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AN INVESTIGATION INTO FIRM PERFORMANCE DURING THE COVID-19 PANDEMIC IN THE BALTIC STATES

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Abstract. The COVID-19 pandemic disrupted economic activity globally. Local restriction as well as restrictions imposed by trading partners led to job losses and firms in certain industries being affected disproportionally. The three Baltic states were affected slightly later than their bigger counterparts. Against this background, the study analyzed factors pertaining to firm performance in Estonia, Latvia and Lithuania during COVID-19 based on enterprise survey data from the World Bank. Cross sectional regressions are estimated to identify factors that potentially could help determine why firms in certain industries and certain countries were more prone to job losses than others. Classic microeconomic factors, e.g., changes in sales, played a critical role in the performance of the firms during the pandemic – specifically relating to the number of full-time employees. Bigger firms were more likely to preserve jobs, as well as firms that adjusted salaries and other benefits received by employees. Firms in a better position to function on-line also preserved more jobs. The disaggregation of the country samples into different industries provides evidence that industry composition and other context-specific factors play a key role in explaining firm performance at industry/sector level. Various interactive dummy specifications to cater for the gender dimension, local ownership and export involvement yielded heterogeneous results. From a macro perspective, Lithuania's economic climate during a growth phase provided more support to firms as well as government support in terms of wage subsidies. position the business cycle the general. Even though pandemics of this nature do not occur regularly, specific factors found to be statistically significant in the empirical study could provide guidelines on how to preserve job opportunities during periods of global downturn in general.

Keywords: Firm performance, COVID-19 pandemic, Baltic states, job losses.

JEL Classification: D20, R10

1. Introduction

2020 brought us the COVID-19 pandemic. Infections originated in China and soon thereafter affected the entire world. The first wave occurred in northern hemisphere's spring and early summer. The COVID-19 pandemic and its impact were felt throughout the world, with all countries and their citizens enduring its effect on all economic and social aspects of life. It posed unprecedented challenges to healthcare systems, countries' economies and international trade, as well as local labour markets (Kisielytė-Reches, 2021; Laurimäe, Paas & Paulus, 2022; Droždz, Burinskas & Cohen, 2023). The health threat of the pandemic and governments' responses and restrictions resulted in a massive fall in economic activity across the globe. Production and supply chains were disrupted, international trade flows decreased, and consumer and business expectations were also negatively impacted (Černikovaitė & Karazijienė, 2021).

Unsurprisingly, the scale and impact of the pandemic resulted in large (and still growing) body of literature that provides us with analyses of the various and varying consequences of the COVID-19 pandemic on individuals, households, firms, countries and regions (Appiah et al., 2022). These studies have various areas of focus e.g., macro-economic indicators, policy responses, as well as the performance of firms (Appiah et al., 2022).

The available literature informs us that the negative social and economic outcomes of the COVID-19 pandemic did not hit all countries

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and regions to the same extent (Laurimäe, Paas & Paulus, 2022; Droždz, Burinskas & Cohen, 2023). Affected countries and sectors within them, displayed different degrees of damage in terms of production, international trade as well as foreign direct investment (FDI) flows (Laurimäe, Paas & Paulus, 2022; Droždz, Burinskas & Cohen, 2023). Kisielytė-Reches (2021) as well as Droždz, Burinskas and Cohen (2023) pointed out that the depth and extent of these effects have not yet been studied thoroughly enough. These authors advocate for more in-depth analysis in this area to fulfill the need for evidence-based policy formulation by governments in the aftermath of the pandemic.

Furthermore, Mamaladze and Abuselidze (2022) make the crucial point that it is imperative to analyze the economic impact of any pandemic across different geographic regions and countries. No single approach can therefore be used to make uniform generalizations. On the contrary, each region and / or individual state characterized by unique features that need to be taken into cognizance (Basile, 2020; Mamaladze & Abuselidze, 2022). This applies to the three Baltic states as well – even though these countries were affected by the pandemic slightly later – mainly because they are smaller, further afield and slightly more isolated (Kisielytė-Reches, 2021). However, despite this, the pandemic hit the economies of the three Baltic states hard since quarter one of 2020. The pandemic and resultant lockdown strategies led to disruptions in supply chains, a decline in the level of consumption, exports and investments (Basile, 2020; Mamaladze & Abuselidze, 2022). Interestingly, the construction sector remained active in all three countries – helping to ease the effect of the pandemic (Mamaladze & Abuselidze, 2022; Staehr & Urke, 2021).

Although for Estonia, Latvia and Lithuania, the general impact of the pandemic may appear to be quite similar, key differences are evident in the management of the pandemic (Basile, 2020; Mamaladze & Abuselidze, 2022). For example, a national emergency was declared in Lithuania much earlier (26 February 2020) than Latvia (12 March 2020) and in Estonia (13 March 2020) (Kutsar & Kurvet-Käosaar, 2021). Furthermore, although the three Baltic states are often mentioned as a collective, they were in different phases of the business cycle the beginning of the pandemic (Kutsar & Kurvet-Käosaar, 2021).

Latvia and Estonia were both in a downward phase of the business cycle with an accompanying slowdown in GDP growth in 2019. Lithuania on the other hand, experienced steady economic growth during the same period (Kutsar & Kurvet-Käosaar, 2021; Mamaladze & Abuselidze, 2022). Estonia, in particular, experienced structural adjustment issues due to the significant decline in the oil shale energy sector. In the case of Latvia, smaller levels of transit cargo and efforts to counter money laundering in the banking sector played an important role in this regard (Foresight Centre, 2020; Mamaladze & Abuselidze, 2022).

