Structures, and Organizational Features.

First, a significant number of studies carried out sectoral-based analyses of the financial performances during COVID-19. In one of the pioneering works, Shen et al (2020) reported significant heterogeneity in the intra-sectoral performances of the firms, particularly they found that service-oriented industries incurred a significant decrease in incomes. On the contrary, Gu et al. (2020) found that the impact was negative and more severe on manufacturing firms and positive for the construction, information, and health sectors. Kubiczek and Derej (2021) studied listed firms in Poland and found that only a few sectors such as games, e-commerce, drugs, and medical equipment were affected positively whereas most other industries faced an adverse impact. Cho and Saki (2021) revealed in their sector-specific study that the financial performances of firms in the textile and apparel sectors considerably decreased in the USA and this impact was even larger than both the 9/11 and 2008 global financial crises. Contradictive to Cho and Saki's (2021) work, Alsamhi et al. (2021) revealed that firms construction sector in India performed better during the pandemic. Several studies also reported sectoral-based analyses concerning the Turkish economy. Ozturk et al. (2020) showed that the banking and metal products sectors faced a negative effect while the food-beverage and trade sectors relatively prospered, the analyses were based on the sectoral indices in the Istanbul Stock Exchange (BIST). Kandil Goker et al. (2020) and Karaomer and Kakilli Acaravcı (2021), on the other hand, found that the tourism, sports, and transportation sectors faced a negative effect. Ataman et al. (2022) reported more comprehensive analyses of 22 sub-sectors. They found that 10 sub-sectors had been affected negatively including construction, transportation, and restaurants, and the rest of the 12 sub-sectors including food, chemicals and petroleum, telecommunication, and trade experienced a positive impact. Kılıc Karamahmutoglu (2022) is another key study that also focused on the sectoral differences in the financial performances of Turkish firms. According to the findings of Kılıc Karamahmutoglu (2022), the impact of the epidemic was positive but more limited than expected in sectors such as technology (Ozdemir, 2020), informatics (Ondes and Ozkan, 2021) and food and beverage (Kılınc and Calıs, 2021). In short, sectoral-based studies show varying impacts on the financial performances of firms during COVID-19 and may conclude that sectors have a strong bearing on the relative performances of firms during the epidemic.

Secondly, firm size appears to be another important feature and its impact on the performance of companies during the COVID-19 period, and numerous papers have investigated the role of the size of the firms in their analyses. One of the preliminary findings on this subject comes from Gu et al. (2020)'s study they showed that smaller firms on average incurred a 30% further decrease in their electricity consumption compared to large firms amidst the pandemic in China, showing relatively adverse impact on smaller enterprises. Gu et al. (2020) and Rababah et al. (2020) also analyzed the performances of Chinese listed firms and found that MSMEs (Micro-Small-Medium Enterprises) faced more negative impact than large firms due to limited sources such as finance, supplies, and customers. Another study by Bloom et al. (2021) studied 2500 small US firms and found that the impact of COVID-19 had been persistent through mid-2021 on firms whose sales revenues dropped more than 50% at the beginning of the pandemic. Cerezo et al. (2022) provided similar results for firms in Spain. Gur et al. (2023) highlighted that micro-small companies are more likely to lean on informal finance than of large firms during the pandemic. Atabek Demirhan (2022) found that large manufacturing companies are 1.73 times more likely to continue their production compared to small ones in the same industry amidst COVID-19.

Thirdly, looking from another perspective a quite number of researchers explored the impact of financial structures on the performances of companies during the pandemic period. Shen et al. (2020), for example, while analyzing the performances of Chinese listed firms, found that the firms with lower investment scales and gross sales were adversely affected. In his empirical paper, Rashata (2021) showed high level of leverage had a negative impact on on Suadi firms. On the contrary, Clampit et al (2021) revealed that riskier listed manufacturing firms in the USA realized 60% more growth in their sales. According to Biswas (2021), research and development (R&D) investment decreased the effect of the pandemic on Indian Listed firms' performances. Regarding the Turkish firms, Tan et al. (2021) showed that public companies with high dividend yields performed better during COVID-19 and Atabek Demirhan (2022) found that export-focused manufacturing companies were affected more by the pandemic. Thus, financial structure was also identified as another crucial feature of firms that affected the performances of firms during COVID-19.

Finally, many studies analyzed the impact of organizational structure on the performances of firms during the pandemic period. Eckey and Memmel (2022) conducted a study on the performance of public firms in Germany and showed that family-owned firms performed better than non-family-owned counterparts. Yet, Eckey and Memmel (2022) also concluded in their study that a multivariate casual study is needed to further explore the topic. Perwitasari et al. (2022) also provided similar results for the same periods in the context of Indonesian listed firms and underscored that institutional ownership caused a high tendency towards risk-reducing policies instead of profits and gains. These two results are also supported by Clampit et al (2021) on manufacturing firms in the USA. Even though the study is not solely on the impact of being public, Gu et al. (2020) also indicated in their above-mentioned study that the energy consumption of listed firms decreased less than non-listed counterparts during COVID-19. Looking from a different angle at the effect of organizational features, Khatip and Nour (2021) analyzed the impact of corporate governance on the performances of firms in Malaysia during the pandemic and demonstrated that board size has no impact on firm performance during COVID-19 compared to pre-covid period. However, according to their study, board diversity has a significant and positive impact. Boshnak et al. (2023) also showed that board gender has a positive impact on the profitability of firms. Although there are not so many studies on Turkish companies, Tekin and Guclu (2023) is another unique study that addressed the relationship among environmental, social, and governance (ESG) on the performances of companies by using public firms across 11 countries including Turkiye. Tekin and Guclu (2023) employed various financial ratios like ROA, ROE, leverage, R&D expense to total assets, and risk (measured by the annual variance of earnings before interest and tax) to analyze corporate performance. The results of the study indicated that the negative impact of COVID-19 on the performance of firms with higher ESG was less when compared to the firms with lower ESG scores. This final result of Tekin and Guclu's (2023) article is compatible with the Harabida et al. (2022)'s study which also demonstrated similar results for Turkish public firms.

Although a number of studies have examined the financial performance of Turkish firms during the pandemic with respect to these four broad categories, we did not find any study, to the best of our knowledge, that has specifically examined and analyzed the role of ownership status in determining the financial performance of the firms in Turkiye amidst the COVID-19. In particular, the unique corporate structure of public firms makes these firms more responsible in terms of both corporate governance and risk management. Even though public listing increases the organizational cost of a firm to a certain level, it is supported and encouraged by public institutions as it contributes to increasing the depth of capital markets, facilitating access to alternative modes of financing, and contributing positively to the foreign trade balance. Therefore, this unique listing status can act as a shield by helping firms to be more resilient in terms of their management of the crises against the COVID-19 shock and so, listed firms might outperform non-listed counterparts. Despite the importance of the subject, there is no study in the literature that particularly focalize on the effect of being public on the performances of Turkish firms during the pandemic period. One of the most important reasons that may explain the lack of such studies is having limited or no access to the financial data of Turkish private companies.

Since studies examining the effect of being public on the performances of firms during COVID-19 are quite limited, the methodologies of studies conducted outside the pandemic period should also be examined in selecting the methodologies to be used in the analysis. In this regard, Mikkelson et al. (1997) is one of the first studies that employed a descriptive matching technique based on several criteria like sector, size, and operating return before the analyses. Following the matching, they utilized the ordinary least squares method to analyze the impact of public listing. Capasso et al (2005) are also one of the pioneering studies which analyzed the impact of ownership structure on firm performance by utilizing the financial datasets of the listed and non-listed European companies. In their analysis, the authors selected 30 listed and non-listed firms that are in the same sectors and countries and applied t-tests as the methodology. Yarba and Yassa (2022) one of the key studies on Turkish Firms analyzed the impact of listing by comparing the public and private firms by employing a quasi-experimental framework. Yarba and Yassa (2022) studied the impact of listing on corporate investment for Turkish Firms. In their analysis, they employed a quasi-experimental methodology with coarsened exact matching for constructing a control group among Turkish private firms and DID regression.

As can be seen from the above-mentioned studies, matching plays a crucial role in analyzing the impact of being listed and the current studies also prefer to use DID methods for stronger causal inference. More specifically, Yarba and Yassa employed the quasi-experimental method which helped them to analyze the causal effect of listing on corporate investments. Moreover, Eckey and Memmel (2022) also highlighted that a multivariate casual study is needed as further research in their study on the performances of firms based on ownership status during COVID-19. Undoubtedly, an experimental design is the most powerful causal inference method in all areas of science. However, implementation of experimental design for causal impact analyses typically requires randomized trials for control and treatment groups and is difficult to implement in economics (Kim & Steiner 2016). Yet, in such situations, a 'quasi-experimental design framework' can be applied to measure the causal impacts by creating a homogenous control group with a matching algorithm and then using the difference-in-differences (DID) regressions (Caliendo and Kopeinig, 2008). So, the quasi-experimental framework would help to provide much more concise results with causal inference in areas like economics.

Taking all these considerations into account in this study, the impact of being public on firm performance during COVID-19 will be analyzed by employing a quasi-experimental design in the context of Turkiye. This study will contribute to the literature in several aspects. Firstly, the impact of being public on the performances of Turkish firms during COVID-19 has not been studied before. Even though some findings indicated that listed firms performed better during COVID-19 (Gu et al, 2020), comprehensive research that solely depends on this issue is not conducted regarding firms in other countries. Secondly, a rich database that includes the financial statements of more than 1 million Turkish corporate private firms will be employed in the study. This database will provide an opportunity to create a similar and valid non-listed control group for each public firm which was not possible in previous studies as they have limited number of observations. Thirdly, this study will add to the current studies in terms of its quasi-experimental methodology which enables to present the relative performances of listed and matched non-listed firms amidst the pandemic period, so that causal inference can be made about the impact of being public after the unique shock of the COVID-19. For this purpose, public firms will be the treatment group and a homogeneous control group will be constructed via propensity score matching (see for similar matching techniques, Akgunduz et al. 2017; Yarba and Yassa, 2021; Akcigit et al. 2022) among all Turkish corporate

private firms in the first step of quasi-experimental design. In the second step of the quasi-experimental design, DID regression analyses will be applied before (2018-2019) and during (2020-2021) COVID-19 periods to measure the impact of being listed on firm performances which will be proxied by 8 financial ratios under 4 major categories (liquidity, profitability, leverage, and efficiency) for different samples based on sector and size samples.

The rest of the paper is organized as follows. Section 2 comprises the literature review. Section 3 explains the details of the datasets and the quasi-experimental methodology. Section 4 describes the selection of a control group among non-listed companies using the PSM technique, taking into account the likelihood of being listed on the stock exchange and the similarity to currently listed companies, and the success of this selection. Section 5 analyzes the impact of being listed on post COVID-19 firm performance (under the categories of liquidity, profitability, leverage, and efficiency) through DID regressions for all companies, scales, and sectors. Section 6 covers the conclusion and discussion of the study. Finally, sections 7 and 8 contain the bibliography and appendix, respectively.

2. LITERATURE REVIEW

COVID-19 was an unexpected negative shock for economies all around the world and it affected all firms from various aspects. Therefore academicians, professionals, and policymakers studied the firm performance from many different angles. According to Li et al. (2021), the effects of the COVID-19 on US economy are more serious than the global financial crisis. Since every country has its unique social, governmental, and economic structure, studies that analyze the effect of firm characteristics on firm performance during the COVID-19 have to consider the country and regional heterogeneity as Hu and Zhang (2021) observed that the countries with better health system and governance can reduce the impact of the pandemic on their performance (proxied by return on assets). However, in order to understand the similarities and differences in company dynamics in different countries and the pros and cons of methodological approaches in more detail, it is also of great importance to examine the studies conducted on companies in all countries that investigate the impact of company characteristics on company performances during the pandemic period. When the studies in this field are examined comprehensively, it can be seen that the analyses can be classified into four main groups: Sector, Size, Financial Structures, and Organizational Features. In addition to these, due to the limited number of studies both in Türkiye and in the world on the effect of listing status on the firms' performances during the pandemic period, which is the main subject of this study, it is also necessary to consider the methodological approaches of other relevant studies on the impact of being public.

