

Firm-level characteristics and the impact of COVID-19: Examining the effects of foreign ownership and international trade

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Abstract

Using a large multi-country firm-level data set from the World Bank Enterprise Survey, we examine whether multinational corporations (MNCs) differ from domestic firms in the prevalence and size of the impact of COVID-19 on sales. Our findings reveal significant differences between MNCs and domestic firms, especially when accounting for the interplay between foreign ownership and international trade. Exporting MNCs are significantly less likely to experience a negative sales impact; this finding is robust to controlling for firm characteristics including size, age and productivity and the use of a propensity score reweighting approach based on the likelihood that a firm was foreign owned prior to the onset of the pandemic. Regarding the impact of the pandemic on the level of sales decrease, trading MNCs experience a significantly smaller negative impact. However, MNCs with joint high levels of imports and exports sustain a larger negative effect. MNCs operating in countries and sectors characterised by a high degree of participation in international production networks are less affected by the pandemic. When controlling for the interaction between MNCs and international trade, we also find a direct positive effect of foreign ownership on the size of sales decrease, representing a liability of foreignness effect.

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KEYWORDS

COVID-19, firm-level performance, international trade, multinational corporations

1 | INTRODUCTION

Together with the immense and devastating impact on public health, the COVID-19 pandemic has generated a large negative economic shock in the world economy, creating damaging effects of a magnitude not seen since the great depression and the two World Wars of the previous century (World Bank, 2021). Reasons for the magnitude of the negative shock include not only the scale, speed and synchronised nature of the manifestation of the pandemic but also that it generated combined supply and demand shocks, resulting in a large decrease in economic activity (IMF, 2021). Furthermore, the effects have been subject to strong international propagation through international trade, rapidly impacting open economies across the globe (Baldwin & Weder di Mauro, 2020; UNCTAD, 2021). Another reason for the large decrease in economic activity has been the marked drop in levels of international investment; according to the latest statistics, worldwide foreign direct investment (FDI) decreased by 35% in 2020, falling to a level last seen in 2005 (UNCTAD, 2021). Although recently there are signs that several developed economies find themselves in the early phases of economic recovery, a high degree of uncertainty prevails (OECD, 2021), and it will undoubtedly take considerable time for economies to adjust and re-establish stable growth paths (IMF, 2021; World Bank, 2021).

Against this background there is a rapidly developing literature studying the scale, nature and drivers of the negative economic effects of the COVID-19 pandemic. Following an initial set of studies on various macro-economic dimensions (e.g. Balleer et al., 2020; Brinca et al., 2020; Maliszewska et al., 2020), a growing number of studies have started to identify the scale and drivers of negative impacts at the firm level. For instance, Dai et al. (2020) and Bartik et al. (2020) present findings on high business closure rates and employment losses among small- and medium-sized enterprises (SMEs) in the first half of 2020 in China and the United States. Another example is Dörr et al. (2021), who use firm-level data for Germany to identify ways in which the pandemic impacts firm operations, including supply chain disruptions and decreased demand. Other studies present findings from cross-country firm-level surveys, revealing substantial negative impacts of the pandemic both on revenues and employment (Apedo-Amah et al., 2020; Beck et al., 2020). Overall, the findings from this initial set of firm-level studies indicate that the impacts of and responses to the pandemic are heterogeneous, not only across countries and sectors but importantly also across firms (Borino et al., 2020; Chetty et al., 2020). The development of a better understanding of which firm characteristics influence these impacts has clear policy implications, as it will aid governments in designing and targeting effective recovery policies.

Our paper adds to the literature that focuses on the scale and drivers of the impact of the pandemic on firm-level performance. For our empirical analysis we use a large multi-country firm-level data set from the World Bank Enterprise Survey (WBES) project. In 2019, WBES surveys were carried out among nationally representative samples of firms in a number of countries. In 2020, a special follow-up survey was applied to these firms, enquiring about the short run impact of the pandemic. In several other countries, regular WBES surveys were carried out in 2020, incorporating a set of similar pandemic-related questions. Combining these data sets results in a large firm-level data set for 43 countries. In our analysis of this data set, we focus on the short run impact of the pandemic on the sales performance of the firms. We use information on whether firms experienced a decrease in sales



following the onset of the pandemic as well as by how much their sales decreased and relate these indicators to a range of firm-level characteristics.