These underlying differences create an important research gap in the literature on the impact of the pandemic on the three Baltic states – especially to study the effect from a micro-economic perspective at firm level. However, according to Droždz, Burinskas and Cohen (2023), studies concentrated specifically on the Baltic states are limited. Droždz, Burinskas and Cohen (2023) mention for example studies such as Pilinkienė (2015), Zabotkina et al. (2020), Bolt et al. (2021), and Petrylė (2022). Consequently, Droždz, Burinskas and Cohen (2023) argue that the Baltic states have not received the deserved attention in the available academic literature. Hence more in-depth empirical studies on the impact of COVID-19 on the Baltic countries' economies are suggested. Our study heeds the call of Kisielytė-Reches (2021) and Droždz, Burinskas and Cohen (2023) and contribute towards the research gap identified above by focusing specifically on the three smaller Baltic states (Lithuania, Estonia and Latvia) and the determinants impacting firm performance within the COVID-19 context. The choice of the three Baltic states for our analysis is based on, and at the same time also contributes to the body of literature as a result thereof in two ways. Firstly, as mentioned before, the three Baltic states were in fact in different phases of their respective business cycles at the start of the crisis Secondly (and related), the article contributes to the literature through a focus on the nuanced differences in the sectoral structure of the three economies, the varying policy responses to the pandemic and how these elements impacted the possible determining factors of firm performance in the three countries. This therefore forms the research question as well as the main aim of the article.

The rest of the article is deployed as follows: The next section represents the relevant literature review. This is followed by methodology and a discussion of the data. The empirical analysis and the discussion of the results precede the conclusions and areas for further studies.

2. Literature review

As expected, the available literature on the fallout of the COVID-19 pandemic is both expansive and diverse. Our analysis of the literature follows an "general to specific" approach, i.e., we first identified general trends and / or strands in the literature and then move to a specific analysis of that aspect in the literature as it pertains on the three Baltic states – if available.

As a point of departure, an important strand in the literature studied the sectoral effect of COVID-19 and compared the industries that were the hardest hit from those who suffered less severe consequences – identifying some of the underlying factors associated with their findings in the process. As soon as the COVID-19 pandemic set in, a few industries were especially hard hit (Shin & Park, 2023). As national lockdowns took effect, the transportation sector (especially the transport of passengers) and the travel and tourism industry across the world suffered immediate and severe punishment (Baek, Mohanty & Glambosky, 2020; Yu, Wei & Xu, 2021; Hilmola, 2022; Droždz, Burinskas & Cohen, 2023; Shin & Park, 2023). Hilmola (2022) concluded that smaller countries that are dependent on international travel and tourism suffered even more.

For Lithuania and Latvia, tourism is a particular important sector. In 2019 tourism was responsible for 8.4% and 5% of total GDP for Latvia and Lithuania, respectively. For both countries tourism represents an important source of export earnings and employment, e.g., 4.9% of total employment in the case of Lithuania (Mamaladze & Abuselidze, 2022). All three Baltic states faced declines in similar industries. These included "…transportation, entertainment and recreation as well as accommodation and food services" (Foresight Centre, 2020: 4). The impact of the pandemic was therefore immediate and direct in this industry in all three countries. There was a sudden and significant decline in revenue and employment because of the decrease in international visitors for hotels, restaurants, and travel agencies and cultural events (Foresight Centre, 2020; Mamaladze & Abuselidze, 2022). Furthermore, it is not only the travel industry that was hard hit, related service sectors and small and medium-sized enterprises (SMEs) that are dependent upon tourism also paid a hefty price in the immediate period after the onset of the pandemic (Hilmola, 2022). The food and beverage sector serves as a pertinent example in the case of all three of the Baltic states – but especially in Lithuania (Foresight Centre, 2020; Mamaladze & Abuselidze, 2022).

In the medium- and longer term, the pandemic did indeed lead to a decrease in production levels as well as export supplies in specific countries due to the resultant market uncertainties (Droždz, Burinskas & Cohen, 2023). The reasons for this are the fact that the COVID-19 restrictions made it difficult for firms keep production going at the same prices applicable before the advent of the pandemic (Droždz, Burinskas & Cohen, 2023). This, in turn, resulted in decreased exports – especially in nations and certain industries where the possibility of working remotely was less of an option (Hayakawa & Mukunoki, 2021). The literature, for example, suggests that the following industries were, *inter alia*, hit harder than firms in other industries: mining, electricity, energy-related, e.g., heating and environment industries (Baek, Mohanty & Glambosky, 2020; Shin, & Park, 2023). For Estonia specifically, the crisis indeed led to notable disruptions in industrial production and exports – especially due to the worldwide decrease in the demand for energy products (Mamaladze & Abuselidze, 2022). Some sectors, e.g., agriculture, faced a smaller negative effect (Maliszewska et al. 2020; Droždz, Burinskas & Cohen, 2023). In the case of Latvia, the logistics and agriculture sectors suffered issues in terms of the relevant supply chains, but importantly were able to recover fairly quickly (Mamaladze & Abuselidze, 2022) as suggested by the literature (Maliszewska et al. 2020; Droždz, Burinskas & Cohen, 2023). In Lithuania, the agricultural sector displayed remarkable resilience, buoyed by local demand as well as maintaining strong European Union (EU) standards and local demand (Mamaladze & Abuselidze, 2022).

