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COVID-19 PANDEMIC AND TURKISH MANUFACTURING FIRMS

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ABSTRACT

Purpose: Globally taken similar measures to prevent the spread of the COVID-19 pandemic caused disruptions in the supply and demand schedules and increase in uncertainty. The shock of this pandemic has forced many firms to take new actions and make new business decisions. The aim of this study is to examine the heterogeneity of the production, employment and policy decisions taken by the firms against the pandemic across productivity distribution.

Methdology: For this purpose, pandemic specific survey responses of a representative panel of 1207 Turkish manufacturing firms matched with pre-pandemic tendency survey responses and administrative data and cross sectional models are employed.

Findings: Estimation results show that productive firms of the Turkish manufacturing sector have taken firmer stance against the devastating economic impact of the pandemic at the initial wave. They are more likely to continue the production and less likely to reduce the employment and to benefit from government supports.

Originality: This study uses unique firm-level dataset that enable to investigate the effects of the pandemic and mitigation policies on firms using representative survey data for Turkish manufacturing sector. This will contribute to the existing narrow empirical literature on the impact of COVID-19 on manufacturing firms by providing new evidence on a large developing country, Türkiye, based on representative firm-level dataset.

Keywords: COVID-19 Shock, Firms, Productivity, Manufacturing Sector, Türkiye.

JEL Codes: D22, L20, L25.

COVID-19 SALGINI VE TÜRKİYE İMALAT SANAYİ FİRMALARI

ÖZET

Amaç: COVID-19 salgınının yayılmasını önlemek amacıyla küresel ölçekte alınan benzer tedbirler arz ve talepte belirgin bozulmalara; belirsizlikte artışa neden olmuştur. Salgın şoku birçok firmanın yeni iş kararları almasını zorunlu hale getirmiştir. Bu çalışmanın amacı verimlilik seviyesine göre firmaların salgına karşı aldıkları üretim, istihdam ve politika kararları farkılılaşmalarını incelemektir.

Yöntem: Bu amaçla, Türkiye imalat sanayi için temsil gücü yüksek 1207 firmaya ait anket cevapları, salgın öncesi eğilim anketi cevapları ve idari kayıtlarla birleştirilerek elde edilen veri seti kullanılmıştır.

Bulgular: Tahmin sonuçları, Türk imalat sektöründe faaliyet gösteren firmalardan verimli olanların ilk aşamada pandeminin yıkıcı ekonomik etkisine karşı daha sağlam bir duruş sergilediğini gösteriyor. Verimli firmaların üretime devam etme olasılıkları daha yüksek, istihdamı azaltma ve devlet desteklerinden yararlanma olasılıklarının daha düşük olduğu gözlenmektedir.

Özgünlük: Bu çalışma, COVID-19 salgını ve salgına karşı uygulanan politikaların Türkiye imalat sanayi firmaları üzerindeki etkilerini araştırmayı sağlayan benzersiz temsil gücü yüksek firma düzeyinde veri seti kullanmaktadır. Bu, gelişmekte olan büyük bir ülke olan Türkiye hakkında yeni kanıtlar sağlayarak COVID-19'un imalat firmaları üzerindeki etkisine ilişkin mevcut dar ampirik literatüre katkıda bulunacaktır.

Anahtar Kelimeler: COVID-19 Şoku, Firmalar, Verimlilik, İmalat Sanayi, Türkiye.

JEL Kodları: D22, L20, L25.

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1. INTRODUCTION

Started as a severe public health problem COVID-19 has turned into an economic crisis rapidly (Pak et al., 2020). Worldwide measures against pandemic such as business shutdowns, quarantines, mobility restriction and social distancing caused unprecedented massive deterioration on demand, supply and expectations. This disruptive and multidimensional shock forced firms to take immediate business decisions and correspondingly forced governments to introduce a wide range of measures in order to support firms and to limit layoffs Türkiye was no exception. Firms faced serious challenges with the COVID-19 shock and Turkish government implemented support policies at the early stage of the pandemic.

The aim of this paper is to provide the first evidence on how Turkish manufacturing firms responded to the COVID-19 shock and to investigate how firms' reactions differed across productivity distribution. Based on April 2020 survey responses of a representative panel of 1207 Turkish manufacturing firms matched with pre-pandemic tendency survey responses and administrative data, we have investigated firms' business decision heterogeneity against COVID-19 shock according to productivity. For policy makers, addressing this issue is crucial for better assessment of the economic impact of the pandemic and therefore for the development of correct policies for the recovery period of Türkiye. Disrupted demand, supply and expectations due to COVID-19 shock, may adversely affect not only laggards but also the most productive firms. Therefore, determining heterogeneities in vulnerabilities of the firms can orient policy interventions for fostering economic growth. Moreover, this paper contributes to the existing narrow empirical literature on the impact of COVID-19 on manufacturing firms by providing new evidence on a large developing country, Türkiye, based on representative firm-level dataset.