We target our analysis on examining whether the short run impact of the pandemic differs between multinational corporations (MNCs) and domestic firms and whether international trade has influenced this impact. So far, firm-level studies have not comprehensively addressed the question whether type of ownership influences the impact of the pandemic. This omission is particularly important for emerging markets and developing economies (EMDEs), given that their development strategies are often centred on the attraction and facilitation of MNCs (Jordaan et al., 2020).¹ As for the effect of international trade, opinions differ as to whether participation on international markets strengthens or weakens the impact of the pandemic. On the one hand, it is argued that international trade can weaken the impact as it allows firms to circumvent negative demand and supply shocks in the countries in which they operate (Espitia et al., 2021; Hyun et al., 2020). On the other hand, the global nature of the impact of the pandemic may magnify negative effects among those firms that operate on international markets. Importantly, given that MNC affiliates are often characterised by high export and import intensities (see Boddin et al., 2017), we also examine whether the interaction between foreign ownership and international trade influences the impact of the pandemic.

By focusing on the effect of type of ownership, our paper relates to a subset of the literature on the operations and effects of MNCs that examines whether foreign-owned firms are differently affected by and/or respond differently to negative economic shocks (e.g. Alvarez et al., 2017; Desai et al., 2008). Compared with domestic firms, MNCs may be better equipped to absorb negative economic shocks as they often possess productivity premiums, easier access to finance and the ability to shift sales and production across international markets and host economies (Alfaro & Chen, 2012; Dikova et al., 2013). However, it is also commonly understood that MNCs face additional costs in host economies caused by their 'liability of foreignness' (Zaheer, 1995), as institutional, cultural and social differences place foreign-owned firms at a disadvantage to domestic firms (Belderbos et al., 2020; Mithani, 2017). If the effects of the liability of foreignness become more important during a negative economic shock, it may be that foreign-owned firms are more strongly negatively impacted than domestic firms.

The contribution of our paper to this literature is that we provide new evidence on the effect of foreign ownership on the short run impact of the most recent economic crisis. Most of the existing evidence on whether foreign ownership influences the impact of negative economic shocks has focused on the effects of financial crises (Desai et al., 2008; Dikova et al., 2013) or country-specific economic downturns (e.g. Alvarez & Görg, 2012; Varum et al., 2014). By examining whether type of ownership influences the impact of the COVID-19 pandemic, we provide new evidence on possible mitigating or exacerbating effects of foreign ownership on the impact of combined supply and demand shocks. Importantly, rather than examining whether MNCs differ from domestic firms in their response to a crisis—i.e. by exiting the market or by applying different strategies to employment and investment—we examine differences between the two types of firm concerning the direct and short run impact of the pandemic-induced economic shock on firm-level sales performance.

Our main empirical findings confirm the important roles of foreign ownership and trade. MNCs involved in exporting activities are less likely to have experienced a negative sales effect. Having said this, among the firms that do experience a negative effect, the decrease in sales is larger among MNCs

¹Also, it is becoming increasingly clear that the impact of COVID-19 has been particularly strong in EMDEs. For instance, in more than 25% of these countries the pandemic obliterated per capita income gains of the last 10 years (World Bank, 2021). Another indication of the sheer scale of the impact in these countries is that close to 95 million people are estimated to have fallen below the threshold of extreme poverty in 2020 compared with pre-pandemic projections (IMF, 2021).

with joint high import and export intensities. Involvement in global production networks dampens this negative effect. In addition, we also find evidence that MNCs are affected negatively by a liability of foreignness effect.

The paper is constructed as follows. Section two provides a literature review which we use to inform our research questions. Section three discusses the data set, provides indicators of the prevalence and magnitude of the negative sales impact across countries, sectors and types of firm and explains the estimation framework. Section four presents our main empirical findings. Section five summarises the findings and discusses suggestions for further research.

2 | LITERATURE REVIEW AND RESEARCH QUESTIONS

2.1 | Economic impact of COVID-19

The severity of the COVID-19 pandemic has fostered the rapid development of research on the economic dimensions of its impact. An initial set of studies analyses various macro-economic dimensions, including the relative importance of demand and supply shocks (Balleer et al., 2020; Brinca et al., 2020), the effect of the sectoral structure of economies (Barrero et al., 2020) and the role of labour and financial markets in processes of economic recovery (Buera et al., 2021). Other studies use computable general equilibrium models to investigate impacts on GDP and trade (Djiofack et al., 2020; Maliszewska et al., 2020) or to analyse the role of Global Value Chains (GVCs) as channel of international propagation of the impact of the pandemic (Bonadio et al., 2021; Eppinger et al., 2020; Pahl et al., 2021).