Hilmola's (2022) review of the literature suggested that online shopping and information technology companies have in fact benefitted significantly from the developments because of the pandemic. This was indeed the case for Estonia and Lithuania. Estonia is renowned for its strong digital infrastructure (Basile, 2020; Mamaladze & Abuselidze, 2022). As a result, many firms were able to adapt relatively smoothly to a remote working environment (Mamaladze & Abuselidze, 2022). In fact, the information technology sector experienced growth as the demand for digital infrastructure, services, and solutions soared. The same applied to Lithuania's information technology sector (Mamaladze & Abuselidze, 2022).

The second notable strand in the literature on the impact of the pandemic on business performance emerged after the realization, as postulated by Shin and Park (2023), that firms (within and between different industries) were not hit to the same extent by COVID-19. This strand of the literature investigated distinct aspects pertaining to the way in which the pandemic impacted firms differently and why that may have been the case. Some evidence in this regard pointed towards the fact that firms with a healthy financial condition as well as firms, where the majority stake is held by institutional investors, tended to perform better at the time of the crisis (Xiong, Wu, Hou & Zhang, 2020; Shin & Park, 2023). Studies such as Shen, Fu, Pan, Yu and Chen (2020) corroborated these findings and showed that firms with smaller investment scales and lower sales revenues were hit harder by the negative impact of the pandemic on firms' profitability (Shin & Park, 2023). The above results imply that financially

stable firms had a better chance to survive the fallout of COVID-19 (Shin & Park, 2023). This more microeconomic focus in the literature was evident in different firm-level studies targeting different regions across the globe.

A number of studies in question made use of the rapid survey of businesses conducted by the Enterprise Analysis unit of the World Bank Group (WBG). This survey form part of the World Bank's research plan to endeavour to unpack and comprehend the effect that COVID-19 had on private businesses of the world's economies (Aga & Maemir, 2021). These surveys (allowed for country and regional comparisons in the literature) were initiated as a continuation of the standard WBG Enterprise Surveys (ESs) (Aga & Maemir, 2021).

Muzi, Jolevski, Ueda and Viganola (2021) used this firm-level data for 31 economies to investigate whether COVID-19's resultant economic crisis exhibited a *"… Schumpeterian "cleansing" of less productive firms"*. The results showed that firms with the higher (statistically significant) probability of closing because of the pandemic, tended to be the ones that were deemed less productive. This indeed suggested that some form of a Schumpeterian "cleansing" process may have been at work. The authors also found a strong negative relationship between levels of innovation and evidence of a digital presence and firm closures. This was particularly evident for small firms – confirming the relevance of adaptability as a resilience tool to help ensure firm survival (Muzi et al., 2021). As mentioned before, the well-developed digital infrastructure in Estonia assisted to negate some of the pandemic's negative effects through the creation of an enabling environment for remote work and digital services (Basile, 2020; Mamaladze & Abuselidze, 2022).

Amin and Viganola (2021) changed the focus of the firm-level data to investigate firm performance. They specifically considered the issue of pre-pandemic access to finance and the probability of decreased sales during the pandemic). Unsurprisingly, the results confirmed that firms with better options available to access finance had a significantly smaller chance of experiencing lower sales. The study by Fahlenbrach et al. (2020) echoed these findings and determined that the more resilient firms amidst COVID-19, were the ones who exhibited greater financial flexibility. Even though almost all firms experienced unexpected historic levels of revenue drops during the pandemic, it was the firms with significant reserves of cash or opportunities to access finance, which were able to cope better with the unfolding crisis (Fahlenbrach et al., 2020).

The link between access to finance and the performance amidst the pandemic is however not homogenous – as found by Amin and Viganola (2021). For example, they found that the mitigating effect of improved access to finance on the decline in sales was more pronounced for firms that had a stable long-standing relationship with important stakeholders, e.g. the suppliers of their production inputs as well as skilled workers. On the other hand, for firms with relative more females in the workforce, the positive mitigating impact of access to finance was less noticeable.

The gender dimension formed another sub-strand in the literature – with contradicting results depending on the location and socio-economic context of the study. See for example the work of Yu, Wei and Xu (2021) for 24 countries; Tiscini, Ciaburri, Magnanelli and Nasta (2023) in Italy, as well as a Chinese study by Yang, Tang and Huang (2023)[1].

Developing economies and geographical areas overall also bore a disproportionate burden in terms of the economic fallout from COVID-19. The study of Aga and Maemir (2021), which focuses their research endeavour on Sub-Saharan Africa, serves as an illustration in this regard. Aga and Maemir (2021) made use of World Bank survey of firms in 38 countries. Eight of these businesses were in Sub-Saharan Africa. The study's results provided proof that firms in Sub-Saharan Africa were much harder hit by COVID-19, compared with other regions (Aga & Maemir, 2021). The authors further found that aspects such as variances in sectoral composition and other firm characteristics were not able to explain this heterogenous impact of the pandemic. The more probable explanation, offered by the authors, was the level of development. Their findings emphasized the importance of economic and structural contexts present even before the advent of the pandemic when trying to understand the different impacts in different regions.

Overall, the literature review reveals the heterogeneity and complexity of COVID-19's impact on firms' performance. This is dependent upon aspects such as the setting, institutional and macroeconomic context as well as the different industrialized environments where the studies were conducted. The need for specific studies in specific regions, as called for by Kisielytė-Reches (2021) and Droždz, Burinskas and Cohen (2023), was accentuated by the results described in the literature review. Hence, it is our study's aim to contribute to the literature by focusing specifically on the three Baltic states – which also differs in the composition of the economy as well as their overall economic performance before the pandemic.