Considering its coverage and uniqueness, it is not surprising to mention that there is a growing empirical literature about the economics of the pandemic. However, limited number of studies have investigated the effects of the pandemic and mitigation policies on firms using representative survey data for developing countries. Bartik et al. (2020) conducted a survey more than 5800 small US businesses in order to assess the impact of COVID-19 on small businesses. The results of the paper reveal the financial fragility of many small businesses and massive dislocation among small businesses due to pandemic. Buchheim et al. (2020) investigates the determinants of firms' business outlook and managerial mitigation strategies in the wake of the COVID-19 crisis using survey responses of German firms. They document that firms with weaker pre-pandemic business conditions are more severely hit by the shock, they choose stronger mitigation strategies and their expectations are worse than the others. Kozeniauskas et al. (2020) investigates how the COVID-19 pandemic has affected firms and which firms benefited from government support using a panel survey of Portuguese firms. The results show that the shock was large and heterogeneous across firms. They conclude that high productive firms are more likely to remain open, less likely to cut employment and make less use of government support. Fernandez-Cerezo et al. (2020) for Spain studies the impact of and responses to the COVID-19 shock using firm-level survey data. They show that the impact of the shock was larger in the case of small, young and less productive firms located in urban areas within each sector-region part. They also reveal that those firms resorted relatively more to government supports. Apedo-Amah et al. (2020) investigates the impact of the COVID-19 shock on firms using a novel data set collected by the World Bank Group and several partner institutions in 51 countries with a focus on developing countries. Results of the study show negative persistent adverse effect on sales and limited impact with intensive margin employment adjustment. Bloom et al. (2021) assesses the impact of the pandemic on SMEs for US using panel survey data. They find a significant negative sales impact and significant heterogeneity across firms. In addition, they show that, the smallest offline firms experienced larger sales drops when compared with the largest online firms.

This paper contributes to the literature on the business effects of COVID-19 with new evidence on a large developing country, Türkiye, based on representative matched firm-level survey and administrative data. The plan of this paper is as follows. Next section describes the context of the COVID-19 pandemic in Türkiye together with the data and the methodology used. Third section provides a brief discussion of the impact of the pandemic with descriptive data analysis and gives the model estimation results. The fourth section concludes.

2. DATA AND METHODOLOGY

2.1. Data

The COVID-19 outbreak, declared as pandemic by the World Health Organization, has manifested in Türkiye by the first COVID-19 case announcement on March 11, 2020 and by the first virus-related death occurred on March 17, 2020. Since then, as many others, Turkish government has put in place wide-ranging preventive measures in order to reduce the spread of the virus. At the first place, employees at high risk i.e., pregnant, disabled and older than 55 started to work remotely and then the coverage

expanded. Education interrupted during the week of 16 March and the schools were closed until the end of the semester. The activities of restaurants, cafes, bars, nightclubs were suspended; the sports leagues were postponed and all the collective events were cancelled.

In order to limit the adverse economic impact of the pandemic, Turkish government has introduced an economic stimulus package including financial supports, credit supports and employment-related measures. On 30 March 2020, The Credit Guarantee Fund (CGF), which provides credit guarantees to the loans borrowed from banks by firms, increased the total amount of available guarantees from TL 25 billion to TL 50 billion. On 2 April 2020, the scope of potential beneficiaries from the Small and Medium Industry Development Organization (KOSGEB) credit support program was expanded to cover the non-industrial SMEs in order to facilitate their access to credit. State-owned banks provided low-interest loans, which were subsidized by the government. In addition to financial supports, employment-related measures were implemented. The conditions for 'Short-time Working Allowance' were relaxed and the bureaucratic procedures were eased. In order to prevent employees losing their jobs, termination of employment contracts was prohibited and employees were encouraged to apply for short-time working allowance. The employees who do not meet the criteria of short-time working allowance were put on unpaid leave and the unemployment insurance fund paid allowance to employees on unpaid leave.