To start with, there are quite many numbers of studies that are focalized on the sector-specific impacts on the performances of companies during the COVID-19. is Shen et al. (2020), being one of the first empirical and comparative studies that employed difference-in-difference methodology, prioritized comparing regional and sectoral effects according to their level of exposure to COVID-19. They also demonstrated that COVID-19 affected negatively the listed Chinese firms' performances proxied by Return on Assets (ROA) and this effect is increased when investment or sales are relatively lower. Another significant finding of Shen et al. (2020) is the positive correlation between negative firm performances and seriously affected regions. As this finding shed light on an important issue, the regional effects must be controlled in regression analyses, too.

Li (2021) used the panel fixed effects method on the 1785 US manufacturing public firms' data and showed that organizational slack (i.e., excess resources) is negatively correlated with the impact of COVID-19 on firm performance (proxied by industry-adjusted ROA). In another sector-specific study, Cho and Saki (2021) revealed that firm performance is considerably decreased in textile and apparel companies listed in the USA and also this impact was larger than both the 9/11 and 2008 crises.

Kubiczek and Derej (2021) analyzed the impact of the pandemic on listed firms' performances in Poland via descriptive analysis and statistical testing and found that most industries are affected negatively in terms of their sales revenues whereas few of them are affected reversely with an increase in their sales.

Alsamhi et al. (2021) used 371 Indian listed firms' data in their sector-specific study to examine the impact of the pandemic on firms and they used performance indicators such as net sales, net profit, and earnings per share. They presented the conclusion that the construction sector minimized its cost, and both the food and construction sectors increased their income during COVID-19 compared to before the pandemic time.

Atayah et al. (2021) conducted a study across 14 countries in G-20 including Turkiye. Although the study used only logistics firms' its findings for countries are significant. They manifested that the impact of COVID-19 on firm performance (proxied by ROA and ROE) varied across countries drastically. While some countries are relatively affected negatively, others are relatively affected positively including Turkiye.

There are an increasing number of sector-specific studies in the literature for Turkish firms as follows: Cengiz and Turan (2021) analyzed the impact of the pandemic on the maritime sector via cross-country level survey including Turkiye, Yılmaz and Sahin (2021) studied food and beverage industry, Kocak et al. (2023) focused on tourism, Gumusburun Ayalp and Civici (2021) studied construction industry. Erol (2022) analyzed the aquaculture sector and underlined that even though the sector grew during COVID-19 financial leverage, foreign dependency on the sector puts serious considerations regarding financial sustainability. Bayram (2021) employed qualitative analysis techniques via focused groups and interviews with a specific focus on the forest products industry and found that the pandemic had shown a negative impact on employment and sales. Damayanti and Aslanoglu (2023) focused on the tourism sector in Turkiye and Indonesia and applied ratio analysis to the sector by using ROA, ROE, net profit margin, current ratio, quick ratio, asset turnover, leverage ratio, and debt to equity ratio.

From a cross-sectoral perspective, Ataman et al (2022) utilized 250 Turkish public firms' data to analyze the impact of COVID-19 on 22 sub-sectors by employing the ratio analysis method specifically net profit margin, return on assets, return on equity, and changes in main accounts in financial statements. According to Ataman et al. (2022), 10 sub-sectors are affected negatively including construction, transportation, and restaurants; while 12 sub-sectors are affected positively such as food, chemical and petroleum, telecommunication, and trade.

Besides these studies, Kilic Karamahmutoglu (2022) employed the Wilcoxon Signed-Ranks Test on the sector level (28 sectors) to analyze the effect of COVID-19 on the financial ratios of Turkish firms. She divided ratios into 4 groups as follows: liquidity (current ratio and acid ratio), financial structure (debt ratio to assets and leverage ratio), profitability (ROA and ROE), and operational (inventory turnover and receivables ratio). According to the study, Kilic Karamahmutoglu (2022) surprisingly found that there was no increase at the expected level in the financial ratios of sectors such as technology (Ozdemir, 2020), informatics (Ondes and Ozkan, 2021) and food and beverages (Kılınc ve Calıs, 2021), which are expected to show high performance. In addition to these studies, Ozguner et al. (2022) applied a different empirical approach using the AHP-TOPSIS method to find the most affected sector in Turkiye and their study pointed out the automotive industry.

During the COVID-19 pandemic, the size of a company has been extensively studied as a determining factor for company performance. Rababah et al. (2020) studied the data of Chinese listed firms with Pooled OLS method and found that SMEs are the most affected companies by COVID-19. Saturwa et al. (2021) also provide another supporting result that MSME (Micro-Small-Medium Enterprises) faced more negative impacts than large firms due to limited resources. These results also reveal the importance of having different sources such as finance, supplies, customers, etc.

Gu et al. (2020) is one of the important studies to analyze the impact of COVID-19 via difference-in-differences regression. Gu et al. (2020) used data from 34,040 Chinese companies and their electricity consumption levels as a proxy to measure the effect of COVID-19. The research proved several important points regarding the different aspects of firm characteristics. First, smaller firms experienced a further %30 decrease. Second, the impact was negative and more severe on manufacturing firms and reversely positive for the construction, information, and health sectors. Third, they found that the impact of the pandemic is lower for listed firms than for non-listed counterparts.

Bloom et al. (2021) used survey data from 2500 small US firms and underscored that the impact of COVID-19 is persistent through mid-2021 on firms whose sales revenue dropped more than 50% at the beginning of the pandemic.

Cerezo et al. (2022) is another study that utilized the comprehensive financial dataset of 4004 firms in Spain. Their study demonstrated that defenseless companies like small firms are more severely affected by the pandemic.

Regarding Turkish Firms, Ekren et al. (2021) found that financing and decline in demands are the major problems faced by all firms regardless of their size during COVID-19 based on a survey conducted by the Chamber of Sworn-in Certified Public Accountants (CSCPA).

Gur et al (2023) examined financing behavior during the pandemic depending on the scale of firms based on a survey of 2983 firms in Turkiye and concluded that small and micro-scaled companies used informal financing more relative to formal financing opportunities such as bank credits than large companies. However, the results of the study presented that medium-sized companies tend to apply for bank loans even more than larger ones during COVID-19.

Atabek Demirhan (2022) used the dataset of 1207 companies in the manufacturing sector of Turkiye in order to analyze the impact of COVID-19 by employing cross-sectional methodologies. According to Atabek Demirhan's (2022) study, productive manufacturing companies were more resilient to the negative effects of the pandemic. The study also showed that large firms are more likely to carry on production with regard to small ones.

From a third perspective, the impact of financial structure on firm performance during the COVID-19 period is another widely researched topic. According to Biswas (2021), R&D investment decreases the effect of the pandemic on Indian Listed firms' performances. Moreover, employing the difference-in-differences fixed effect method, the study demonstrated that R&D investor manufacturing firms experienced higher growth of return to sales (ROS) and income growth.

In his empirical paper, Rashata (2021) studied listed Saudi firms before and during the pandemic in terms of 3 main perspectives: operational, financial, and market performance. Rashata (2021) demonstrated that leverage was the major performance-decreasing factor among three factors both before and after COVID-19 but the impact got stronger after the pandemic. However, he concluded that there was no significant difference in firms' performance onset of the pandemic.

Clampit et al. (2021) is another comparative study that employs OLS as an analysis method and brought out the fact that firms that are riskier in terms of operations realized 60% more sales growth during COVID-19. In their study, they used 1298 US manufacturing companies whose data are publicly available.

Biswas et al. (2022) came up with a multi-criterion-based analytic framework to measure the impact of the pandemic on the performance of 30 firms listed in BSE, India. They found that COVID-19 has no major effect on firms' financial distress and long-term growth projections.

Another important study on the firm’s operational performance during COVID-19 is Zhang and Zheng's (2022) research on Chinese listed firms. Zhang and Zheng (2022) used activity turnover ratios in order to measure the effect of the pandemic and they found that COVID-19 increased the average time spent in operational processes and decreased expected cash flows. So that, we may conclude that activity ratios are another important aspect to take into account when studying the impact of COVID-19.

Purwanto (2020) conducted a qualitative study of 7 top managers from various industries in Indonesia and found that COVID-19 negatively affected firms from various aspects such as the decline in raw materials, demand, and production capacity.

Bloom et al. (2023) used firm-level monthly survey data in their study and demonstrated that total factor productivity decreased by 6% during 2020 and 2021.

Ahmad et al. (2022) showed that the impact of networking capital management on firms' performance (proxied by Tobin's Q and ROA) increased during COVID-19 compared to the 2008 global financial crisis by employing a dynamic panel model of 557 non-financial firms from 3 developing countries.

Kilic Karamahmutoglu (2022) revealed that COVID-19 had a significant positive effect on liquidity ratios, a significant negative effect on financial leverage ratio and efficiency ratios, and did not have a significant impact on profitability ratios of Turkish firms. According to Tan et al. (2021), Turkish companies with high dividend yields performed better during the pandemic regarding their stock returns. Orhan and Tırman (2020) also highlighted that risk (measured by variance) increased in all sectors during the epidemic.

In the fourth aspect, there have been numerous studies examining the impact of company size on performance during the pandemic era. In their study, Eckey and Memmel (2022) used 299 public firms in Germany via their descriptive analysis and showed that family-owned firms performed better than non-family-owned firms. However, Eckey and Memmel (2022) also emphasized that a multivariate casual study is of crucial need as a further research topic. Perwitasari et al. (2022) also provided similar results in the context of Indonesian listed firms and added that institutional ownership creates a high tendency towards risk-reducing policies instead of profits and gains.

Boshnak et al. (2023) incorporated 258 listed Saudi firms' data and applied a cross-sectional analysis to compare before and after COVID averages of different measures such as performance (ROA), leverage (total debt to total assets), and liquidity (current assets to current liabilities). In their study, Boshnak et al. (2023) also showed that board gender has a positive impact on Return on Assets (ROA). From another perspective, Farwis et al. (2021) provide that COVID-19 has a negative impact on firms' corporate governance measures like qualification and board size.

As one of the pioneering studies on this subject, Khatip and Nour (2021) also analyzed the impact of corporate governance on firm performance during the pandemic con the case of Malaysia and demonstrated that board size has no impact on firm performance during COVID-19 compared to pre-covid period. However, according to their study, board diversity has a significant positive impact on firm performance during COVID-19. These results also showed that general perspectives of corporate governance, especially diversity, significantly help companies to cope with unexpected and unique crises.

Almustafa et al. (2023) is one of the most comprehensive and comparative studies because it includes 739 non-financial corporates from 12 MENA countries, and they demonstrated that governance quality is one of the most crucial elements alleviating the effect of COVID-19 on firm performance.

Tekin and Guclu (2023) is another unique study that addressed the relationship between environmental, social, and governance (ESG) on corporate performance by using panel data analysis methods with 1546 company-year observations across 11 Muslim countries including Turkiye. Tekin and Guclu (2023) employed various financial ratios like ROA, ROE, leverage, R&D expense to total assets, and risk (measured by the annual variance of earnings before interest and tax) to analyze corporate performance. The results of the study indicated that the performances of firms with higher ESG scores are less impacted during COVID-19 compared to the ones with lower ESG scores. This final result of Tekin and Guclu's (2023) article is compatible with the Harabida et al. (2022)'s study which also found the same result for Turkish listed firms with regards to the effect of the ESG on firm performances during the pandemic.

Since the current literature on the impact of being public on firm performance during the pandemic period is limited, studies on the impact of being listed on firm performance outside of the pandemic period should also be examined in terms of the methodologies that can be employed in the analysis. The study of Mikkelson et al. (1997) was among the pioneering studies to utilize a descriptive matching approach, considering factors such as sector, size, and operating return in their analyses. After the matching, they used the ordinary least squares (OLS) method to analyze the effect of listing. They found that going public separates the managerial control over the firm and potentially deteriorates the initiatives that could be taken by managers.