[1]For more detail about these studies, see the discussion after Table 4.

We will investigate the determinants impacting firm performance within the COVID-19 context in this region, contributing to the literature. The dataset and research methodology for this endeavour are described in the next section.

3. Data and methods

Description of data source

The data for this project was obtained from the World Bank Enterprise Surveys (WBES). The World Bank regularly conducts worldwide firm-level surveys of private sector firms. Using representative samples for this purpose, the World Bank has completed these surveys since the 1990s (World Bank, n.d.). The World Bank defines the WBES as follows on their website: "*… are nationally representative firm-level surveys, with top managers and owners of businesses interviewed using a globally comparable questionnaire that covers a broad range of business environment topics as well as firms' characteristics and performance measures.*" (World Bank, n.d.). The World Bank makes all gathered information and data available to the public after completion of the surveys (World Bank, n.d.). This includes the raw granular data and the various WBES indicators at the firm and economy level (World Bank, n.d.). This is done through their website and data portal (World Bank, n.d.). According to the World Bank (n.d.): "*The website currently contains a total of 355 WBES collected through a consistent methodology across the world, 12 Informal Sector Enterprise Surveys covering 38 cities, and other surveys, along with the cross-economy databases.*"[2]

The World Bank adjusted the standard questionnaire for the purpose of the survey. This was specifically done in order to obtain relevant information as to how firms have coped with and responded to the arrival of the COVID-19 pandemic. The dataset used for this study contains information from 4 801 firms from 46, mostly developing, countries. The surveys were completed in 2020 and 2021. We used this dataset, but focused our analysis on firm performance in Estonia, Latvia and Lithuania, following the methodology described next.

Methodology and Empirical Strategy

The study follows a quantitative methodology. The dataset described above was used to conduct a preliminary descriptive analysis of the variables of interest in terms of the research objective. This is followed by a cross-sectional regression analysis where firm performance is proxied using (an) appropriate dependent variable(s). Similar approaches were followed by Webster et al. (2022), focusing on four central American countries, and Khan (2023), who included 39 countries in the analysis. Possible factors that may influence firm performance (identified from the literature) are then used as possible explanatory variables in the regression analysis. The study uses standard OLS regressions for its cross-sectional analysis.

Table 1 describes the variables to be used in the empirical analysis.

Table 1
Variables to be used in the analysis

	Dependent variable	**Expected sign**
changeworkers	% change in number of permanent full-time workers since Dec 2019	
	Explanatory variables	
DumManu	Dum = 1 if firm in manufacturing; base other services	+
DumRetail	Dum = 1 if firm in retail; base other services	+
weeksclosed	total number of weeks closed	-
chancesales	% change in monthly sales compared to a year ago	+
onlinesales	online sales as proportion of total sales	-
remotework	proportion of workforce working remotely	-
salarylower	proportion of workers receiving lower salaries/ benefits due to COVID	-
DumLarge	Dum = 1 for large firm, small firm as base	+
DumMed	Dum = 1 for medium firm, small firm as base	+
LocalOwn	Dum = 1 if domestic owner; = 0 for foreign owner	+ or -
FemMan	Dum = 1 if manager is female; = 0 if male	+ or -
Export	Dum = 1 if firm does export; 0 if only sell locally	+ or -
	Descriptives only	
capacity	capacity utilization in %	
ftworkers	number of permanent full-time workers	
fworkp	proportion of full-time workers that are female	
chfworkers	% change in female workers since Dec 2019	

[2]For more information you van visit the website at https://www.enterprisesurveys.org/en/enterprisesurveys

The dependent variable in all the regressions is the percentage change in the number of full-time workers since December 2019. The rest of the table lists the included explanatory variables, with their expected signs, followed by variables only mentioned while setting the scene and a discussion of their descriptive statistics.

The World Bank surveys cover firms in three broad categories: manufacturing, retail and other services. In order to distinguish between these categories of firms two dummy variables are included. DumManu accounts for firms in the manufacturing industry and DumRetail for retail firms. With firms in other services industries as the base for the dummy variables, the expected signs for the dummies are positive with the expectation that more job losses would occur in firms delivering other services. An increase in the number of weeks closed is expected to lead to more job losses – therefore the negative sign. The main determinant of change in full time employment is expected to be change in sales. If sales increased, more people could be employed and vice versa; explaining the expected positive sign.

The next three variables relate to specific strategies employed by firms during Covid. If online sales could increase, more employees work remotely and employees receive lower salaries, it could help to alleviated cash flow constraints and lower the number of layoffs. The survey distinguishes between small, medium and large firms. Small firms employ less than 20 people, medium firms between 20 and 99, and large firms a hundred or more. With small firms as the base group, the expectation is that medium (indicated by DumMed) and large firms (DumLarge) could be more resilient and less prone to reduce their workforce.

The last three variables represent three firm specific indicators whose expected outcomes are not so obvious. LocalOwn distinguishes between local and foreign owners. One could argue that local owners could be more reluctant to reduce employment in their own country, while on the other hand, foreign investors could be financially stronger and retain more workers. Exporting firms, with a broader target market, could be less affected and less likely to reduce employment. But one could also argue the opposite. The last dummy variable is included to see if employment levels differ between firms with female managers compared to male managers. The last part of Table 1 lists variables not included in the regression analysis but discussed as introduction to the analysis.