The importance of macroeconomic studies notwithstanding, there is a pressing need to obtain more microeconomic evidence on the scale and the determinants of the effects of the pandemic (Borino et al., 2020; Chetty et al., 2020). Several studies provide evidence on the scale of the impact and the types of problems experienced by firms. For example, Dai, Hu, et al. (2020) and Dai, Feng, et al. (2020) report findings from two surveys among small- and medium-sized enterprises (SMEs) in China, one applied in February shortly after the outbreak of the pandemic and a second one applied in May. Although a majority of firms had resumed operations in May following the easing of restrictions, many did so at partial capacity. Furthermore, 18% of the firms had closed for good, representing a decrease in employment of around 14%. For the United States, Bartik et al. (2020) present results from a survey among more than 5800 SMEs showing that around 43% of businesses had to temporarily close down following the onset of the pandemic; on average, firms reduced their workforce by 40%. Related findings for the United States based on data from the Current Population Survey indicate that the number of active business owners decreased by 22% over the period February–April 2020 (Fairlie, 2020).

A few studies present cross-country firm-level evidence on the impact of the pandemic. Beck et al. (2020) report findings from a survey among almost 500 publicly listed firms in 10 emerging economies, 69% of which indicate to have been impacted negatively by the pandemic. Borino et al. (2020) analyse data from the International Trade Centre's COVID-19 Business Impact Survey for 4433 firms in 133 countries. Their findings show that around 62% of firms experienced problems with accessing inputs and around 80% of the firms reported a decrease in sales. Apedo-Amah et al. (2020) use data for more than 100,000 firms obtained from firm-level surveys in 51 countries. Their findings reinforce the impression that the immediate impact of the pandemic has been very large, with 84% of the firms indicating to have experienced a decrease in sales. The sample-averaged country level decrease in sales amounts to almost 50%.

2.2 | Country, sector and firm-level characteristics

Firm-level studies stress the importance of controlling for the heterogeneous nature of the impact of the pandemic across economic sectors. For instance, Dörr et al. (2021) use representative data for Germany from the Mannheim Enterprise Panel to examine various dimensions of the impact (decreased demand, supply chain interruptions, liquidity shortfalls) and find that the strongest impacts occur in accommodation and catering, the creative industry and entertainment industries. More generally, sectors that have been subject to the most stringent government measures—sectors usually characterised by the need for physical interaction and proximity between customers and firms—have experienced the strongest impacts. Similar results are presented for the United States by Bartik et al. (2020) and Fairlie (2020). Cross-country studies also confirm the presence of substantial heterogeneity across economic sectors as well as across countries, caused by differences in the scale of the pandemic, the strength and scope of government measures and various other structural economic characteristics (Apedo-Amah et al., 2020; Beck et al., 2020).

The findings from the firm-level studies are somewhat limited in terms of clearly identifying specific firm characteristics that influence the impact of the pandemic. Firm size and international trade participation constitute the two main characteristics that several studies identify to be important. Regarding firm size, it is commonly found that SMEs have been hardest hit (Apedo-Amah et al., 2020; Buchheim et al., 2020; Fernández-Cerezo et al., 2021). Not only are SMEs overrepresented in sectors that have been affected particularly strongly (OECD, 2021), but they are also more fragile financially (Bartik et al., 2020) and they are less likely to be aware of or successfully apply for government support (Cirera et al., 2021; Guerrero et al., 2021). Another explanation for the effect of firm size is that large firms may find it easier to diversify their products, thereby creating additional market demand. Also, large firms possess more resources and can exploit productivity premiums to absorb and respond to negative economic shocks.

Evidence on the effect of trade participation is more heterogeneous. Some studies find that exporting firms are characterised by larger negative impacts. For instance, Dai, Feng, et al. (2020) find for China that exporting firms are more likely to experience raw material shortages, supply chain disruptions and other logistical problems. They argue that this is caused by exporting firms relying on a limited set of preferred suppliers, limiting their flexibility to access alternative suppliers. Similarly, Borino et al. (2020) find that firms that are involved in exporting and importing activities experience more problems in terms of accessing input and export markets.