Massive dislocation caused by the COVID-19 shock disrupted the existing economic system and almost all businesses were affected, but not necessarily in the same direction. Aggregated data masks heterogeneities, which has never been so important. Firm-level surveys and analyses are valuable and necessary mediums for revealing the most vulnerable part of the economy. Determining firm heterogeneity against COVID-19 shock provides mentoring on the development of efficient policy interventions. For this purpose, The Central Bank of the Republic of Türkiye (CBRT) conducted a survey in March-April 2020 to the manufacturing firms. The main firm-level data source in this study is this survey entitled as "Real Sector Impact of COVID-19". The survey contains questions about firms' operations and employment decisions related with the pandemic, the problems that they face, and their use of government support against the pandemic (Table 1).

Table 1. Real sector impact of COVID-19 survey questions that are used in the analysis

Questions related with production activity	
Does your company continue production during the pandemic? (Yes/No)	
If your production has increased, by what percentage? (%)	If your production has decreased, by what percentage? (%)
If you halt your production specify the date:	Expected starting time for your production activity: (Within 2 weeks/Between 2 weeks - 1 month/ Between 1-3 months/ 3 months or more/ Duration cannot be predicted)
Questions related with the problems faced due to pandemic	
What are the problems faced by your company due to the pandemic? (No problems encountered/ Decrease in orders/ Inability to deliver existing orders/ Increasing financial difficulty/ Disruption in logistics/ Supply problems/ Cost increases/ Difficulty in finding employees/ Other)	What are the most important financial problems faced by your company due to the pandemic? (No problems encountered/ Personnel wages and social security expenditures/ Rent/ Loan payments/ Bill payments/ Delay in collection of receivables/ Other expenditures/ Other)
Question related with the government support program	
What are the main tool(s) you intend to use to deal with the cash flow shortage? (No cash flow shortages/ Commercial bank loans/ Personal loans/ Negotiating with buyers to avoid taking out loans/ Equity financing (either new shareholders or raising existing shareholders' equity)/ Reducing operating costs (e.g. layoffs or salary reductions/ Benefiting from support announced under the Economic Stability Shield program (excluding business loan support)/ Other	
Questions related with the employment	
Have you laid off your employees due to the pandemic? (Yes/No)	If yes, what percentage of the employees, did you lay off? (%)
Are you considering laying off your employees due to the pandemic? (Yes/No)	If yes, what percentage of your employees do you intend to lay off?(0-5%/ 5-10%/ 10-20%/ More than 20%/ Unpredictable)
Do you plan to use the short-time working allowance due to the pandemic? (Yes/ No)	If yes, what percentage of your employees do you intend to use it for? (%)

COVID-19 survey was conducted across firms that are in the coverage of CBRT Business Tendency Survey (BTS). Since 1989, CBRT has been conducting monthly BTS in order to track the general views of the representatives of manufacturing firms about general economic outlook. The survey consists of questions that comprise the assessments of representatives on their firms' level of production, volume of sale orders, employment, stocks of finished goods, selling prices, unit cost and capacity utilization rate. The survey also includes questions regarding expectations about macroeconomic variables such as producer price inflation rate, interest rates on loans and general course of business conditions (Business Tendency Statistics and Real Sector Confidence Index, 2021). It's frame match up with the survey units of the Turkish Statistical Institute's (TURKSTAT) monthly manufacturing industry production index (IPI) and hence is representative of the manufacturing industry. Three-digit industry codes based on NACE Rev.2 sector classification are also available in the dataset together with the administrative data about total number of employees, production values and export intensity on an annual basis.

Using 2019 annual data for production volume and number of employment in the BTS dataset together with 3-digit producer price indices, firm-level partial labor productivity is measured as real production volume per employee. Export intensity of the firm shows export share in total sales and again 2019 figures in BTS dataset are employed. As mentioned before BTS is a monthly survey and firms report their capacity utilization rates on a monthly basis. In our analysis, firm-level average capacity utilization rates for the year of 2019 are used. In BTS dataset, firm size is categorized as small, medium and large according to their number of employees and total assets.

The resulting matched dataset enables to investigate initial responses of manufacturing firms against COVID-19 by considering firm-specific control variables such as sector, size, capacity utilization and export intensity. Table 2 gives basic descriptive statistics about the dataset.