The following section discusses the results of the empirical analysis conducted for the purposes of adhering to the research objective.

4. Results and discussion

As customary, we commence with basic descriptive statistics of the variables used in the analysis. The first aspect to consider is the change in the sales of firms in each of these countries during the period under consideration. The average percentage change in monthly sales compared to a year ago for Estonia, Latvia and Lithuania were -4.2%, -7.4%, and -15,7%, respectively. The impact on sales was more severe in the case of Lithuania, with Estonia faring relatively better, but still with a decrease in sales volume. These statistics come as no surprise given the fact that all three countries performed at well below their normal capacity because of the pandemic's impact on their business. Estonia, Latvia and Lithuania performed at 68.1%, 69.3% and 76.3% of normal firm capacity, respectively.

The impact of the pandemic is also evident from the total number of weeks that firms in these countries were closed because of the imposed lockdowns and other government measures to combat the virus. In all three countries, there were firms fortunate enough not to have experienced closures. For the most part, these statistics proved to be as sobering as expected. In Estonia, the average number of weeks closed was just below one week (0.88) with the maximum number of 62 weeks closed. The corresponding figure for Latvia was 1.4 weeks and 52 weeks maximum, and for Lithuania, 1.7 weeks closed on average and a maximum of 72 weeks – the longest recorded for the three countries. The obvious hypothesis that arises is to what extent these statistics also translated into significant losses of jobs.

It is therefore important to look at the number of workers who may have lost their jobs because of the economic downturn caused by the pandemic. For Estonia, the biggest loss in the number of workers was 193 workers, with an average of seven workers per firm in this regard. Given that the average firm in the Estonia sample employed 62 workers, this implies that, on average, firms had changes (decreases) in the number of workers of just over 10%. In comparison, Latvia was at first glance seemingly even worse of. The biggest decrease in the number of workers was 200, with an average of 20 workers. However, given that the average size of the full-time workforce in the case of Latvia is 192, the percentage decrease is also just over 10%. Lithuania, on the other hand, was indeed hit harder in terms of job losses. The average decline was nine workers per firm and the average full-time employment was 57 people per firm – equating to a decrease of 16%, which was the highest for the three countries. The literature review established that the impacts of a crisis, such as the COVID-19 pandemic, is never gender neutral (Yu, Wei & Xu, 2021). This necessitates the further disaggregation of the impact on workers by also looking at the gender dimension thereof. We analyze two aspects here, namely the proportion of full-time workers who are female as

well as the percentage change in the number of female workers in firms since December 2019.

Interestingly, Lithuania employed on average the highest proportion of female workers per firm in the sample, i.e., 49.4%, but the country also recorded the lowest percentage decrease in the number of female workers (-8.5%) in the period under consideration. On the other hand, one finds Estonia, with the lowest average proportion of female workers (45.3%), but the second highest percentage decline in the number of female employees (-17.2%). Lithuania occupies the middle ground in this regard, so to speak, with values of 48.7% and -19.9% for the two variables in question. The possible reasons and factors behind these descriptive observations form a critical area for further studies and may relate to the kind of firms.

It is also useful to mention the proportion of firms in the sample that engage in exports, as this also provides an indication of the external vulnerability they may experience. The average figures for the three countries pertaining to this variable are as follows: Estonia (37%), Latvia (31%) and Lithuania (32%) – indicating that Estonian firms are slightly more involved in export activities compared to the other two countries.

Given the focus on gender in the literature, we also consider the roles of female managers and domestic owners during the crisis. In terms of the percentage of female managers, Estonia, Latvia and Lithuania had on average 28%, 38% and 29%, respectively – leaving Latvia with significantly more female managers in charge of firms. The averages for the percentage of locally-owned firms in the sample were: Estonia (83%), Latvia (74%) and Lithuania (88%) – indicating that in all three countries, around three quarters of the firms are domestically owned.

The following section provides the regression analysis performed to unpack some of the underlying factors at play in terms of firm performance in these three countries.

Regression Analysis

The descriptive analysis above highlights the impact of the COVID-19 pandemic on firm performance in Estonia, Latvia and Lithuania. There were significant decreases in sales volumes because of businesses that had to be closed. All of this spilled over into significant job losses. Because of the significant socio-economic effects that even temporary unemployment may have on people, communities and economies as a whole, the loss of jobs was used as the main proxy for firm performance in our analysis. We argue that this is the culmination of all the other elements of firm performance, as discussed in the descriptive analysis. The dependent variable therefore is the change in the number of permanent full-time workers since December 2019 in each of the three countries under consideration.

The empirical strategy was to first estimate the base model with the full sample of all firms, including the independent variables forthcoming in the literature and summarized in Table 1. This is then followed by sector-specific specifications for the three countries. Tables 2 to 3 provide the regression outputs and subsequent discussions.

As a first step of analysis, variance inflation factors (VIF) were calculated to ensure that the potential impact of multicollinearity is limited. The VIF values for the respective explanatory variables vary from 1.18 to 2.33. Since values below 3 are not considered to be problematic and values higher than 4 or 5 or 10, depending on the source, multicollinearity is not considered to be present.