One of the earliest studies to analyze the relationship between ownership structure heterogeneity and performance in European companies was conducted by Capasso et al (2005), using financial datasets from both listed and non-listed companies. The authors selected 30 listed and non-listed firms that are in the same sectors and countries and applied t-tests as a methodology for the analysis. Their study demonstrated that public firms' growth rate is higher, and have lower leverage ratios and net profit per equity than of non-listed counterparts.

Orihara (2017) is another study that analyzed the impact of public listing on corporate management. Orihara (2017) utilized a panel dataset of listed and non-listed firms in Japan and employed an experimental design for causal analysis via instrumental variables.

Yarba and Yassa (2022) conducted a crucial study on Turkish companies, examining the effects of listing through a quasi-experimental approach that compared public and private firms. Yarba and Yassa (2022) analyzed the effect of public listing on corporate investment for companies in Turkiye. The analysis utilized a quasi-experimental methodology by employing coarsened exact matching to generate a control group of Turkish private companies and using a difference-in-differences framework. They demonstrated that Turkish manufacturing companies grow and invest more than their private counterparts.

Table 1: Summary of the Relevant Literature on Firm Performance During the COVID-19

Category	**Positive Impact**	**Negative Impact**
Sector	Health (Gu et al., 2020) Agriculture (Kılınc and Calıs, 2021) Technology (Gu et al., 2020) E-Commerce (Kubiczek and Derej, 2021)	Tourism (Kandil Goker et al., 2020) Restaurants (Ataman et al., 2022) Construction (Alsamhi et al., 2021) Transportation (Karaomer and Kakilli Acaravcı, 2021)
Size	Large Firms (Gur et al., 2023; Atabek Demirhan, 2022)	SMEs (Gu et al., 2020; Rababah et al., 2020; Cerezo et al., 2022)
Financial Structure	R&D Investment (Biswas, 2021) Investment (Shen et al., 2020) Riskiness (Clampit et al., 2021)	Leverage (Rashata, 2021) Exporters (Atabek Demirhan, 2022)
Organisational Features	ESG (Tekin and Guclu, 2023) Corporate Governance (Khatip and Nour, 2021) Family Ownership (Eckey and Memmel, 2022) Public Ownership (Gu et al., 2020)	Institutional Ownership (Perwitasari et al., 2022)

Table 1 shows the summary of the relevant literature that is explained above in detail on firm performance during the COVID-19. As can also be clearly seen in Table 1, the findings of the studies in the category of organizational features, especially in firm ownership status, contradict each other. Eckey and Memmel (2022) showed that family-owned firms and Gu et al. (2020) demonstrated that public firm performed better during the pandemic. However, on the other hand, Perwitasari et al. (2022) found that institutional ownership negatively affected firms during the COVID-19. Therefore, further studies with causal inference and more concise results are needed regarding the firm ownership status is of utmost significance.

3. DATA AND METHODOLOGY

In this section, detailed information will be given about the quasi-experimental methodology and data sets that will be used in the thesis under two main headings: Data and Methodology.

Under the “Data” heading, an explanation will be made regarding the data used within the scope of the thesis and the details of these datasets. In the study, firm-level microdata was obtained by compiling from 4 different sources using the big data environment provided by the Central Bank of the Republic of Turkiye (CBRT). The first of these sources is the balance sheet and income statements obtained from the financial data that companies provide to the Revenue Administration of Turkiye on an annual basis due to their legal obligations. Secondly, data on companies' exports and imports were obtained using customs declarations provided by the Republic of Turkiye's Ministry of Commerce. The third one is the Central Registry System (MERSIS) resources which contain the provincial and regional data of the companies. Finally, data for the years in which public companies were listed on the stock exchange were obtained from publicly available sources provided by the Public Disclosure Platform (KAP).

Under the “methodology” heading, details will be provided regarding the quasi-experimental design employed to analyze the causal relationship. In this context, two subheadings will be included to explain details about the propensity score matching (PSM) and differences-in-differences (DID) methods that will be used in the analysis and why these methods are preferred.

3.1 Data

In this study, 4 major administrative datasets are used which are provided by the relevant public institutions to the Central Bank of the Republic of Turkiye (CBRT). Firstly, balance sheets and income statements are obtained from the data that companies have to declare to the Tax Revenue Administration annually within the scope of the tax law for the years 2009-2021. Secondly, firm-level import and export of goods data are acquired through the customs records provided by the Republic of Turkiye's Ministry of Commerce. Thirdly, the data of the central registry system, which includes the provincial and regional information of the companies, were integrated into the study. Lastly, unlike these three resources, information on initial public offering dates and the current listing status of listed firms was obtained from the public disclosure platform (KAP)'s website.

3.1.1 Tax Revenue Administration

The financial ratios relevant balance sheets and income statement items used within the scope of this study were compiled from the data provided by the revenue administration. The sector information in this raw data has been revised by the Turkish Statistical Institute (TURKSTAT) according to the Statistical Classification of Economic Activities in the European Community (a.k.a. NACE) standards. In addition to these data sets, TURKSTAT has also provided a firm-level number of employee data for the use of CBRT. Thus, the firm size was determined according to the definitions of the Small and Medium Enterprises Development Organization of Türkiye (KOSGEB) in the relevant years based on total assets, net sales, and number of employees. So, it must be underlined that firm size is not constant throughout the years and it can change according to the above-mentioned criteria. Therefore, this situation must be taken into account while interpreting the results of the studies which employ this dataset. Since companies without legal entities are subject to a different taxation regime, companies with legal entities (limited and joint stock companies) are included in this data set (934,209 firms in 2021). While the majority of these companies (72.8%) are micro-sized companies, approximately 21.4% are small-scale, 4.68% are medium-sized and only 1.13% are large-scale companies in 2021. It is necessary to underline a crucial issue due to the collection of these micro data for tax purposes, there may be some erroneous statements such as negative total assets and negative sales, especially in the balance sheet data, and different methods such as winsorize, trim or drop are used by researchers to use these data in analysis (see, for instance, (Akcigit et al., 2022; Yarba and Yassa, 2021; Akgunduz et al., 2017).

3.1.2 Customs Records

Since there is no import data in the companies' income statements, the goods import and export data of the companies can be calculated through the foreign trade data provided by the Ministry of Commerce of the Republic of Turkiye. Two systems are used to produce foreign trade statistics: the General Trading System (GTS) and the Special Trade System (STS). Goods entering or leaving free zones, customs warehouses, and the country's free circulation area are used in the calculation of foreign trade statistics with GTS. In calculating foreign trade statistics with STS, goods entering or leaving free zones and customs warehouses are not included in the statistics, only goods entering or leaving the country's free circulation area are included in the statistics. In the production of foreign trade statistics according to GTS, information compiled from the free zone transaction forms, customs declarations, warehouse declarations, and truck carnets is used. The data in the foreign trade database provided to CBRT does not include raw data compiled from warehouse declarations and truck carnets and entries/exits to free zones from abroad. Additionally, there are no products belonging to the 27th chapter (energy trade) in the data set. The import and export data used within the scope of this study are calculated according to the GTS regime codes within the above-explained scope. Considering these issues, the current data set covers approximately 89.5% of the total export of goods and 81.7% of the total import of goods in 2021 (TURKSTAT, 2022).

3.1.3 Central Registry System (CRS)

Firm-level registration information is provided by the Central Registry System (CRS) which is designed to provide two basic functions. The primary function of the system is to facilitate the registration, alteration, and cancellation of company and commercial enterprises in an electronic environment, as well as the regular storage and presentation of trade registry records and content that must be registered and declared in an electronic environment. The secondary basic function is to integrate all legal entities and economic units into a system with a single unique number, as well as to link public institutions and legal entities by providing relevant information from a single point. Thus, in this study, firm-level registration city and region information are obtained from the databases that are available to CBRT via CRS.

3.1.4 Public Disclosure Platform (PDP)

All notifications required to be disclosed to the public (according to the capital markets and exchange market law of Turkiye) by the public firms in Turkiye are announced by the Public Disclosure Platform (PDP) which is operated by the Central Securities Depository and Trade Repository of Turkiye. So, the listing date and current listing status of the companies were obtained through data obtained from PDP's website.

3.2 Methodology

Causal inference is the most desired result for any research design, and employing an experimental design is the best choice for it. To utilize an experimental design, treated (public firms in our study) and control groups (private firms in our study) must be randomly assigned by an exogenous factor that has no relation with the intervention (COVID-19 in our study) (see, Cook and Campbell, 1986; Howard and Raitzer, 2017). Yet true experiments with randomized controlled trials (RCTs) are not always feasible as is the case in this study, in which we cannot randomly assign public listing. However, Quasi-experimental designs can be employed when RCTs cannot be implemented to measure causal treatment impacts (Kim and Steiner,2016). In quasi-experiments, researchers put their best effort into ensuring that control and treatment groups are identical before intervention (pre-treatment period) as much as possible to isolate the effect of the treatment and exclude the effects come from other covariates, then they measure the impact of treatment after the intervention (a.k.a. causal inference). Since this study will analyze the impact of being public (treatment) on firm performances (dependent variable) during COVID-19 (intervention, exogenous shock), a quasi-experimental design is an appropriate choice for this analysis.

The quasi-experimental design consists of two important parts: constructing valid control and treatment groups and analyzing for causal inference.

3.2.1 Matching Method: Propensity Score Matching (PSM)

In our study, the treatment group, public firms, is pre-determined and thus cannot be assigned by the researcher. So, it is very crucial to construct an identical control group as the first step of the quasi-experimental design.

According to Stuart's (2010) study, there are 3 steps for designing a matching:

1) Defining the concept of "closeness" to measure the similarity of people/firms;
2) Implementing a method to measure the “closeness”;
3) Assessing the matching performance.

For defining the “closeness” two important aspects come forward: variables to include and distance measures. Stuart (2010) uses the term “strong ignorability” to explain the difference between the control and treatment groups based on employed covariates. Therefore, she adds that using all variables (covariates) that are connected with the treatment in the matching is crucial (see, Rubin and Thomas, 1996; Heckman et al., 1998). Even though there are four major distance measures, two of them, exact and linear propensity scores, are the most preferred by researchers (Imai et al.,2008; Rubin and Thomas, 1996; Rosenbaum and Rubin, 1985). Exact matching is very straightforward and defined as selecting individuals based on their exact similarity within used categorical variables (covariates); however, the propensity score is defined as the conditional likelihood of being assigned to a treatment group based on a set of observed variables (covariates) (Rosenbaum and Rubin, 1983). While Imai et al. (2008) and Iacus et al. (2012) highlighted that exact matching is better in many ways, others (see, Rubin and Thomas, 1996; Rosenbaum and Rubin, 1985) found that linear propensity scores are more effective specifically in terms of bias reduction. A recent study by Black et al. (2020) also showed that exact matching, specifically Coarsened Exact Matching (CEM), is substantially poorer than other statistical methods. Additionally, Kim and Stenier (2016) highlighted that multivariate matching such as propensity scores performs well when the number of firms in the treatment group is small and the pool of possible control firms is large. Thus, although coarsened exact matching can provide stronger control over covariates, it reduces the number of observations drastically which may lead to serious sample selection bias, especially when the size of the treatment group is limited. Therefore, in this study, Propensity Score Matching (PSM) with a probit specification and one-to-one matching method will be employed to construct a valid control group.

When it comes to the third step where we assess the performance of the PSM; Rosenbaum and Rubin (1985) suggested several methods to measure matching performance and the most widely used ones are two sample t-tests and standardized bias (SB). According to their study, SB was defined as the difference in sample means between treated and matched subsamples as a ratio of the square root of the average of sample variances in both groups (see also, Caliendo and Kopeinig, 2008). According to above mentioned the two-sample t-test method, tests are applied on both groups on each covariate before and after matching; and the results of the t-tests after the matching are expected to be insignificant.

3.1.2 Analysis Method: Differences-in-Differences (DID)

After constructing an identical control group, several methods have been employed in causal inference studies and the most commonly used methods are Regression Discontinuity Design (RDD), Instrumental Variable (IV), and Difference in Differences (DID).