Table 2. Basic descriptive statistics, 2019

Statistic	*Value*	*Statistic*	*Value*
Number of Firms	1207	Production Value (Million TL)	578006
Number of Employees (Total)	505632	Number of Employees (Average)	419
Capacity Utilization Rate (Average, %)	68.5	Export Intensity (%)	27.0
Size Distribution (%)		Sector Distribution (%)	
Small	6.6	Durable Consumption Good	3.91
Medium	35.6	Non Durable Consumption Good	25.1
Large	57.8	Intermediate Goods	50.87
		Investment Good	20.1

The matched sample covers 1207 firms that employed 505632 employees. The average number of employees for the sample is 419, which is much higher than that of overall average. Size distribution also shows the dominance of large firms in the sample. An average firm in the sample uses 68.5 percent of its production capacity and exports constitutes 27 percent of its total sales. When sectoral distribution according to usage is considered, the sample mainly contains firms that are producing intermediate and investment goods.

According to TURKSTAT statistics for 2019 there are 403018 enterprises with 3786144 number of employees and 2365543 million TL production value in manufacturing sector. When we look at the corresponding figures in our sample, the coverage rates are 0.3, 14.4 and 24.4 percent respectively. Although coverage rate according to the number of firms is low, employment and production volume coverage rates are much higher. This implies our sample mainly represent large firms in the sector.

2.2. Empirical Model

In order to analyze the effect of productivity on firms' production and employment decisions together with the decision to be beneficiary from the government support during the first wave of the pandemic, we employ the following cross-sectional model:

$$y_i = \beta_0 + \beta_1 . std\_prod_i + \beta_2 S_i + \beta_3 C_i + \varepsilon_i \quad (1)$$

Here, y_i stands for the dependent variable and shows the firm's business decisions. Business decisions of firms are examined under three main headings as production, employment and benefiting from supports. Hence, the dependent variable y_i is defined in six different ways: (1) For the case of production, we create two alternative indicators; a dummy variable indicating whether the firm continues its production activity or not and the percentage of change in the production volume due to the pandemic. (2) Likewise, for examining the employment decisions of the firms during the pandemic, dependent variable, y_i is first defined as a dummy variable for dismissing their employees due to the pandemic and then defined as the percentage of employees who will benefit from the Short Working Allowance. (3) Lastly for the models

regarding the decision about benefiting from the government support against the pandemic, the dependent variable, y_i is defined as the probability of benefiting from the short-time working allowance and economic stability support program.

The variable of interest is firm-level productivity, which is denoted as std_prod in Equation (1). Here, we use partial labor productivity for its simplicity and practicality. In order to control for sectoral differences in productivity, we use standardized version of the productivity measure as in Equation 2-4:

$$std\_prod_i = (Prod_i - Prod^s)/\sigma^s_{Prod} \quad (2)$$

$$prod_i = log\left[\frac{Production\ Value_i}{PPI^s.(Number\ of\ employee)_i}\right] \quad (3)$$

$$prod^s = \frac{1}{N^s}\sum_{i\in s} prod_i \text{ and } \sigma^s = \frac{\sqrt{\sum_{i\in s}(prod_i - prod^s)^2}}{N^s - 1} \quad (4)$$

Here, s refers to the 3-digit sub-sector according to the Nace Rev.2 sector classification. $Prod_i$ represents the logarithmic transformation of partial labor productivity of firm i, while $Prod^s$ represents the average sector log productivity at the triple level; σ^s_{Prod} represents the standard deviation of sector log productivity at the 3-level. PPI^s is the producer price index for the corresponding sector s.

In addition to firm-level productivity, two-digit sector fixed effects and firm-specific control variables are included in the models. Within the scope of available data, firm-level capacity utilization rate, export intensity and size dummies are used as firm-specific control variables. Capacity utilization rates are reported on a monthly basis and pre-pandemic capacity utilization rate of a firm is defined as the average capacity utilization rate for the year 2019. The data on the export intensity is based on the statements of the firms in the BTS. The data is compiled annually and is expressed as the share of exports in total sales. In the models in which the dependent variable is defined as a binary variable logistic regression in the models with continuous dependent variables least squares (OLS) regression analysis is used, respectively.

3. EMPIRICAL FINDIGS

3.1. Descriptive Findings

In this section, we provide a descriptive analysis of the results of the COVID-19 Survey. Accordingly, 52 percent of the firms stated that their production volume suspended either completely or partially due to the pandemic; 42 percent of the firms indicated that there is no change in their production plan and only 6 percent of the firms reported increased production volume with the pandemic (Figure 1). The expected decline in production due to COVID-19 pandemic was significant. Approximately 60 percent of the firms that reported production decline due to pandemic stated that production decreased by more than half (Figure 2). Moreover, 72 percent of the firms in the sample expected that production suspension would be at most 3 months (Figure 3).