Unsurprisingly, the classic microeconomic variable of the percentage change in monthly sales compared to a year ago shows a statistically significant relationship with the percentage change in the number of workers for both Estonia and Lithuania at the 1% and 5% levels of significance, respectively. This was not the case for Latvia, but the dummy variables representing large firms and medium firms (with small firms as the base) were statistically significant (at 1% and 10%, respectively) for Latvia and not for the other two countries. The economic circumstances prevailing amid the pandemic may have been picked up by this variable indirectly in the case of Latvia. However, the proportion of workers receiving lower salaries/benefits due to COVID-19 also proved a statistically significant variable in the regression for Latvia and Lithuania at the 1% and 5% levels of significance, respectively. Where more/fewer workers receive a pay cut, the percentage change in the number of workers is positive/negative – suggesting that this job saving strategy was successful in the three countries.

These findings as whole corroborate the negative economic impacts on the firm performance of standard economic variables that saw significant negative effects due to the pandemic. As mentioned before, the firms in the sample represent three very distinct industries. In order to delve deeper into potential industry effects, the next three tables (3 to 5) report the results after regressing change in number of workers on the same explanatory variables – but in three separate sub-samples for manufacturing firms, retail firms and firms providing other services.

The sample, including manufacturing firms, reported in the bottom part of Table 2, yielded less significant results. Several of the variables that proved statistically significant in the "all firm" regression proved statistically significant again, but at a much lower level of significance (15%), with LOCALOWN again with a negative sign for the coefficient but only at the 15% level of significance.

Highlights to note from the results on retail firms, in the first part of Table 3, is the fact that, for Estonia,

Table 2

Estimations on all firms in the sample and manufacturing

	Dependent variable: % Change in number of workers					
	Estonia		Latvia		Lithuania	
	Estimated coefficient	**Probability**	**Estimated coefficient**	**Probability**	**Estimated coefficient**	**Probability**
	All firms in one sample					
C	-3.2156	0.6340	-50.9016	0.0224	9.2752	0.3219
CHANCESALES	***0.5338	0.0001	0.4203	0.1344	**0.3879	0.0275
REMOTEWORK	-0.2116	0.3021	0.1073	0.8559	-0.2270	0.1870
WEEKSCLOSED	*-3.3887	0.0900	-0.2077	0.8761	-0.2924	0.6975
DUMLARGE	7.7566	0.2491	***49.3252	0.0016	4.5827	0.6589
DUMMED	6.9289	0.1609	*26.9743	0.0982	5.5254	0.4611
DUMMANU	-3.0773	0.5859	8.7188	0.5531	6.4918	0.4903
DUMRETAIL	-2.6839	0.6898	3.6239	0.8801	8.8674	0.3479
FEMMAN	3.7582	0.4908	3.1274	0.8533	1.6692	0.8183
LOCALOWN	-2.8840	0.4074	-15.8060	0.3538	**-18.9916	0.0206
EXPORT	-0.7136	0.8986	7.7821	0.5658	-11.2736	0.1702
ONLINESALES	0.1699	0.2572	-0.3040	0.3730	-0.1613	0.4351
SALARYLOWER	0.0137	0.8591	***0.5771	0.0010	**0.4106	0.0105
R^2	0.1810		0.1132		0.1325	
Obs	204		129		135	
	Manufacturing firms					
C	-4.7131	0.5730	-35.8296	0.2584	13.8508	0.5018
CHANCESALES	#0.1713	0.1431	0.5801	0.4108	0.2230	0.5041
REMOTEWORK	0.0425	0.8937	0.5770	0.6492	#0.3241	0.1207
WEEKSCLOSED	1.6899	0.3457	5.1144	0.2774	1.1384	0.4319
DUMLARGE	0.4888	0.9653	#46.8107	0.1071	13.5828	0.2949
DUMMED	1.7259	0.8764	12.7747	0.5577	-2.7858	0.8384
FEMMAN	3.6228	0.5727	-26.9116	0.2947	-3.7672	0.7509
LOCALOWN	-4.5552	0.3864	-11.6154	0.5440	#-23.0140	0.1207
EXPORT	1.0207	0.9096	4.5659	0.8188	-13.2294	0.2049
ONLINESALES	-0.1604	0.3671	-0.1306	0.7682	0.4873	0.8814
SALARYLOWER	0.0386	0.5729	*0.4678	0.0680	0.2616	0.2061
R^2	-0.0813		0.0397		-0.0173	
Obs	72		58		51	

Source: Authors' own regressions run on World Bank data

Note: Estimated with heteroskedasticity consistent standard errors and covariance
*** statistically significant at 1%, ** statistically significant at 5%, * statistically significant at 10%, # statistically significant at 15%.

the dummy variables representing large firms and medium firms (with small firms as the base) were now statistically significant (at 10% and 5%, respectively). The estimated coefficients indicate that, in general, the percentage change in the number of workers is more positive as firm size increases by ±16 percentage points for medium firms and 22 percentage points for large firms compared to smaller firms. This supports the literature that firms with lower sales revenue and less stable finances suffered more during the pandemic, whereas firms with better access to finance (which may well relate to size) fared better. (See e.g., Shin and Park (2023), Fahlenbrach et al. (2020) as well as Amin and Viganola (2021).) For Latvia, this was no longer the case. This may point to the fact that more of the large and medium firms in Estonia are indeed in the retail sector – but this needs to be confirmed as such. It must also be noted that the dummy variable for domestic ownership remains statistically significant for Lithuania – irrespective of the composition of the sampled firms. This is not the case for the other two countries. The coefficient is consistently negative, which suggests that locally owned firms in Lithuania tended to be more likely to reduce the workforce. This may be because foreign owners also receive income from businesses in their own countries and may be able to hedge their position better instead of retrenching people. From a nationalistic point of view, one could expect that local owners would be more inclined to try and save job opportunities.