Hyun et al. (2020) present more nuanced findings on the relationship between trade and the impact of the pandemic. They assemble a panel data set for around 7900 publicly listed firms in 71 countries, using the weekly growth rate of the firms' market value during the first five months of 2020 as indicator of firm-level performance. Their findings show that the intensity of the pandemic in countries to which firms export to and import inputs from is negatively associated with firm-level performance. At the same time, the negative effect of the pandemic in the country where a firm is located is smaller when the firm has high export and import intensities, indicating that firms are able to partly circumvent own-country-specific impacts of the pandemic through international trade. This latter result is in line with findings presented by Espitia et al. (2021). They use monthly trade data for a set of countries to estimate sector-level gravity trade models and find that although countries are sensitive to shocks experienced by their trade partners, international trade also makes them less sensitive to the impact of the pandemic in their own economies.²

²Constantinescu et al. (2022) use a different perspective to assess the effect of firm-level international trade. Analysing firm-level data from 45 countries, they find that 'globally engaged firms' (firms directly involved with international markets) are characterised by a faster recovery. Explanations for this include better capabilities to find new international input and output markets and their higher propensity to access support.

2.3 | Multinational corporations and negative economic shocks

In global terms, the effects of the pandemic on international investment flows and the operations of MNCs have been strong. In 2020, values of new Greenfield investment announcements and international project deals—types of investment that create positive impacts on the productive capacity of host economies—decreased by 44% to 53% in EMDEs and by 16% to 28% in developed economies (UNCTAD, 2021). Findings from the Global MNE pulse survey show that many MNCs experience problems both with demand and supply (World Bank, 2020). The average negative impact on output and revenues among the surveyed MNCs amounted to 58% and 65%, respectively. These large negative effects have resulted in a substantial scaling back of the operations of MNCs, in particular by reducing the size of workforces and by decreasing or postponing investments (World Bank, 2020).

The primary reason to expect that MNCs are more likely to be affected by a negative economic shock is that their operations are affected by a liability of foreignness (Zaheer, 1995), creating additional costs for foreign-owned firms and placing them at a disadvantage to domestic firms (Zaheer & Mosakowski, 1997). The sources of the liability of foreignness are commonly understood to relate to social, cultural and institutional differences between the home and host countries of MNCs (Belderbos et al., 2020; Mezias, 2002; Mithani, 2017). These differences result in increased transaction costs, but can also generate additional costs in more indirect ways when they lead to information asymmetries and increased uncertainty about business environments in host economies (Calhoun, 2002; Hennart et al., 2002; Standifird & Globberman, 2005).

Under stable economic conditions, foreign-owned firms compensate for their liability of foreignness by exploiting their ownership-specific advantages (Dunning & Lundan, 2008; Mata & Freitas, 2012). When a negative economic shock distorts the balance between these two forces, it may be more difficult for MNCs to absorb and respond to the deterioration of economic conditions in their host economies. For instance, transaction costs with domestic firms may increase due to increased uncertainty and MNCs may have less knowledge and understanding of how host economy institutional frameworks respond to such shocks. Also, it may be that foreign-owned firms lack information on rules and regulations of support and recovery programmes that host economy governments implement, or that these governments target such programmes (intentionally or unintentionally) primarily towards domestic firms. Brakman et al. (2021) argue that the pandemic has indeed led to an increased importance of the negative effects from liability of foreignness and that this appears to be fostering the re-organisation of the international operations of MNCs into geographically more condensed and reliable production networks.

In contrast, there are also several reasons why MNCs may be better equipped to deal with negative economic shocks. First, it is well-documented that foreign-owned firms have productivity premiums over domestic firms (e.g. Arnold & Javorcik, 2009; Girma & Görg, 2007) that can help them absorb and respond to negative shocks. Second, MNCs are often more involved in producing for international markets (Boddin et al., 2017), making them less sensitive to host–economy-specific shocks. This effect can be strengthened by their ability to shift production and sales between different host economies and markets (Bernard & Sjöholm, 2003; Dikova et al., 2013). Also, intra-MNC demand for intermediate products can shield foreign-owned firms from such shocks (Alfaro & Chen, 2012). Third, MNCs tend to have easier access to capital, either from their parent companies or from international capital markets (Desai et al., 2004; Manova et al., 2015). As economic crises are often accompanied by restricted access to capital (Desai et al., 2008; Garicano & Steinwender, 2016), easier access to finance places MNCs at an advantage over domestic firms.