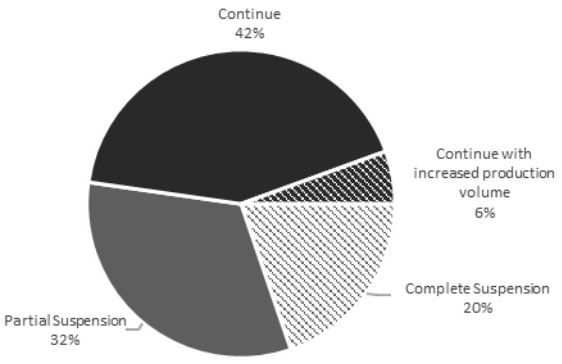

Figure 1. Production status of manufacturing firms as March/April 2020 (%)

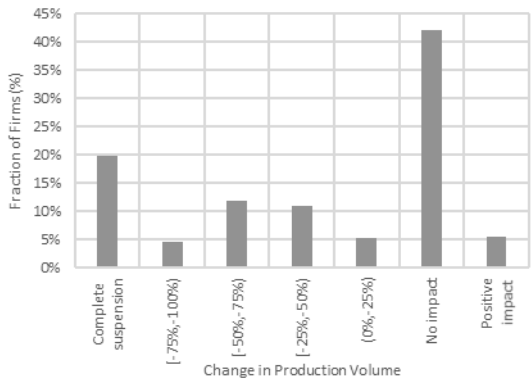

Figure 2. Production adjustment during pandemic (%)

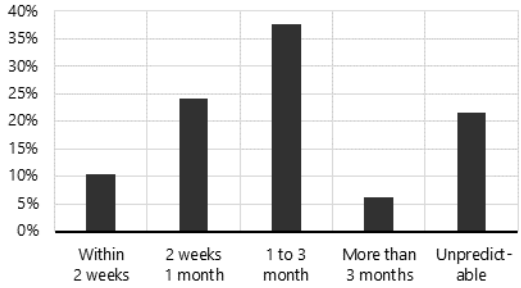

Figure 3. Expected shutdown duration

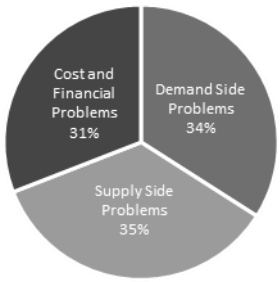

Figure 4. Problems encountered due to pandemic

The share of firms that encountered supply and demand problems due to the pandemic seems to be nearly the same (Figure 4). This result verifies that implemented measures to assure public health against COVID-19 outbreak combine aspects of 'supply' and 'demand' shocks as noted in Baldwin and Weder di Mauro (2020). Moreover, almost one third of the firms reported cost and financial problems as the major concern due to the pandemic. As mentioned before, with the onset of the pandemic, Turkish government introduced measures to limit company bankruptcies and layoffs with the short-time working allowance and economic stability shield package support program. In Figure 5, the distribution of the use of government supports is given. The share of beneficiaries reached to 77 percent, which implies the inclusiveness of the implemented policies for the case of Türkiye. De Nicola et al. (2021) study for East Asia and Pacific region concluded that the support has not reached many firms. Indonesia had the highest share of beneficiaries from policy support within the region with only 20 percent, which lagged far behind Türkiye.

The impact of the pandemic on production decisions differs significantly across sectors as documented in Figure 6. Adversely affected sectors are mainly those that are producing durable consumer goods such as leather, textile, wearing and motor vehicles whereas for the sectors with strategic importance such as petroleum, pharmaceuticals, food, paper and chemicals, production is predominantly on its normal course (Figure 6).