When the focus is placed on "other services" (see bottom part of Table 3), the importance of a decrease in sales as explanatory variable again came to the fore – with statistically significant coefficients for

Table 3
Estimations on retail firms and other services

	Dependent variable: % Change in number of workers					
	Estonia		Latvia		Lithuania	
	Estimated coefficient	**Probability**	**Estimated coefficient**	**Probability**	**Estimated coefficient**	**Probability**
	Retail firms					
C	-12.6952	0.2277	**-185.7825	0.0796	#19.0021	0.1047
CHANCESALES	0.4340	0.2222	-1.3814	0.4269	*0.4076	0.0861
REMOTEWORK	0.0218	0.9111	3.7650	0.8730	0.0347	0.9158
WEEKSCLOSED	-2.5517	0.1999	-5.2523	0.7456	0.8640	0.4481
DUMLARGE	*22.2234	0.0754	#99.2735	0.1212	-5.8229	0.8262
DUMMED	**16.0454	0.0344	31.3209	0.6726	15.3520	0.1639
FEMMAN	2.8828	0.7240	80.1464	0.2186	3.5435	0.7949
LOCALOWN	-5.1867	0.4908	77.4098	0.3111	**-32.5496	0.0440
EXPORT	-5.4962	0.4169			-19.8072	0.2479
ONLINESALES	**0.4679	0.0122	0.8036	0.6926	0.0742	0.4948
SALARYLOWER	**0.2195	0.0206	-0.0204	0.9872	#0.4098	0.1115
R^2	0.1963		-0.2248		-0.0225	
Obs	56		20		46	
	Other services					
C	6.2458	0.5947	15.9290	0.6498	16.2411	0.1980
CHANCESALES	***0.7041	0.0012	***0.8448	0.0048	0.5955	0.2108
REMOTEWORK	-0.3293	0.3361	-0.3408	0.4942	*-0.4721	0.0520
WEEKSCLOSED	-3.8769	0.1869	-0.2323	0.8637	-1.2199	0.4862
DUMLARGE	4.2210	0.7706	19.5887	0.5176	-16.3873	0.3903
DUMMED	3.1480	0.7408	31.8015	0.2321	3.0900	0.8566
FEMMAN	6.2289	0.7020	-6.5717	0.8137	3.3190	0.8788
LOCALOWN	-5.4356	0.4435	**-83.2696	0.0189	-11.1426	0.4030
EXPORT	-5.3184	0.6014	31.5572	0.1428	-1.2130	0.9326
ONLINESALES	-0.0129	0.9558	-0.2645	0.4900	-0.5484	0.1770
SALARYLOWER	-0.0692	0.6731	***0.8476	0.0011	0.8549	0.1640
R^2	0.2019		0.2253		0.3083	
Obs	76		51		38	

Source: Authors' own regressions run on World Bank data

Note: Estimated with heteroskedasticity consistent standard errors and covariance
*** statistically significant at 1%, ** statistically significant at 5%, * statistically significant at 10%, # statistically significant at 15%.

Estonia and Latvia at the 1% level of significance. This is expected, as people/workers render services. This model is the only one where the dummy variable for domestic ownership was no longer statistically significant for Lithuania. It was, however, for Latvia at the 5% level of significance in the "other service" regression. The proportion of workers receiving lower salaries/benefits due to COVID-19 remains a constant presence and again proved to be statistically significant for Latvia – in this case, at the 1% level of significance again. This again makes sense because as more people receive lower salaries, the percentage change in the number of workers will be positive.

Although not reported in full, like the estimations above, various specifications were assessed with interactive dummies trying to establish whether employment levels were affected differently under specific situations. In particular, the aim was to determine whether firms with female managers, firms with domestic owners and firms active in the export market reacted differently to changes in sales, remote work and weeks of closure. Table 4 summarizes the highlights in this regard.

Table 4 reveals a gender dimension in the results, which confirms the view in the literature that the impact of an economic crisis is never gender-neutral (Yu, Wei & Xu, 2021). The impact, however, is not in the same direction for all countries. For Estonian manufacturing and retail firms, the coefficient of the interactive variable WEEKSCLOSED*FEMMAN is positive – which would seem to indicate that female managers would be more inclined to save job opportunities. The estimated coefficient of the same variable is, however, negative for Latvian firms in the other services sector. The coefficient for the CHANCESALES*FEMMAN variable was consistently negative and statistically significant for

Table 4
Specifications assessed with statistically significant interactive dummies

Variable	Coefficient and (probability)	Context
WEEKSCLOSED*FEMMAN	12.828 (0.0031)	Estonia manufacturing
WEEKSCLOSED*FEMMAN	3.671 (0.1210)	Estonia retail
CHANCESALES*FEMMAN	-2.3594 (0.0125)	Latvia other services
WEEKSCLOSED*FEMMAN	-7.713 (0.0027)	Latvia other services
CHANCESALES*FEMMAN	-1.1218 (0.0299)	Lithuania manufacturing
WEEKSCLOSED*EXPORT	-8.708 (0.0455)	Lithuania other services
CHANCESALES*EXPORT	1.1326 (0.0564)	Lithuania manufacturing
WEEKSCLOSED*EXPORT	31.672 (0.0120)	Latvia manufacturing
WEEKSCLOSED*LOCALOWN	-6.378 (0.0096)	Latvia all firms
REMOTEWORK*LOCALOWN	-1.104292 (0.1040)	Lithuania all firms
CHANCESALES*LOCALOWN	0.597940 (0.0078)	Lithuania all firms
WEEKSCLOSED*LOCALOWN	2.682674 (0.0037)	Lithuania all firms
REMOTEWORK*LOCALOWN	-2.678 (0.0002)	Lithuania manufacturing