Evidence on the question whether type of ownership is important for the impacts of and responses to negative economic shocks is varied. Several studies examine differences in exit rates of MNCs and domestic firms, under the assumption that the effect of liability of foreignness becomes more



important during these shocks. The footloose nature of MNC investments facilitates the relocation of production facilities to other host economies (Bernard & Sjöholm, 2003; Görg & Strobl, 2003), which makes it likely that MNCs show higher market exit rates in response to negative economic shocks. Alvarez and Görg (2012) examine the effects of a country-specific negative economic shock in Chile in the late 1990s and find that in general MNCs are more likely to exit the market, a difference with domestic firms that increased during the economic downturn. Similarly, Varum et al. (2014) present evidence that MNCs had a higher exit rate in the early 1990s during an economic downturn in Portugal. In contrast, Godart et al. (2012), Wagner and Weche Gelübcke (2013) and Amendola et al. (2012) examine the impact of the financial crisis of 2007–2008 for Ireland, Germany and Italy and find no significant differences in exit rates between foreign-owned and domestic firms.

Turning to studies that examine whether MNCs and domestic firms perform differently in response to negative economic shocks, Eppinger and Smolka (2020) analyse firm-level data for Spain and find that MNCs significantly increased their share of sales on international markets during the financial crisis of 2007–2008. The effect of foreign ownership on export intensity is particularly strong in financially vulnerable industries, reflecting the importance of MNCs having easier access to finance. Dikova et al. (2013) also find that foreign ownership is positively associated with increased export intensity. Using aggregated data on the sales of US-owned MNCs in over 50 host economies, they examine the effects of more than 80 banking, debt and currency crises for the period 1983–2005. Their findings show that MNCs respond to negative economic shocks by increasing their export intensity, in particular in response to local currency crises (see Dikova et al., 2013).³

Alfaro and Chen (2012) present evidence of a clear positive effect of foreign ownership on sales performance during the financial crisis. Deploying matching techniques on a large firm-level data set containing information on about 12 million domestic and foreign-owned establishments in 53 countries, they find that MNCs experienced significantly larger sales growth in the years 2007–2008. This effect materialises primarily among MNC affiliates that produce intermediate products for their parent firms. MNCs with strong financial linkages to their parent firms are also characterised by significantly higher growth rates during the crisis years. For pre-crisis years, the estimated effects of producing for parent firms and having strong financial linkages are not significant.

Finally, Blalock et al. (2008) and Alvarez and Görg (2012) examine differences between MNCs and domestic firms during economic shocks in Indonesia and Chile. Blalock et al. (2008) find that the years following the start of the Asian financial crisis in 1997 are characterised by significant increases in value added, employment and capital among MNCs. Alvarez and Görg (2012) find that although both domestic and foreign-owned firms experienced negative employment effects during the economic downturn in Chile in the late 1990s, the effects were significantly smaller among MNCs, suggesting that they were better able to absorb the negative economic shock.

2.4 | Research questions

The variation of the impact of the COVID-19 pandemic across countries, sectors and firms indicates the importance of further microeconomic research on factors that influence this impact. For many countries, the question whether there are differences in the impact between foreign-owned and domestic firms is very important. Therefore, our first research question is whether type of ownership

³Related findings are presented by Desai et al. (2008), who analyse the effects of currency depreciations in the 1990s in a number of emerging economies and find that US-owned MNCs experienced significantly faster sales growth compared to domestic firms.

influences the negative sales impact of the pandemic, representing the most direct indicator of the immediate and short run impact of the pandemic. It is unclear what to expect of the effect of foreign ownership a priori, as the effect may be either negative or positive. Furthermore, most of the existing evidence applies to the effects of foreign ownership on the impact and responses to financial crises, whereas our analysis focuses on the effects of a different type of negative economic shock.

Our second research question addresses the effect of international trade, representing the one factor that both micro- and macroeconomic studies envisage as a potential determinant of the scale of the impact of the pandemic. Again, existing evidence indicates that the effect may be positive or negative. On the one hand, firms that are involved in exporting and importing activities may be less impacted, when international trade allows them to (partially) escape country-specific dimensions of the pandemic. On the other hand, especially given the global nature of the impact of the pandemic, it may be that the negative economic shock is magnified among firms that rely on international markets for inputs and sales.