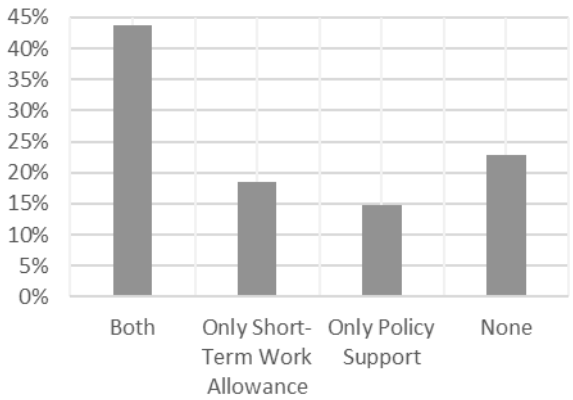

Figure 5. Use of government supports

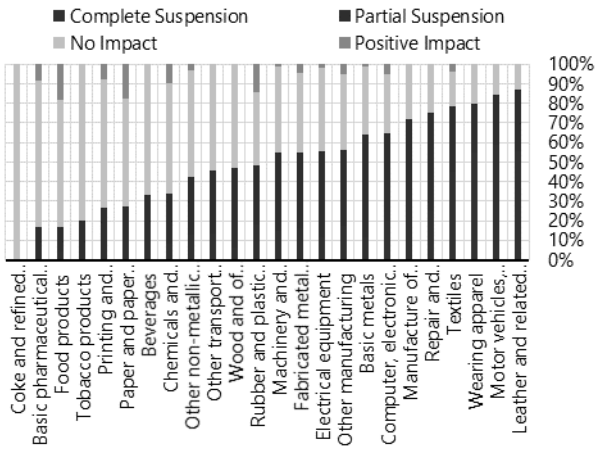

Figure 6. Sectoral impact of pandemic on production

3.2. Estimation Results

The primary decision manufacturing firms have to make when faced the COVID-19 shock is whether to continue production activity or not. Next, firms have to decide on the amount of production adjustment. Therefore, we first try to address the effect of productivity levels on firms' production decision by modelling the probability of continuing production during the pandemic and then percentage of change in production volume due to the pandemic.

The estimation results for the models of production decisions taken by the firms against the pandemic are summarized in Table 3. Columns (1) and (3) of the table displays estimation results of the models without control variables and columns (2) and (4) shows the model estimation results with controls.

Table 3. Production decisions against COVID-19 and productivity

Dependent Variable	*Probability of continuing production during the pandemic*		*Percentage of decline in production volume due to the pandemic*	
Independent Variables	(1)	(2)	(3)	(4)
Productivity	0.11*	0.14**	-1.81*	-2.31**
	[0.065]	[0.067]	[1.068]	[1.137]
Capacity Utilization		0.11*		-2.70***
		[0.067]		[1.064]
Export Intensity		-0.379		-0.401
		[0.246]		[4.291]
Size Group				
Medium		0.45		-6.38
		[0.305]		[5.513]
Large		0.55**		-9.57*
		[0.310]		[5.780]
Number of Observations	1 183	1183	1201	1201
Sector fixed effect	Yes	Yes	Yes	Yes
R^2	0.14	0.14	0.33	0.34

Note: Clustered standard errors are given in the parentheses. (***, **, *) indicates significance level and *** p<0.01, ** p<0.05, * p<0.
+ Columns (1) and (2) shows estimation results for the logistic regression and coulmns (3) and (4) shows the OLS regression results.

Estimation results reveal that the manufacturing firms' decisions regarding the production activities with the outbreak of the pandemic differ considerably. The probability of continuing production during the pandemic is higher for productive and large firms with high-capacity utilization. Statistically significant and positive coefficient estimates for productivity given in columns (1) and (2) indicate that the probability of continuing production during the pandemic period increases with productivity level of the firms. The corresponding odds ratios imply that having a high productivity and capacity utilization of one standard deviation from the sector average increases the probability of continuing production during the pandemic by 1.15 and 1.11 times. Moreover, the probability of continuing production during the pandemic for large firms is 1.73 times higher than that of small firms in the same sector[2].

Against COVID-19 shock, not only firms' decision about continuing production but also firms' production volume decision displayed heterogeneous pattern. The estimation results for the percentage of decrease in production volume due to the pandemic given in the fourth column show that for large and productive firms with high-capacity utilization rate decline of production volume due to pandemic is lower. The estimated coefficient for the productivity variable is found to be negative and statistically significant which implies that a firm with one standard deviation higher than the industry average has a 2.3 percent less decrease in production volume due to the pandemic.

Results point out that both the decrease in production volume and the possibility of continuing production vary according to the level of productivity, capacity utilization and size of the firms. The negative impact of COVID-19 on the production activities of is more limited for the high productive firms relative to low productive firms within the same sector. Likewise, the need of production adjustment due to pandemic is less for larger firms with higher capacity utilization rate.

Firms' another margin to adjust when facing the COVID-19 shock is employment. Regarding employment decisions of the firms against pandemic, we first consider the extensive margin and model the probability of laying off employees due to the pandemic. However, starting from 17 April 2020, government banned layoffs to prevent job losses so that either employers put employees on unpaid leave without terminating their contracts or they benefit from short-time working allowance. In order to consider intensive margin of the employment decision of the firms, in the second stage, we model the percentage of employees who benefits from short-time working allowance due to the epidemic. The corresponding estimation results given in Table 4.