RDD is a unique methodology, and it is utilized when eligibility for a specific treatment depends on a function of specific features that can be observed by the researcher (Dague and Lahey, 2018). IV can be used where researchers suspect the possibility of unmeasured confounding and thus there exists an instrumental variable (IV) that affects the outcome indirectly via its impact on the treatment and yet it has no direct correlation with the outcome (Baiocchi et al.2014). DID is a very famous methodology in terms of its simplicity. It measures the impact of a treatment/program by determining if the treatment group's mean has a significant difference compared to the control group (Somers et al. 2013). Another crucial aspect of DID is that it removes time-invariant confounders by differencing pre and post treatment periods (Gibson et al. 2021). The most critical assumption of DID design for causal inference is “parallel/common trends”, so the outcome of interest for the control and treatment group must follow a parallel trend before the shock (See, Lechner,2010; Sasabuchi, 2021).

In this study, difference-in-differences (DID) regression has been employed to analyze the impact of being public (treatment) on firm performance (dependent variable) during COVID-19 (exogenous shock). DID is widely used in various areas of science from economics (Karlı, 2023; Akgunduz et al., 2017, Akcigit et al.2022) to healthcare (Whittaker et al., 2016) and sociology (Gangl, 2010) to education (Deschacht and Goeman, 2015).

The impact of being public on firm performance during COVID-19 is analyzed with DID by with the following equation:

$$Y_{it} = \beta_0 + \beta_1 * Post_t + \beta_2 * Listed_i + \beta_3 * (Post_t * Listed_i) + \rho_i + \omega_t + \sigma_i * \omega_t + \tau_i * \omega_t + \varepsilon_{it} \quad \text{(E1)}$$

Where i denotes firm and t represents year. Y_{it} is the variable of interest for firm performance. $Post_t$ is a dummy variable which takes "1" for during COVID-19 years (2020-2021) and "0" for pre-COVID years (2018-2019). $Listed_i$ is the treatment dummy variable and it takes "1" for public firms and "0" for private firms. $Post_t * Listed_i$ is the interaction term. In the study, various fixed effects are included. ρ_i is firm fixed effect that is included to control any time-invariant factors unobserved heterogeneity (Yarba and Yassa, 2021). ω_t is the year fixed effect that is added to absorb year specific impacts affecting all firms in the economy. $\sigma_i * \omega_t$ is another interaction term in the equation of firm sectors and years and it is added to control for yearly sector level effects. $\tau_i * \omega_t$ is the final interaction term of operating city of a firm and that absorbs yearly city-level effects. Lastly, ε_{it} is the robust error term of the equation.

In this study, 2 financial ratios under each of the 4 main categories (Liquidity, Profitability, Leverage, and Efficiency) will be utilized as a measure of firm performance (Y_{it}). Even though there is a vast literature on firm performances and studies employed various financial ratios for each category, most generally accepted and widely used financial ratios (see, for instance, Altman, 1968; Wilcox, 1971; Chen and Shimerda, 1981; Bates and Bates, 2003; O'Connor, 2005; Beaver et al., 2005; Delen et al., 2013; Vintilă and Alexandra 2016; Kilic Karamahmutoglu, 2022) will be included in the study as shown below in Table 2.

To put it briefly, financial liquidity refers to the short-term ability of companies to pay their short-term debts at time t. Current ratio and quick ratio are among the most preferred financial ratios in this sense. Current ratio, in the broadest sense, shows the ability of all short-term assets to pay all short-term debts, acid ratio shows the ability to pay all short-term debts of liquid assets, except for company stocks, which are relatively more difficult to instantly convert into liquidity. Therefore, a reasonable liquidity ratio makes companies more resilient to sudden shocks.

Table 2: Selected Financial Ratios as Proxies for Measuring Firm Performance Under 4 Categories

Main Category	Ratio - 1	Ratio – 2
Liquidity	Current Ratio = Current Assets /Current Liabilities	Quick (Acid) Ratio = (Current Assets - Inventories) / Current Liabilities
Profitability	Return on Assets = Net Profit / Total Assets	Net Profit Margin = Net Profit / Net Sales
Leverage	Debt Ratio = Total Debt / Total Assets	Leverage Ratio = Total Debt / Total Equities
Efficiency	Net Profit per Employee = Net Profit / Number of Employees	Cash Conversion Cycle = (DIO)* + (DRO)** - (DPO)***

* DIO (Days Inventory Outstanding) = 360* (Average Inventory / Cost of Goods Sold)
** DRO (Days Receivables Outstanding) = 360* (Average Account Receivables / Net Sales)
*** DPO (Days Payables Outstanding) = 360*(Average Account Payables / Cost of Goods Sold)

As the name suggests, profitability refers to the net added value that companies obtain from their activities in the relevant quarter or year. In this context, the ratios frequently used to measure the real profitability of the company are return on assets (ROA), return on equity (ROE), and net profit margin. Since ROA and ROE demonstrate relatively close movements, they report similar results in the analyses, ROA is generally preferred over ROE as the equity can differ substantially in impact analysis studies covering different sectors. On the other hand, the net profit margin expresses how much value-added profit the company makes compared to the total sales it produces.

Ratios classified under the leverage category express how much companies are financed by external resources compared to their equity capital. Debt ratio shows the total external liabilities with regard to total assets and leverage ratio shows total debt to total equities. Hence, the less leverage the better resilience against unexpected economic and financial shocks.

In the last category, efficiency refers to firms' ability to use their resources, financial management, and human resources in a more productive way, so that the company can perform and manage its risks better. In this regard, net profit per employee shows the efficiency in terms of employed labor. The cash conversion cycle is another crucial efficiency indicator that shows the gap between the sales period plus the waiting period of stocks and the number of days for paying the debts. Therefore, the higher the cash conversion cycle, the more time it takes for a company to generate cash.

4. FORMING CONTROL AND TREATMENT GROUPS FOR QUASI-EXPERIMENTAL DESIGN

Besides being the first step, forming valid control and treatment groups is also one of the most crucial processes of the quasi-experimental study for causal inference. Since the treatment group is pre-determined in this study and includes public firms during the years 2018-2021, a control group will be formed among private firms via propensity score matching with the one-to-one nearest matching specification. As explained in the methodology section, there are 3 steps for forming a control group: selecting covariates, implementing matching methodology, and assessing matching performance. When selecting the covariates (i.e., variables), it is very important to add all variables that are related to the treatment group (Rubin and Thomas, 1996; Heckman et al., 1998). Therefore, it is of utmost significance that all variables related to public firms must be included in the matching.

There exists a vast literature on determinants of being public or, in other words, why firms decide to become public. One side of the literature supports the idea that firms become listed to raise cheap finance for their large investments (Diamond, 1991; Holmstrom and Tirole, 1993); however, on the other side, researchers found out that the decision of being public is related with neither financing needs nor sales growth levels (Helwege and Packer,2001; Fischer, 2000; Mikkelson et al., 1997). Another study (Albornoz and Pope, 2004) regarding the case from the U.K. found that leverage and profitability are significant and negatively affect the probability of being listed. Pagano et al., (1998) also found that sales, capital expenditure, ROA, and leverage are significant regarding the decision of being public.

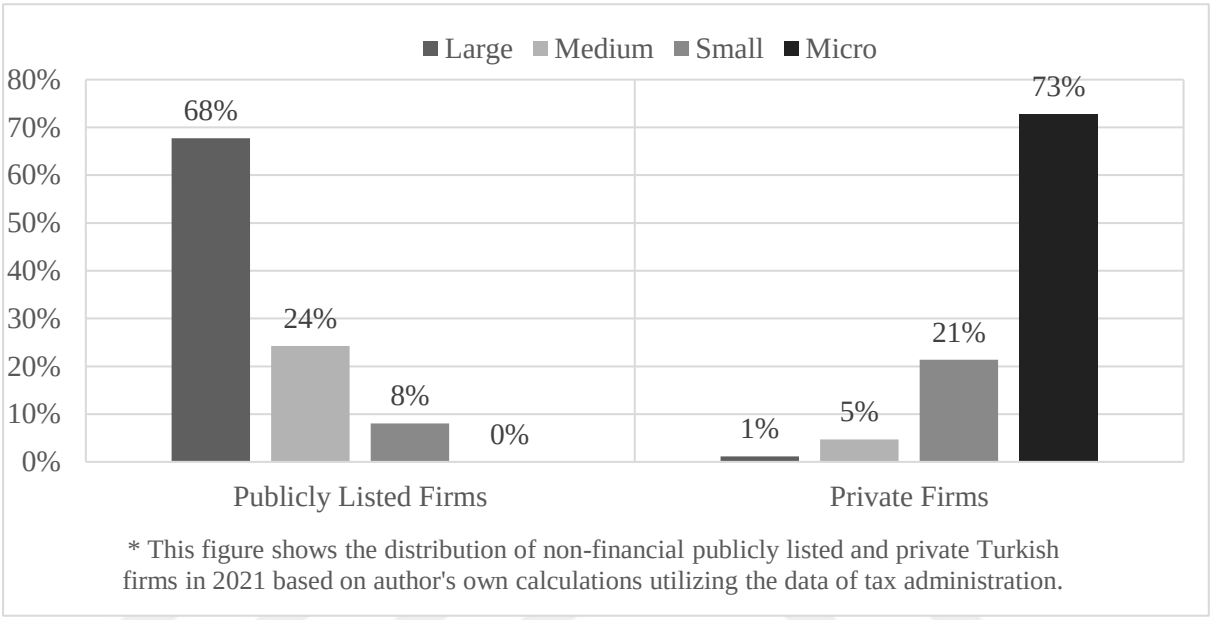
A similar matching design is used in the study of Yarba and Yassa (2021). Their study was similar to this one in terms of its treatment (public firms) and control (private firms) group definitions. However, they employed the coarsened exact matching (CEM) method in their study. Yet, they used a rich set of covariates including (net sales, employment to control firm size, 2-digit NACE sector dummies for industry specification, and many others such as tangible assets, liquid assets, debt structure, revenues, and inventories) to create a control group among private firms considering the likelihood of listing.

Considering the general approach of the literature on this subject, a comprehensive approach is employed in matching to construct a valid control group. 6 control variables (total assets, total sales, number of employees, total credits, paid equity, gross fixed assets) and 4 main ratios which are of interest to the study under each main category (ROA for profitability, debt to equity for leverage, quick (acid) ratio for liquidity and net profit per employee for efficiency) are employed for both 2018 and 2019. Moreover, 2-digit NACE sectors and city fixed effects are included in the matching. These variables are selected according to the current literature on the likelihood of being public and previous studies on matching. Four ratios mentioned above are added because yielding 4 other ratios did not change the matching result and matching group as well.

Before starting the matching, firm-level data sets were subjected to a data preparation and cleaning process. The scope of the study includes the periods of 2 years before COVID-19 and 2 years during COVID-19. So, the treatment group is defined as companies that are continuously listed on the stock exchange between 2018-2021. Thus, in order to ensure continuity, private firms that consistently reported their financial data between 2018 and 2021 were included in the sample of candidates for the control group. As it is shown in Figure 1, 68% of the listed firms are large firms, while almost 73% of private firms are micro firms and as expected there is no listed micro-sized firm. Therefore, since micro firms are not the concern of this study, micro firms are excluded from the matching dataset. Additionally, in order to prevent possible heterogeneity problems and to increase matching performance, sectors (NACE 2-digit) and cities in which public companies do not belong are excluded from the matching dataset. More importantly, companies that were previously listed on the Istanbul Stock Exchange and not listed during the 2018-2021 period were excluded from the sample of private companies in order to avoid the possibility of continuing the effect of publicly listing. Lastly, since the administrative dataset includes calculation of accounting errors which causes outliers, especially for the

ratios of smaller firms. So, the financial ratios of firms are 90% winsorized (5% and 95%) within each year before matching in order to avoid the effects of outliers to the both results of the study and the matching (see, Yarba and Yassa, 2021; Akcigit et al., 2022). Finally, after all these cleanings, our matching dataset ended up with 241 public firms and 137,347 private firms for 2018-2021.