Latvian "other services" firms as well as for Lithuanian manufacturing firms. This finding seems to indicate that female managers were more inclined to lay off workers if sales declined. These results also confirm the variation in the literature. Studies such as Tiscini, Ciaburri, Magnanelli and Nasta (2023) and Yang, Tang and Huang (2023) found that businesses under female leadership fared better during the pandemic. On the other hand, Yu, Wei and Xu (2021) found that female-led businesses in their study displayed an increased probability of possible closure, and being closed for longer if it happened (Yu et al., 2021).

The results when domestic ownership is interacted with the number of weeks closed, the change in sales as well as the proportion of people working remotely, also yielded mixed – albeit mostly counterintuitive – results. One would have expected that domestically owned firms would have reacted with greater sensitivity towards job losses in general. This was, however, not the case for all Lithuanian firms or specifically firms in the Lithuanian manufacturing sector. All domestically owned firms in Latvia also proved to be more likely to lay off more people when faced with weeks of closure – based on the negative coefficient of the WEEKSCLOSED*LOCALOWN variable. However, when Lithuanian firms were faced with weeks of closure, they indeed seem to be more sensitive to job losses – as is illustrated by the positive coefficient for the WEEKSCLOSED*LOCALOWN interactive dummy variable (which was the sign to be expected). These differences constitute another avenue for further studies.

Furthermore, firms active in the export market also reacted differently to the number of weeks closed. One would have expected a positive coefficient for this interactive variable to mitigate the effect of closure. However, in the case of Lithuanian firms in the *other services sector*, the coefficient is negative and statistically significant, but in the case of Latvian manufacturing firms, the coefficient is positive and statistically significant. This again seems to confirm the literature suggesting that the factors impacting firm performance in times of crisis are often region- and/ or country specific (Aga & Maemir, 2021; Kisielytė-Reches, 2021; Droždz, Burinskas & Cohen, 2023).

5. Conclusions

The paper analyses the potential firm level determinants of the change in employment levels during the COVID-19 pandemic. Classic micro-economic factors played a particularly important role in explaining firm performance amidst the COVID-19 pandemic – as measured by the change in the number of workers employed. Furthermore, the disaggregation of the country samples into different industries, in turn, provides evidence that industry composition and other context-specific factors play an important role in explaining firm performance at industry/sector level.

All three the Baltic countries imposed containment measures and/ or specific restrictions towards the end of February to middle March of 2020. All three governments announced support measures to assist the affected economies and all three countries received grants from the European Union to alleviate the immediate impact of the pandemic (IMF, n.d.). Although the regression models focus on firm level indicators, it is possible that the observed change in employment levels could also be affected by the macroeconomic environment.

Three of these indicators could potentially play a role. First it was mentioned that Estonia and Latvia were in a downward phase of the business cycle when COVID struck – while Lithuania was experiencing positive economic growth (IMF, n.d.). Lithuania's better position is echoed by the economic growth figures recorded for 2020. Estonia recorded negative growth in -2.9%, Latvia -3.6% and Lithuania only – 0.02%. The resulting government support measures

also confirm this trend. Estonia granted support to the value of 8.5% of GDP; Latvia 13% of their GDP and Lithuania only 5% of GDP. Lithuanian firms could therefore have been in a better position to absorb the negative effects of COVID. The last contribution could stem from the specific kind of support rendered. Lithuanian government support specifically targeted wage subsidies and subsidies for firms experiencing declining sales (IMF, n.d.). With this as background, it is interesting that the loss of employment opportunities for Lithuanian firms in the other services industries could not be attributed to changing levels of sales, as reflected in Table 3. This was not the case for the other two countries (IMF, n.d.). Estonia is well-known for its extensive digital infrastructure (IMF, n.d.). This may be the reason why it is the only country where increased online sales were statistically significant in lowering the negative impact of the pandemic on employment levels – see results in Table 3.

However, we fully acknowledge the potential weaknesses of the study. Key in this regard is the fact that the 2021 and 2022 survey data was pooled together for the purpose of the analysis, as it was clear that separating it was not feasible due to the small number of observations available for 2021 specifically. This acknowledgement brings with it the expressed need to conduct further studies over a longer period and, if possible, to follow firms over time. We further argue that there is a prominent place for appropriately designed fit-for-purpose qualitative and/or mixed-method micro-level studies to conduct in-depth investigations into some of the behavioral factors that may possibly play a role in explaining firm perfor-mance in the three countries. As a final note of caution, the authors do realise that the three country wide surveys could only include those firms that were able to absorb the worst outcomes / effects of the pandemic and did survive to be interviewed. Certain nuances of the impact of the pandemic on firms could be lost because of the lack of feedback from the firms that did close.

AUTHOR CONTRIBUTIONS

Both authors actively contributed towards the planning of the article, data gathering, data analysis and drafting of the final paper.

DATA AVAILABILITY

The data is publicly available and can be downloaded from the World Bank's enterprise survey data base at: https://www.enterprisesurveys.org/en/enterprisesurveys

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