[2] The given figures refer to the odd ratio, which is equivalent to exponential of the corresponding coefficient estimate. Exp(0.14)=1.15, Exp(0.11)= 1.11 and Exp(0.55)=1.73 respectively.

Table 4. Employent decisions against COVID-19 and productivity+

Dependent Variable	*Probability of laying off employees due to the pandemic*		*Percentage of employees who will benefit from short-time working allowance*	
Independent Variables	(1)	(2)	(3)	(4)
Productivity	-0.03	-0.06	-2.86***	-3.07***
	[0.105]	[0.106]	[1.012]	[1.076]
Capacity Utilization		-0.20**		-2.08**
		[0.090]		[1.053]
Export Intensity		-0.26		7.65**
		[0.419]		[4.104]
Size Group				
Medium		-0.07		-1.66
		[0.452]		[5.179]
Large		-0.11		-2.59
		[0.457]		[5.433]
Number of Observations	1 162	1 147	1 203	1 188
Sector fixed effect	Yes	Yes	Yes	Yes
R^2	0.04	0.05	0.32	0.32

Note: Clustered standard errors are given in the parentheses. (***, **, *) indicates significance level and *** p<0.01, ** p<0.05, * p<0.1
+ Columns (1) and (2) shows estimation results for the logistic regression and coulmns (3) and (4) shows the OLS regression results.

Considering the probability of laying-off employees due to the epidemic, the estimation results show that the productivity levels of the firms do not play statistically significant role. This finding is considerably acceptable. As mentioned before, government implemented the dismissal restrictions in order to protect employment in this period. When the model results for the rate of benefiting from the Short Working Allowance considered heterogeneity with respect to productivity level, capacity utilization rate and export intensity draws attention. For productivity and capacity utilization, the estimated coefficient is negatively significant implying that the ratio of employees to benefit from the Short Working Allowance declines as the level of productivity and capacity utilization increases. On the contrary, the estimated coefficient of export intensity is positive and statistically significant which implies that the ratio of employees benefiting from Short Working Allowance is higher for the export-oriented firms.

Lastly, we investigate firms' decisions on being a beneficiary from the support provided by the government during the first wave of the pandemic. With the outbreak of COVID-19 pandemic, Turkish government quickly implemented short-time working allowance and economic stability support programs. Estimation results for the probabilities of benefiting from these programs are provided in Table 5.

Table 5. Receiving policy support decision for COVID-19 and productivity

Dependent Variable	*Probability of Benefiting from Short Working Allowance*		*Probability of Benefiting from Economic Stability Support Program*	
Independent Variables	(1)	(2)	(3)	(4)
Productivity	-0.21***	-0.20***	-0.15***	-0.12**
	[0.068]	[0.071]	[0.061]	[0.064]
Capacity Utilization		-0.13**		-0.06
		[0.071]		[0.065]
Export Intensity		0.37		0.41*
		[0.254]		[0.223]
Size Group				
Medium		0.04		0.48*
		[0.314]		[0.280]
Large		0.23		0.55*
		[0.326]		[0.289]
Number of Observations	1 195	1180	1 203	1 188
Sector fixed effect	Yes	Yes	Yes	Yes
R^2	0.15	0.15	0.03	0.03

Note: Clustered standard errors are given in the parentheses. (***, **, *) indicates significance level and *** p<0.01, ** p<0.05, * p<0.1.

Estimation results put forth statically significant differentiation in the probability of benefiting from government supports according to productivity levels of the firms. Negative and statistically significant coefficient estimates for productivity indicate that productive firms are less likely to benefit from support policies. For the short working allowance policy, the firms with higher capacity utilization are less likely to benefit from this support. For the case of economic stability support, estimation result shows that larger and export-oriented firms are more prone to benefit from this program.

4. CONCLUSION

Measures taken globally during the COVID-19 pandemic caused significant disruptions in supply chains and demand, and increasing uncertainties forced many companies to take new actions. Given this, the objective of this paper is to put forth the initial response of the Turkish manufacturing firms against COVID-19 shock and to investigate firm heterogeneities on production, employment and policy decisions. For this purpose, we matched "Real Sector Impact of COVID-19" survey with the pre-pandemic BTS and administrative data. The main contribution of this paper is to exploit new and unique matched firm-level dataset to shed light to the heterogeneity in the COVID-19 shock impact across Turkish manufacturing firms.