Figure 1: Size Distributions of Public and Private Firms in 2021*



* This figure shows the distribution of non-financial publicly listed and private Turkish firms in 2021 based on author's own calculations utilizing the data of tax administration.

As it is explained in the methodology section, Propensity Score Matching (PSM) with a probit specification and with the one-to-one nearest matching specification will be employed to construct a valid control group. Thanks to the propensity score matching methodology, 240 out of 241 (99.5%) public firms (treatment group) one-to-one matched with 240 private firms (control group). Thus, the final data of the study includes a total of 1920 observations (60.0% manufacturing firms and 62.81% large-scale firms) to be used in DID for causal inference.

It is very crucial to assess the performance of the matching for quasi-experimental designs. Therefore, there are several methods used as it is reviewed in the methodology section for this purpose. In this study, one visual graphing technique and one statistical test will be employed to show matching performance: before and after matching kernel density distributions of selected covariates and balancing test of all covariates. Additionally, box whisker diagrams of selected variables for before and after matching can be found in the appendix.

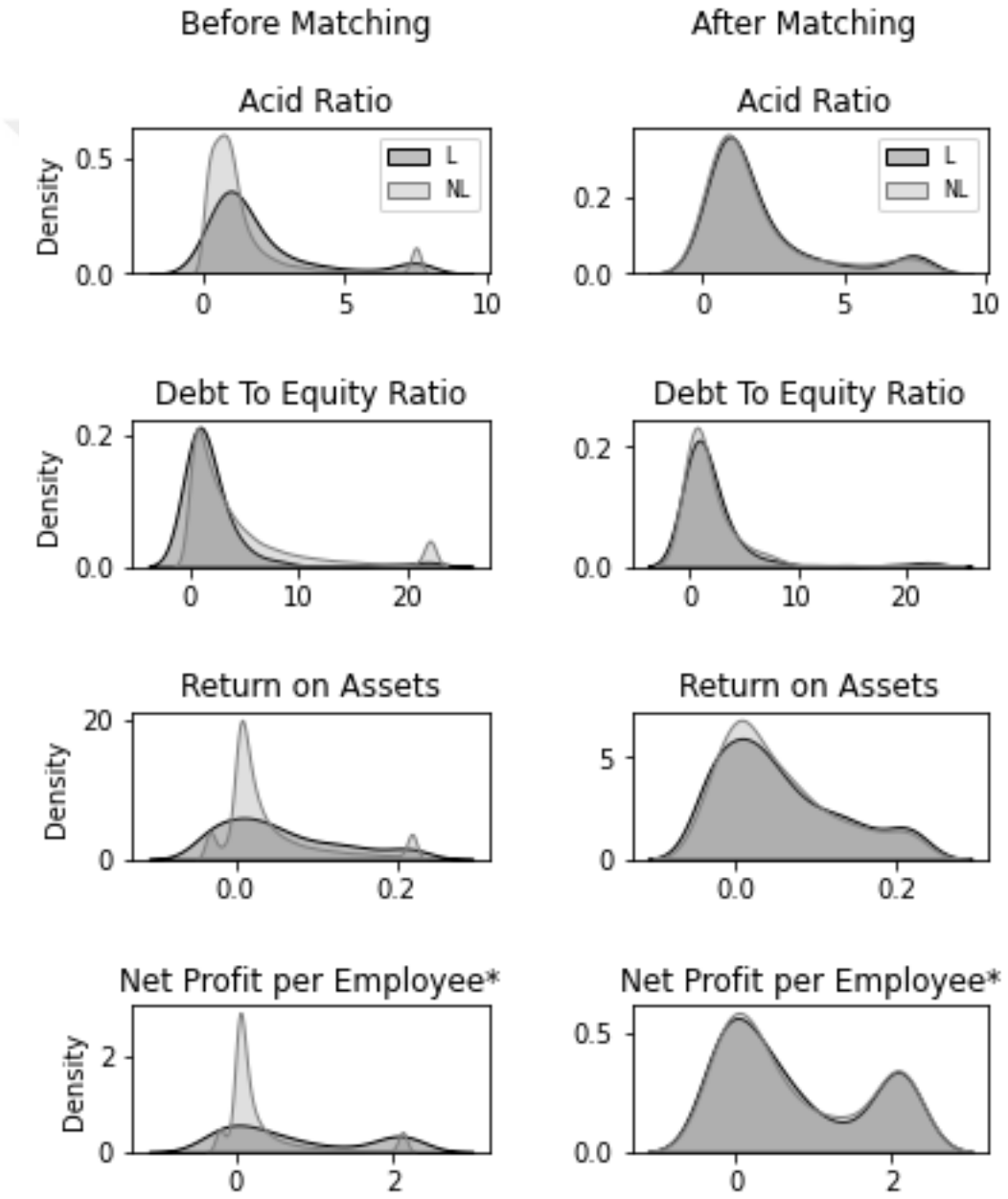
Figure 2 and Figure 3 show kernel density distributions of selected accounts (Figure 2) and ratios (Figure 3) for before and after matching samples of listed (L, public) and non-listed (NL, private) firms.

Figure 2 shows before and after matching distributions of selected covariates (# of employees, total assets, total sales, total equity, and gross fixed assets) of control (non-listed) and treatment (listed) groups. It is very clear that distributions of listed and non-listed firms differ significantly before the matching. However, it is possible to see that the distributions of listed and non-listed firms after matching overlap almost exactly.

Figure 2: Kernel Density Distributions of Selected Accounts in 2019 (All values are shown in natural logarithms; L: Public Firms, NL: Non-Listed Firms)

Figure 3 shows before and after matching distributions of selected main ratios (acid (quick) ratio, debt to equity ratio, return on assets (ROA), and net profit per employee) of control (non-listed) and treatment (listed) groups. It is very clear that distributions of control and treatment companies differ significantly before the matching. Yet, as it's the case in Figure 2, it is obvious that the distributions of control and treatment firms after matching overlap almost exactly.

Figure 3: Kernel Density Distributions of Selected Financial Ratios in 2019 (L: Public, NL: Non-Listed)*



* Net Profit per Employee is shown as 100,000 TL.

Table 3 shows the balancing test of the propensity score matching which consists of two-sample t-test results of treatment and control groups before matching (unmatched, U) and after matching (matched, M), means of each sample, percentage of bias (shown as percentage difference of means) and bias reductions after matching in percentages. As is also explained in the methodology section, Rosenbaum and Rubin's (1985) two-sample t-test and standardized bias (percentage of bias) methods are widely used statistical tools for measuring matching performances and both of them are employed in the balancing test in Table 3. For each variable used in the matching, we observe that before matching two-sample (samples of control and treatment groups) t-test results are significant while after matching two-sample t-test results are insignificant which points to a perfect matching performance according to Rosenbaum and Rubin (1985). As another performance indicator, the average percentage bias reduction after the propensity score matching exceeds 90%. Thus, as can be observed from Figure 2, Figure 3, and Table 3, a valid and similar control group is constructed among private firms for a quasi-experimental study with regard to public treatment firms.

Table 3: Results of Balancing Tests for Propensity Score Matching

Variable	Unmatched (U) / Matched (M)	(Mean) Treated	Control	%bias	%reduct |bias|	t-test t	p>|t|
--- Control Covarietes ---							
Total_Assets_2018	U	19.707	15.537	258.0		46.64	0.000
	M	19.707	19.836	-7.9	96.9	-0.77	0.445
Total_Assets_2019	U	19.803	15.727	253.9		46.96	0.000
	M	19.803	19.942	-8.6	96.6	-0.82	0.410
#_of_Employees_2018	U	5.3947	2.5743	177.8		35.81	0.000
	M	5.3947	5.4351	-2.5	98.6	-0.24	0.810
#_of_Employees_2019	U	5.3356	2.5501	175.0		35.77	0.000
	M	5.3356	5.4031	-4.2	97.6	-0.40	0.691
Net_Sales_2018	U	18.924	15.605	155.5		33.72	0.000
	M	18.924	18.932	-0.4	99.7	-0.04	0.969
Net_Sales_2019	U	18.921	15.762	147.1		33.23	0.000
	M	18.921	18.932	-0.5	99.7	-0.05	0.963
Total_Credits_2018	U	14.956	10.753	69.9		12.35	0.000
	M	14.956	14.965	-0.1	99.8	-0.01	0.988
Total_Credits_2019	U	14.712	11.054	61.0		11.03	0.000
	M	14.712	14.714	-0.0	100.0	-0.00	0.998
Equity_2018	U	18.099	13.007	273.8		37.02	0.000
	M	18.099	18.3	-10.8	96.1	-1.30	0.193
Equity_2019	U	18.167	13.202	271.5		37.11	0.000
	M	18.167	18.383	-11.8	95.7	-1.40	0.162
Gross_Fixed_Assets_2018	U	18.032	13.165	174.2		25.77	0.000
	M	18.032	17.978	1.9	98.9	0.21	0.834
Gross_Fixed_Assets_2019	U	18.115	13.416	175.1		26.76	0.000
	M	18.115	18.139	-0.9	99.5	-0.10	0.924
--- Ratio Covarietes ---							
Debt_to_Equity_2018	U	2.3656	5.244	-51.7		-6.75	0.000
	M	2.3656	2.1896	3.2	93.9	0.48	0.631
Debt_to_Equity_2019	U	2.2699	4.7393	-50.1		-6.66	0.000
	M	2.2699	2.1547	2.3	95.3	0.35	0.729
Acid_Ratio_2018	U	1.9308	1.3329	35.0		6.01	0.000
	M	1.9308	1.9942	-3.7	89.4	-0.36	0.718
Acid_Ratio_2019	U	1.9836	1.4515	28.4		4.74	0.000
	M	1.9836	1.9063	4.1	85.5	0.43	0.670
ROA_2018	U	.06156	.04137	27.1		4.74	0.000
	M	.06156	.05778	5.1	81.3	0.50	0.617
ROA_2019	U	.05534	.04248	18.6		3.18	0.001
	M	.05534	.05314	3.2	82.8	0.33	0.741
Net_Profit_Per_Employee_2018	U	64789	25852	59.9		12.41	0.000
	M	64789	64629	0.2	99.6	0.02	0.982
Net_Profit_Per_Employee_2019	U	73973	32502	55.0		11.20	0.000
	M	73973	76090	-2.8	94.9	-0.26	0.797