Kozeniauskas et al. (2020) investigates how the COVID-19 pandemic has affected firms and which firms benefited from government support using a panel survey of Portuguese firms. The results show that the shock was large and heterogeneous across firms. They conclude that high productive firms are more likely to remain open, less likely to cut employment and make less use of government support. Fernandez-Cerezo et al. (2020) for Spain studies the impact of and responses to the COVID-19 shock using firm-level survey data. They show that the impact of the shock was larger in the case of small, young and less productive firms located in urban areas within each sector-region part. They also reveal that those firms resorted relatively more to government supports. Apedo-Amah et al. (2020) investigates the impact of the COVID-19 shock on firms using a novel data set collected by the World Bank Group and several partner institutions in 51 countries with a focus on developing countries. Results of the study show negative persistent adverse effect on sales and limited impact with intensive margin employment adjustment. Bloom et al. (2021) assesses the impact of the pandemic on SMEs for US using panel survey data. They find a significant negative sales impact and significant heterogeneity across firms.

Our first set of results shows that manufacturing sector affected by the COVID-19 pandemic but far from uniformly across firms and subsectors. Half of the respondents reported either partial or complete suspension in production activity and adversely affected sectors are mainly those that are producing durable consumer goods such as leather, textile, wearing and motor vehicles. For the sectors such as petroleum, pharmaceuticals, food, paper and chemicals, production predominantly continued on its normal course. Survey results also put forth multidimensional impact of the pandemic. Firms' responds regarding problems encountered due to pandemic seem to be nearly the same for supply, demand and cost/financial problems.

The second set of the results based on econometric models reveal heterogeneous impact of the COVID-19 shock on firms' business decisions. Productivity levels of the firms generate obvious differences in the responses against pandemic. Productive firms operating in the manufacturing sector are found to be more likely to continue production and less likely to reduce employment during the pandemic. They also tend to benefit less from government policy supports. These results all together suggest that large firms with high productivity have taken a firmer stance against the devastating economic effects of the pandemic.

Apart from productivity, we observe heterogeneities across capacity utilization rate, size and export intensity. Large firms with higher capacity utilization rate are less prone to either halt or reduce production activity. According to the estimation results, export-oriented manufacturing firms suffer more from COVID-19 shock compared to their domestic counterparts. As export activity of the firms increases the usage of short time working allowance, the likelihood of benefiting from government economic support increases. Another implication emerges from model estimation results is that Turkish manufacturing firms made employment adjustment at intensive margin (using short working allowances or temporary furlough schemes) instead of extensive margin (layoffs). Therefore, firms did not translate production and turnover declines to the employment fully. Observed heterogeneity is consistent with the results of studies for other countries (Kozeniauskas et al. (2020) for Portugal, Fernandez-Cerezo et al. (2020) for Spain, Bloom et al. (2021) for US).

We provide evidence that COVID-19 shock has affected manufacturing firms in Türkiye in a heterogeneous manner and these results have important policy implications. At the initial wave of the pandemic, productive firms have stand firmly against COVID-19 shock. While broad governmental supports offered at the initial stage of the pandemic have provided relief especially for small and less productive firms in the manufacturing sector, continuation of those programs may become less desirable. Such massive shocks are bad selectors since they can force both productive and unproductive firms out of the market. Prompt government actions against COVID-19 shock entails the risk of supporting "zombie" and less productive firms rather than firms that are more productive. Initially, indiscriminative broad support policy can be preferred to limit firm bankruptcies and employment losses. However, prolonged broad governmental supports have potential risk for misallocation of public funds to zombies and low productive firms rather than productive ones which can delay economic recovery. Besides prolonged low levels of

demand and increased uncertainty, aggravate business conditions for productive firms too. Hence, as the COVID-19 pandemic persists, more targeted support policies for productive firms are necessary for expediting the recovery.

These results are valuable for improving our understanding of the the economic impact of Covid-19 in Türkiye. However, it is well known fact that the impact has varied dramatically across sectors. Particularly for the contact-intensive sectors such as trade, transport, accommodation and entertainment the suffer is more accute. The main limitation of this study is the sector coverage. As data for service sector becomes available, new facts about economic impact of Covid-19 for Turkish economy can be explored in future research.

Conflict of Interest

The views expressed here are those of the author. They do not necessarily reflect the official views of the Central Bank of the Republic of Türkiye.

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Compliance with Ethical Standards

It was declared by the author that the tools and methods used in the study do not require the permission of the Ethics Committee.

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