5. THE IMPACT OF BEING PUBLIC ON FIRM PERFORMANCE DURING COVID-19

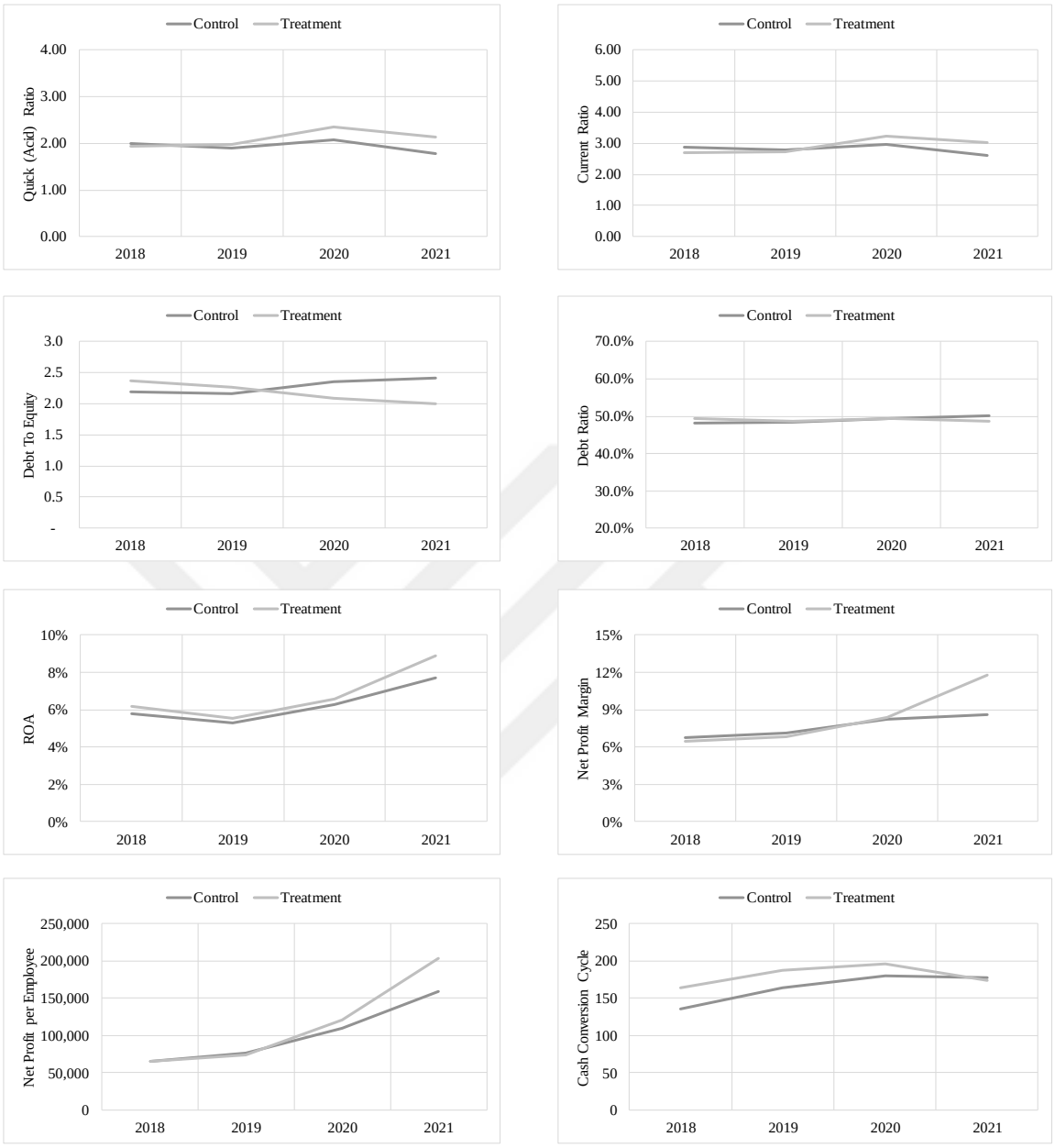
In this section, the impact of being public on firm performance during COVID-19 will be analyzed via differences-in-differences (DID) regressions for a matched sample. As shown in Table 2 firm performance will be examined by utilizing proxies of financial ratios gathered under 4 major umbrellas, namely, liquidity, profitability, leverage, and efficiency. Table 2 shows each financial ratio under the main groups. The current ratio and the quick (acid) ratio will be used as liquidity measures, return on assets (ROA) and net profit margin are going to be employed as profitability indicators, and debt ratio and debt to equity ratio will be wielded as leverage proxies, finally, net profit per employee and cash conversion cycle are going to be incorporated to be efficiency indicators.

Since the matched sample includes 1920 observations and 60% of all sample consist of manufacturing firms and 62.81% of all sample contains large-scale firms, it is of utmost importance to evaluate these memberships (industry and size) separately in addition to the sample of all firms. Therefore, DID regressions will be run for 5 different samples for each financial ratio as follows:

1. All sample
2. Sample of Manufacturing
3. Sample of Non-Manufacturing
4. Sample of Large Sized Firms
5. Sample of SMEs (Small and Medium Sized Enterprises)

Before starting DID regression analyses, it is of utmost necessity to demonstrate parallel trends of covariates of control and treatment groups before the shock (COVID-19 in this case). As can be seen from Figure 4, financial ratios which will be used in the DID regressions as dependent variables, satisfy the parallel trend assumption for control and treatment groups before the pandemic (2018-2019).

Figure 4: Yearly Average Values of Financial Ratios by Control and Treatment Groups



5.1 Liquidity

The current ratio and quick (acid) ratio are employed as proxies to measure the impact of being public on liquidity during the pandemic.

Table 4 demonstrates 5 difference-in-differences (DID) regression results on the current ratio for the utilized samples as mentioned above. The current ratio is measured by current assets divided by current liabilities and indicates the level of liquidity by showing whether a firm is eligible to pay out its short-term liabilities with its current (short-term) assets.

Table 4: The Impact of Being Public on Liquidity (Current Ratio)

	(1) *All Firms*	*(2)* *Manufacturing*	*(3)* *Non-Manufacturing*	*(4)* *Large*	*(5)* *SME*
POST × LISTED	*0.476****	*0.304**	*0.800***	*0.152*	*0.885***
	(0.163)	*(0.167)*	*(0.333)*	*(0.140)*	*(0.428)*
Constant	*2.728****	*2.595****	*2.980****	*2.315****	*3.538****
	(0.054)	*(0.059)*	*(0.106)*	*(0.048)*	*(0.126)*
Firm FE	*YES*	*YES*	*YES*	*YES*	*YES*
Year FE	*YES*	*YES*	*YES*	*YES*	*YES*
Year × Sector FE	*YES*	*YES*	*YES*	*YES*	*YES*
Year × City FE	*YES*	*YES*	*YES*	*YES*	*YES*
Observations	*1,896*	*1,112*	*712*	*1,123*	*621*
R-squared	*0.792*	*0.817*	*0.783*	*0.889*	*0.778*

*The dependent variable Y_{it}, as stated in equation (E1), is the current ratio for the above regressions and other fixed effect control variables are kept the same as defined in equation (E1) shown in the methodology section. $Post_t$ and $Listed_i$ variables are omitted in the regression results because these variables are dropped from the regressions due to existence of multicollinearity with the fixed effects. POST × LISTED is the interaction term defined as ($Post_t * Listed_i$) in the equation (E1) and coefficient of the interaction term shows, ceteris paribus, the average post COVID-19 impact of being listed on Y_{it}. Number of observations may not add up to total because singleton observations within fixed effects are dropped. While interpreting the results it must be taken into account that firm size is not constant and it can change throughout the years, so the total number of observations for (4) and (5) can be an odd value. Robust standard errors are shown in parentheses. *, **, *** indicates the statical significance at 1%, 5%, and 10%, respectively.*

The coefficient of interaction term in the first DID regression where all control and treatment firms are included is significant at 1% in (1). Thus, ceteris paribus, public firms have a 0.476 higher current ratio on average than private firms in post COVID-19 period (2020-2021). When the impact is analyzed for manufacturing and non-manufacturing samples, interaction terms in regression (2) and (3) are both significant at 1% and 10%, respectively. So, on average, listed manufacturing firms' current ratio is greater than non-listed manufacturing firms by 0.304 during the pandemic years and this impact increased to 0.800 for non-manufacturing firms. The interaction term of regression (4) where the sample is limited to large firms is not statistically significant and so, results showed that there is no significant difference among listed and non-listed large firms. Finally, the results for the SME sample demonstrated that listed SMEs' current ratio is 0.885 greater than non-listed SMEs.

Table 5 illustrates DID regression outcomes on the quick (acid) ratio for the given samples. Quick ratio is calculated by current assets minus inventories to the current liabilities and thus, used as a tighter liquidity measure because it evaluates if a firm is able to pay its short-term debts with its more liquid current assets (it excludes inventories because a firm cannot be able to sell its inventories under hard conditions).

Table 5: The Impact of Being Public on Liquidity (Quick (Acid) Ratio)

	(1) *All Firms*	*(2)* *Manufacturing*	*(3)* *Non-Manufacturing*	*(4)* *Large*	*(5)* *SME*
POST × LISTED	*0.329***	*0.249***	*0.500***	*0.067*	*0.655***
	(0.111)	*(0.115)*	*(0.225)*	*(0.098)*	*(0.286)*
Constant	*1.923***	*1.728***	*2.254***	*1.632***	*2.484***
	(0.038)	*(0.041)*	*(0.075)*	*(0.034)*	*(0.087)*
Firm FE	*YES*	*YES*	*YES*	*YES*	*YES*
Year FE	*YES*	*YES*	*YES*	*YES*	*YES*
Year × Sector FE	*YES*	*YES*	*YES*	*YES*	*YES*
Year × City FE	*YES*	*YES*	*YES*	*YES*	*YES*
Observations	*1,896*	*1,112*	*712*	*1,123*	*621*
R-squared	*0.806*	*0.820*	*0.799*	*0.891*	*0.793*

*The dependent variable Y_{it}, as stated in the equation (E1), is the Quick Ratio for the above regressions. Other details are the same as explained in Table 4. Robust standard errors are shown in parentheses. *, **, *** indicates the statical significance at 1%, 5%, and 10%, respectively.*

Looking at the impact of being public on firms' quick ratio amidst COVID-19, regression results for all sample (1) in Table 5 demonstrated that listed firms recorded 0.329 more quick ratio, on average, than non-listed firms during the pandemic term and this impact is significant at %1. The result of the (2) model shows that listed manufacturing companies have an average 0.249 higher quick ratio than non-listed manufacturing industry companies in the post-period at 5% significance. This impact is increased to 0.5 when the sample is limited to non-manufacturing firms at 5% significance. As a parallel to the current ratio regression in Table 5, the impact of being public on liquidity during COVID-19 is not statically significant for the sample of large firms. The impact is significant at %5 for the sample of SMEs and so, listed SMEs have a 0.655 higher quick ratio than non-listed SMEs during the pandemic years.

To sum up, there exists a positive causal relationship between public and firm liquidity after the unique economic shock of COVID-19 for all samples. This causal effect is relatively larger for non-manufacturing companies than manufacturing firms. When firm size was employed as a filter for regression samples, no significant impact was found for large firms. Yet, for SMEs, a significant effect was observed, almost twice that of the entire sample. The results are highly consistent for both proxies for liquidity (current ratio and quick ratio).

5.2 Profitability

Return on assets (ROA) and net profit margin are employed as proxies to assess the impact of being listed on profitability during the COVID-19 years (2020-2021). As explained in more detail in the methodology section, these two ratios are the most commonly preferred ratios in the relevant literature for analyzing the profitability of firms. Because ROA and Net Profit Margin measure the fundamental perspectives of profitability. ROA assesses the overall profitability of a firm with respect to total assets and Net Profit Margin measures the firms' ability to generate profit out of its total sales.

Table 6 demonstrates 5 DID regression results on return on assets (ROA) for the utilized samples below. ROA is one of the most widely used profitability ratios among researchers and professionals. ROA is calculated by net profits over total assets and points to the firm's ability to produce net profits with regard to its total assets.

Table 6: The Impact of Being Public on Profitability (ROA)

	(1) *All Firms*	*(2)* *Manufacturing*	*(3)* *Non-Manufacturing*	*(4)* *Large*	*(5)* *SME*
POST × LISTED	*0.003*	*0.000*	*0.008*	*-0.004*	*0.018**
	(0.005)	*(0.006)*	*(0.009)*	*(0.006)*	*(0.010)*
Constant	*0.064****	*0.076****	*0.048****	*0.073****	*0.052****
	(0.002)	*(0.002)*	*(0.003)*	*(0.002)*	*(0.003)*
Firm FE	*YES*	*YES*	*YES*	*YES*	*YES*
Year FE	*YES*	*YES*	*YES*	*YES*	*YES*
Year × Sector FE	*YES*	*YES*	*YES*	*YES*	*YES*
Year × City FE	*YES*	*YES*	*YES*	*YES*	*YES*
Observations	*1,896*	*1,112*	*712*	*1,123*	*621*
R-squared	*0.746*	*0.773*	*0.677*	*0.799*	*0.756*

*The dependent variable Y_{it}, as stated in the equation (E1), is the Return on Assets (ROA) for the above regressions. Other details are the same as explained in Table 4. Robust standard errors are shown in parentheses. *, **, *** indicates the statical significance at 1%, 5%, and 10%, respectively.*

When the results of all samples are evaluated separately, it is observed that the coefficient of the interaction term in all regressions except SMEs (5) is statistically insignificant. In the sample of SMEs, it is seen that public SMEs had 0.018 more ROA than private SME companies in the post-covid shock period at %10 statistical significance. However, since the impact is not significant in the first four regressions, it is hard to say that the causal impact for the SME sample (5) is convincing enough.

Table 7 shows DID regression outcomes on the net profit margin for each sample. Net profit margin is a very basic and crucial ratio to assess business profitability which is calculated by net profits over net sales. In other words, the net profit margin denotes the proportion of net gain derived from the total sales generated in the relevant year.

Considering the results for the sample which includes all companies (1), it is observed that public companies had 0.02 more net profit margin than the non-listed group after the pandemic shock, and this impact is significant at 5%. No significant impact is found for both manufacturing (2) and large (4) firm samples. However, non-manufacturing listed companies have a strong positive divergence from non-listed firms in terms of net profit margins by 0.046 on average, with 1% statistical significance. Similarly, public SMEs' net margins are 0.54 larger than those of private SMEs and this impact is also significant at 5%.

Table 7: The Impact of Being Public on Profitability (Net Profit Margin)

	(1) *All Firms*	*(2)* *Manufacturing*	*(3)* *Non-Manufacturing*	*(4)* *Large*	*(5)* *SME*
POST × LISTED	*0.020***	*0.008*	*0.046****	*0.008*	*0.054***
	(0.008)	*(0.008)*	*(0.017)*	*(0.008)*	*(0.021)*
Constant	*0.075****	*0.075****	*0.075****	*0.072****	*0.079****
	(0.003)	*(0.003)*	*(0.006)*	*(0.003)*	*(0.007)*
Firm FE	*YES*	*YES*	*YES*	*YES*	*YES*
Year FE	*YES*	*YES*	*YES*	*YES*	*YES*
Year × Sector FE	*YES*	*YES*	*YES*	*YES*	*YES*
Year × City FE	*YES*	*YES*	*YES*	*YES*	*YES*
Observations	*1,896*	*1,112*	*712*	*1,123*	*621*
R-squared	*0.668*	*0.719*	*0.626*	*0.765*	*0.665*

*The dependent variable Y_{it}, as stated in the equation (E1), is the Net Profit Margin for the above regressions. Other details are the same as explained in Table 4. Robust standard errors are shown in parentheses. *, **, *** indicates the statical significance at 1%, 5%, and 10%, respectively.*

To briefly summarize the impact of being public on company profitability after post COVID-19, when evaluated in terms of return on assets, which measures how much profit companies can produce relative to their size, it can be said that this effect does not point out a significant causal relationship. However, especially when considered in terms of net profit margin proxy, this effect turned out to be strong and positive for non-manufacturing and SME company samples.

5.3 Leverage

Debt ratio and debt to equity ratio are utilized as proxies to evaluate the effect of being public on leverage amidst the pandemic term (2020-2021). Debt and debt to equity ratio are two crucial ratios which indicates the firms' leverage levels. Debt ratio is more straight forward and it shows the total debt level of a firm to total liabilities. On the other hand, debt to equity ratio measures how many times a firm is indebted compared to its total equities. Unfortunately, it is not possible to state a general threshold for the optimal values of these ratios because it varies in each sector. Yet, it is possible to say that, considering all other things equal, lower level of leverage is better for a firm in terms the riskiness of a business.

First, table 8 consisted of 5 DID regression results on the debt ratio for the utilized samples below. Debt ratio indicates the level of proportion of a company's incurred debts with respect to its total assets. Thus, the debt ratio measures the overall level of indebtedness of a firm.

Table 8: The Impact of Being Public on Leverage (Debt Ratio)

	(1)	*(2)*	*(3)*	*(4)*	*(5)*
VARIABLES	*All Firms*	*Manufacturing*	*Non-Manufacturing*	*Large*	*SME*
POST × LISTED	*-0.021***	*-0.012*	*-0.030**	*-0.004*	*-0.039***
	(0.009)	*(0.011)*	*(0.015)*	*(0.010)*	*(0.019)*
Constant	*0.495****	*0.522****	*0.449****	*0.561****	*0.374****
	(0.003)	*(0.004)*	*(0.005)*	*(0.003)*	*(0.006)*
Firm FE	*YES*	*YES*	*YES*	*YES*	*YES*
Year FE	*YES*	*YES*	*YES*	*YES*	*YES*
Year × Sector FE	*YES*	*YES*	*YES*	*YES*	*YES*
Year × City FE	*YES*	*YES*	*YES*	*YES*	*YES*
Observations	*1,896*	*1,112*	*712*	*1,123*	*621*
R-squared	*0.914*	*0.910*	*0.921*	*0.937*	*0.891*

*The dependent variable Y_{it}, as stated in the equation (E1), is the Debt Ratio for the above regressions. Other details are the same as explained in Table 4. Robust standard errors are shown in parentheses. *, **, *** indicates the statical significance at 1%, 5%, and 10%, respectively.*

Analyzing Table 8 for the sample of all companies (1), public firms decrease their debt ratio by 0.021 in the pandemic years in comparison to non-listed counterparts. The impact of being public on the debt ratio during the pandemic term is not significant for manufacturing and large firm samples. Even though, for non-manufacturing SME firms, the corresponding effect is increased to -0.039 and -0.3 at 10% and 5% significance, respectively.

Secondly, debt to equity is used as a proxy of firm performance to analyze the effect of being public on the leverage of firms during the pandemic. Debt to equity is a ratio that measures the total debt leverage in terms of firm's total equities, in other words, it demonstrates how many times its total equity a firm became indebted to.

Table 9 shows the DID regressions for different sub-samples of matched listed and non-listed firms. The coefficient of interaction term in (1) indicates that listed firms decreased their debt-to-equity by 0.513 compared to non-listed firms amidst the COVID-19 years. There exists a homologous decline in debt-to-equity ratios for both manufacturing and SME companies by 0.512 and 0.448, respectively. When the regression run on the large company sample is considered, it is observed that large public companies had a lower debt to equity ratio of 0.671 compared to private counterparts during the pandemic. Finally, this effect is not significant for non-manufacturing sample.

Table 9: The Impact of Being Public on Leverage (Debt to Equity Ratio)

VARIABLES	*(1)* *All Firms*	*(2)* *Manufacturing*	*(3)* *Non-Manufacturing*	*(4)* *Large*	*(5)* *SME*
POST × LISTED	*-0.513***	*-0.512**	*-0.423*	*-0.671***	*-0.448**
	(0.204)	*(0.265)*	*(0.326)*	*(0.323)*	*(0.237)*
Constant	*2.361****	*2.326****	*2.421****	*2.994****	*1.441****
	(0.076)	*(0.099)*	*(0.127)*	*(0.119)*	*(0.085)*
Firm FE	*YES*	*YES*	*YES*	*YES*	*YES*
Year FE	*YES*	*YES*	*YES*	*YES*	*YES*
Year × Sector FE	*YES*	*YES*	*YES*	*YES*	*YES*
Year × City FE	*YES*	*YES*	*YES*	*YES*	*YES*
Observations	*1,896*	*1,112*	*712*	*1,123*	*621*
R-squared	*0.784*	*0.724*	*0.846*	*0.803*	*0.814*

*The dependent variable Y_{it}, as stated in the equation (E1), is the Debt to Equity for the above regressions. Other details are the same as explained in Table 4. Robust standard errors are shown in parentheses. *, **, *** indicates the statical significance at 1%, 5%, and 10%, respectively.*

To wrap up the impact of being public on firm leverage during the COVID-19, matched DID regressions showed that public firms have higher debt and debt to equity ratios during the pandemic years compared to private firms. This impact was stronger and clearer in the debt to equity ratio. The relevant impact was significant for all SME samples in both ratios. Yet, (4) regression on debt to equity ratio for large firms showed that large listed firms had 0.671 lower leverage than non-listed companies. Moreover, when this impact is analyzed for the industry breakdown of samples, the significance level decreases for both ratios.

5.4 Efficiency

Net profit per employee ratio and cash conversion cycle are utilized as indicators of efficiency in order to analyze the impact of being public on the post covid shock efficiency of firms. These ratios are used as an important indicator of firm efficiency. The former measures the firm efficiency based on the produced net value added (proxied by net profit) per each employee. The latter measures the efficiency based on the cash conversion cycle which indicates whether a firm needs external finance as working capital or not.

Table 10 shows 5 matched-difference-in-differences regression results on net profit per employee for the utilized samples as mentioned at the beginning of the fifth chapter. Net profit per employee is the basic efficiency ratio that indicates the net profit produced for each employee of the company.

Table 10: The Impact of Being Public on Efficiency (Net Profit Per Employee)

	(1) *All Firms*	*(2)* *Manufacturing*	*(3)* *Non-Manufacturing*	*(4)* *Large*	*(5)* *SME*
POST × LISTED	*28,727***	*19,622***	*45,090****	*18,222**	*57,921****
	(8,224)	*(9,127)*	*(16,438)*	*(10,254)*	*(19,321)*
Constant	*101,599****	*97,739****	*109,723****	*113,171****	*85,379****
	(2,890)	*(3,198)*	*(5,748)*	*(3,630)*	*(5,863)*
Firm FE	*YES*	*YES*	*YES*	*YES*	*YES*
Year FE	*YES*	*YES*	*YES*	*YES*	*YES*
Year × Sector FE	*YES*	*YES*	*YES*	*YES*	*YES*
Year × City FE	*YES*	*YES*	*YES*	*YES*	*YES*
Observations	*1,896*	*1,112*	*712*	*1,123*	*621*
R-squared	*0.73*	*0.78*	*0.69*	*0.80*	*0.68*

*The dependent variable Y_{it}, as stated in the equation (E1), is the Net Profit Per Employee for the above regressions. Other details are the same as explained in Table 4. Robust standard errors are shown in parentheses. *, **, *** indicates the statical significance at 1%, 5%, and 10%, respectively.*

(1) is the regression outcome for the sample that includes all matched control and treatment firms. Ceteris paribus, listed firms are found to have 28,727 TL more net profits per employee on average than non-listed counterparts during the pandemic years. This impact is in the same direction as other regression results (2,3,4,5) which are statistically significant. It is crucial to note that this effect is lesser, yet still positive for both manufacturing and large firms. Despite, this impact is increased to 45,090 TL and 57,921 TL for non-manufacturing and SME companies, respectively.

The cash conversion cycle (CCC) is another important proxy for firm efficiency, and it shows how effective a firm's trade activity is in terms of its cash conversion. It is calculated by days receivables outstanding plus days inventory outstanding minus days payables outstanding and it indicates how quickly a company turns its cash outflows into cash inflows including the inventory turnover.

Table 11 consists of matched-DID regressions for 5 different samples based on sector and firm size. According to the results of (1) where all firms are included, listed firms have decreased their CCC by 25 days compared to their non-listed counterparts during the covid period. While this effect is insignificant for large and non-manufacturing companies, public manufacturing firms also recorded 23 days decline in their CCC compared to private manufacturing firms during the same period. Strikingly, this positive impact (decline in CCC) has almost tripled to 79 for listed SMEs on average compared to non-listed SMEs.

Table 11: The Impact of Being Public on Efficiency (Cash Conversion Cycle)

	(1)	*(2)*	*(3)*	*(4)*	*(5)*
	All Firms	*Manufacturing*	*Non-Manufacturing*	*Large*	*SME*
POST × LISTED	*-25.29***	*-22.90**	*-25.67*	*1.94*	*-79.21**
	(11.91)	*(11.88)*	*(28.49)*	*(7.10)*	*(41.67)*
Constant	*175.6****	*171.8****	*184.5****	*125.1****	*281.0****
	(4.26)	*(4.32)*	*(9.74)*	*(2.52)*	*(12.87)*
Firm FE	*YES*	*YES*	*YES*	*YES*	*YES*
Year FE	*YES*	*YES*	*YES*	*YES*	*YES*
Year × Sector FE	*YES*	*YES*	*YES*	*YES*	*YES*
Year × City FE	*YES*	*YES*	*YES*	*YES*	*YES*
Observations	*1,705*	*1,105*	*536*	*1,105*	*452*
R-squared	*0.79*	*0.82*	*0.78*	*0.88*	*0.81*

*The dependent variable Y_{it}, as stated in the equation (E1), is Cash Conversion Cycle for the above regressions. Other details are the same as explained in Table 4. Robust standard errors are shown in parentheses. *, **, *** indicates the statical significance at 1%, 5%, and 10%, respectively.*

To conclude, there exists a causal relationship between public and firm efficiency after the unique economic shock of COVID-19 for all samples for each proxy employed in Table 10 and Table 11. This causal impact is relatively higher for listed SMEs and reversely, lower and less significant for large firms. When regression outcomes are considered for industry-based sample distinction (regression 2,3 in Tables 10 and 11), the impact level of results is different for each proxy. There is no significant difference among public and private non-manufacturing firms after COVID-19 in terms of CCC. Yet, from the perspective of net profit per employee, non-manufacturing listed firms are strongly (statistically significant at 1%) more efficient than non-listed manufacturing firms during the pandemic period.

5.5 Overall Firm Performances

Table 12: Summary Table of Coefficients of POST × LISTED Variable in All Regressions

Category	DEPENDENT VARIABLES	Regression Samples				
		All Firms	Manufacturing	Non-Manufacturing	Large	SME
Liquidity	Current Ratio	0.476***	0.304*	0.800**	0.152	0.885**
	Quick (Acid) Ratio	0.329***	0.249**	0.500**	0.067	0.655**
Profitability	Return on Assets (ROA)	0.003	0.00	0.008	-0.004	0.018*
	Net Profit Margin	0.020**	0.008	0.046***	0.008	0.054**
Leverage	Debt Ratio	-0.021**	-0.012	-0.030*	-0.004	-0.039**
	Debt to Equity Ratio	-0.513**	-0.512*	-0.423	-0.671**	-0.448*
Efficiency	Net Profit Per Employee	28,727***	19,622**	45,090***	18,222*	57,921***
	Cash Conversion Cycle	-25.29**	-22.90*	-25.67	1.94	-79.21*
Total Number of Significant Cases		**7**	**5**	**5**	**2**	**8**

*Summary results of the robustness test of regressions only with firm fixed effects (without any Year, Year×Sector, and Year×City fixed effects) can be found at Table 13 in the appendix. As can be seen from the Table 13, the robustness results are aligned with the final results of the study. Therefore Year, Year×Sector, and Year×City fixed effects are kept in the final regressions because they add to the overall precision of results. *, **, *** indicates the statical significance at 1%, 5%, and 10%, respectively. The color tones are also darkened accordingly, and the non-coloring areas show insignificant results.*

Table 12 shows all coefficients of POST × LISTED variables which is the interaction term that measures the relative impact of being public on firm performance during the pandemic in all analyses demonstrated above in Table 4 to Table 11 for different sub-samples in 4 main categories.

First, the results of this study regarding the performance category of liquidity demonstrated that public firms' liquidity were higher compared to non-listed counterparts on average during the pandemic. This effect is observed to be greater for non-manufacturing firms than for manufacturing companies. Despite there being no significant difference between large public and private firms, listed SMEs recorded higher liquidity than non-listed SMEs.

Secondly, this study showed that being public did not significantly and positively affect the relative profitability of firms especially in terms of return on assets during the pandemic. However, when net profit margin was taken into account as a proxy for firm performance, public non-manufacturing, and SME companies significantly performed better than matched non-listed firms by 0.046 and 0.054, respectively.

Thirdly, regarding the impact of being public on firm leverage, it is found that public firms significantly decreased their leverage by 0.021 and 0.513 compared to matched non-listed firms, respectively for debt ratio and debt to equity ratio. It is important to note that this impact is similar and significant for SME sample, too. However, when it is observed for the large firm sample, this impact becomes insignificant for debt ratio. Additionally, it is important to underline that this impact clearly weakens in industry-level analyses.

Fourthly, this study demonstrated that being public has a positive causal impact on relative firm efficiency compared to matched private firms during the COVID-19. Listed firms decreased their cash conversion cycles by 25 days on average than of matched private firms and increased their net profit per employee by 25,727 TL during the pandemic years. Even though there is no significant impact on the cash conversion cycle for non-manufacturing and large firms, the above-mentioned impact on net profit per employee was almost doubled for public SMEs and non-manufacturing firms.

To sum up, this study demonstrated that the impact of being public is significant for 7 out of 8 proxies of firm performance during COVID-19 for the sample of all firms. Therefore, this study showed that being public positively affected firm performance compared to the matched private firms. However, it should be underlined that the magnitude and importance of the impact varies across different sectors and scales. When the overall results of sectoral samples are examined, a significant and relatively positive effect in favor of publicly traded companies was revealed in 5 out of 8 indicators of firm performance for both manufacturing and non-manufacturing samples.

The most striking finding of the study is obtained when the results for Large and SME samples are analyzed. The effect of being publicly traded is highly significant and positive for the SME sample in each firm performance proxy. On the other hand, when the results for the large company sample are examined, it is seen that the impact of being public is insignificant in 6 out of 8 firm performance proxies. The results of this study found evidence of the positive impact of being public on the performance of SMEs during negative economic shocks such as Covid-19.

6. CONCLUSION

COVID-19 was certainly an unprecedented economic shock to the world and Turkiye was not an exception. The Turkish economy continued to grow (in terms of yearly GDP growth) in the pandemic period unlike many other emerging markets. Yet, real sector companies were affected by this crisis in many other aspects, such as supply chain dynamics, varying sectoral profit margins, changes in business models, corporate governance. For this reason, previous studies have analyzed the effects of many features of company performance during the COVID-19 period. These characteristics are generally grouped under four main headings: sector, scale, financial structures, and organizational characteristics. Although there are many other studies, focusing on these dimensions both in the world and in Türkiye, it has been argued in the review of literature of this work that studies about analyzing the effect of organizational characteristics on company performance during the pandemic period in Türkiye are limited.

In this thesis, the impact of being public on firm performance during COVID-19 is analyzed by employing a quasi-experimental methodology within the context of Türkiye. Being public is a unique status that has many different advantages such as international recognition and the opportunity to get access to international finance. However, it has some other liabilities such as changes in the organizational structure which enforce them to be more responsible to the public in terms of both corporate governance and risk management. Although these obligations, which cause organizational and managerial changes in companies, may be perceived as negative at first glance, they can make companies more resilient to negative economic and financial conditions. To analyze the impact of this organizational feature, quasi-experimental methodology has been applied in two stages: first, a similar and valid non-listed control group among private firms is constructed with regard to the treatment group which consists of public firms using propensity score matching (PSM) and second, analyzing for the casual inference using difference-in-differences method (DID).

Having access to the CBRT's comprehensive databases which are also supported by other public institutions, all legal entity companies, including all joint stock and limited firms, and their financial and descriptive datasets from 2018 to 2021 are incorporated into the analysis. Thus, firm performances of matched public and private firms are analyzed under four major categories and two sub-categories which are stated in parentheses for each category as follows: liquidity (current ratio and quick (acid) ratio), profitability (return on assets (ROA) and net profit margin), leverage (debt ratio and debt to equity ratio) and efficiency (net profit per employee and cash conversion cycle).

According to the results of the study, it is found that public firms performed relatively better compared to the matched private firms regarding the overall firm performance during COVID-19. However, the significance, direction, and magnitude of the impact can vary for each category of performance assessment depending on sector and firm size.

Firstly, when the firm performances are evaluated in terms of liquidity ratios, public firms' net liquidity position was better with regard to matched private firms. This result did not hold for the large firms in the sample. When the results are compared for manufacturing and non-manufacturing samples, the positive effect is observed to be greater.

Secondly, when the impact analysis from the profitability perspective is examined, it is seen that being public does not have a significant effect in terms of ROA during the COVID-19 period, except for the SME sample. However, evidence was found that being public has a significant positive effect on the net profit margin ratio in the non-manufacturing industry and SME samples.

Thirdly, there is evidence that being public has a reducing net effect on financial leverage in comparison to the non-public firms during the COVID-19 period for both in all firms and SME samples. However, this impact clearly weakens for large, and sectoral sub-samples. Therefore, it is must be underlined that public SMEs performed better in comparison to matched private firms regarding management of their leverage.

Fourthly, when the findings for efficiency were examined in terms of net profit per employee, it is revealed that public firms strongly and positively performed better than matched private firms in all samples. However, this effect of being public weakens for the cash conversion cycle and becomes insignificant for non-manufacturing and large samples. However, it still continues with a net significant reduction which is a positive in all other samples.

To summarize, as a result of this quasi-experimental study, it has been demonstrated that being public increases company performance more than being a private company during the Covid-19 period. Moreover, one of the most striking results of the study is that the impact of being public is much stronger and in the same direction for the SMEs, but is insignificant regarding the sample of large companies. One of the possible reasons for this insignificance might be that large firms may have more similar corporate governance structure regardless of their ownership status (public vs private). These results lead to an important policy recommendation. In order to solve the liquidity problems faced especially by SMEs during the Covid-19 period, monetary and fiscal policies were actively used and government incentives were provided (Ülger, 2022). In this context, it is of great importance to encourage SMEs to become public in order to reduce the amount of government incentives that will be needed in the event of a similar negative economic shock in the future and to make the real sector, which is mostly composed of SMEs, more resilient against such shocks.

In conclusion, we found proof of the positive causal impact of being public on firm performance which is measured under 4 main categories of liquidity, profitability, leverage, and efficiency during the COVID-19. Yet, we underline that even though the causal impact is positive and strongly significant for most cases, for only a few industries and sizes observed impact is insignificant. Our results are also parallel with related previous literature (Tekin and Guclu, 2023; Gu et al.,2020; Khatib and Nour; 2021). Additionally, some results of this study cannot be compared to previous studies in several aspects because of its unique methodology and comprehensive design. First, the quasi-experimental methodology of the study enabled us to analyze the subject in more depth and terms of causal effects beyond correlational relationships. Second, the quasi-experimental methodology allows us to analyze the relative performances of very similar, matched, firms for different samples of sectors and firm sizes. Thus, we concluded that being a public firm before COVID-19 acted as a shield against the unique negative shock of COVID-19 especially for SMEs as they performed better than non-listed (private) counterparts in all aspects of firm performance analyzed above. Therefore, we conclude that supporting the public listing of SMEs will help both SMEs and the overall economy to be more resilient to negative shocks like COVID-19.

Considering every study has its limitations and there is always a gap for further studies, this thesis has several limitations and can be improved in various ways. Firstly, matching theory stands at a crucial place for the quasi-experimental designs and it is evolving continuously, therefore new methodologies such as machine learning can be adapted to improve matching performance which can affect the overall performance and robustness of the study. Secondly, even though we control for several fixed effects (firm, year, Sector ×Year, City × Year) in our DID regressions, some other studies can also control for macro-financial variables instead of fixed effects or include some others such as firm group (some firms has same ownerships) fixed effects. Last but not least, these results can also be compared and re-analyzed when future financial datasets of private firms are available.

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8. APPENDIX

Table 13: Summary Table of Coefficients of POST × LISTED Variable in All Regressions Without Any Year Fixed Effects (Only Firm Fixed Effects is Used)

Category	DEPENDENT VARIABLES	Regression Samples				
		All Firms	Manufacturing	Non-Manufacturing	Large	SME
Liquidity	Current Ratio	0.435***	0.262	0.726**	0.089	0.872**
	Quick (Acid) Ratio	0.309***	0.231**	0.452**	0.056	0.661***
Profitability	Return on Assets (ROA)	0.005	0.002	0.008	-0.001	0.012
	Net Profit Margin	0.020**	0.009	0.036**	0.008	0.039**
Leverage	Debt Ratio	-0.017*	-0.007	-0.031**	-0.001	-0.037**
	Debt to Equity Ratio	-0.485**	-0.499**	-0.48	-0.619**	-0.299
Efficiency	Net Profit Per Employee	28,436***	19,284**	42,086***	16,563	46,463***
	Cash Conversion Cycle	-18.1	-15.9	-22.4	1.5	-63.5*
Total Number of Significant Cases		**6**	**3**	**5**	**1**	**6**

, **, * indicates the statical significance at 1%, 5%, and 10%, respectively. The color tones are also darkened accordingly, and the non-coloring areas show insignificant results.*