Our third research question concerns the existence of interaction effects between foreign ownership and international trade. Given that MNCs often produce for a wider range of export markets, they may be better able to circumvent negative host-economy-specific shocks. The fact that they often have easier access to finance may also help them to diversify their products and explore new input and export markets. Also, they may face more stable supply and demand relationships when their buyers and suppliers are other affiliates of the MNC organisations to which they belong. Therefore, we hypothesize that the interaction between foreign ownership and trade participation exercises a dampening effect on the negative impact of the pandemic.

3 | DATA AND REGRESSION MODEL SPECIFICATION

3.1 | Data

We use a large multi-country firm-level data set that we compiled from the World Bank Enterprise Survey (WBES) project. In 2019, WBES surveys were carried out among representative samples of firms in a number of countries. In 2020, a special follow-up survey was applied to these firms enquiring about the short run impact of the pandemic. A set of similar pandemic-related questions was integrated into surveys that were carried out in several other countries where regular WBES surveys were implemented in 2020. By combining the various firm-level data sets, we obtain a unique firm-level data set containing indicators of the short run impact of the COVID-19 pandemic in a heterogeneous set of 43 developing, emerging and advanced economies.

We focus in our analysis on the short run impact of the pandemic on firm-level sales. Table 1 reports country averages on the prevalence and the strength of the negative sales impact.⁴ The left hand side of Table 1 ranks the countries according to the percentage of firms that experienced a decrease in sales. It is clear that the prevalence of the negative sales impact is high, with the percentage of impacted firms ranging from 86% to more than 96% in the top 10 most affected countries. In a majority of countries, the percentage of negatively impacted firms is more than 60%; the sample mean level of negatively impacted firms is more than 70%. The right hand side of Table 1 ranks the countries according to the average percentage sales decrease among firms that experienced a decrease in sales following the onset of the pandemic. El Salvador ranks number 1, with an average firm-level sales decrease of 72%. A substantial number of countries have an average firm-level sales decrease of

⁴Table S1 in the online Appendix lists the countries with the number of firms covered by the surveys.

TABLE 1 Impact of COVID-19 pandemic on sales.

| % Firms with decrease in sales | | | | Firm-level % sales decrease | | | |
|--------------------------------|------|------------------|------|-----------------------------|------|------------------|------|
| Country | % | Country | % | Country | % | Country | % |
| Guinea | 96.1 | Italy | 73.5 | El Salvador | 72.0 | Montenegro | 44.2 |
| Niger | 95.5 | Russia | 70.1 | Honduras | 65.7 | Kazakhstan | 44.0 |
| Zimbabwe | 91.4 | Greece | 69.1 | Moldova | 64.3 | North Macedonia | 43.0 |
| Togo | 89.8 | Bosnia and Herz. | 62.0 | Georgia | 62.0 | Belgium | 39.0 |
| Jordan | 89.1 | Portugal | 61.9 | Italy | 61.9 | Belarus | 38.5 |
| Moldova | 89.1 | Romania | 59.8 | Albania | 61.0 | Russia | 38.1 |
| Zambia | 87.9 | Slovenia | 57.8 | Zimbabwe | 59.5 | Lithuania | 37.4 |
| Honduras | 87.7 | Belgium | 57.4 | Niger | 59.1 | Romania | 37.0 |
| Chad | 87.1 | Croatia | 57.3 | Guinea | 57.2 | Malta | 36.9 |
| Guatemala | 86.8 | Serbia | 56.7 | Nicaragua | 55.7 | Serbia | 36.3 |
| El Salvador | 85.9 | Kazakhstan | 56.5 | Guatemala | 55.5 | Poland | 35.6 |
| Mozambique | 85.1 | Ireland | 55.2 | Jordan | 54.4 | Portugal | 35.3 |
| Morocco | 84.7 | Poland | 54.2 | Morocco | 54.1 | Netherlands | 35.2 |
| South Africa | 84.2 | Czech | 53.5 | Mozambique | 54.0 | Slovakia | 34.5 |
| Albania | 83.4 | Belarus | 51.5 | Cyprus | 52.8 | Czech Republic | 34.2 |
| Nicaragua | 81.9 | Lithuania | 51.0 | Mongolia | 52.6 | Estonia | 32.1 |
| Mongolia | 81.4 | Hungary | 50.4 | Ireland | 51.5 | Latvia | 31.9 |
| Malta | 79.8 | Netherlands | 50.3 | Zambia | 50.9 | Croatia | 31.7 |
| Georgia | 77.6 | Slovakia | 48.0 | Togo | 50.6 | Hungary | 31.6 |
| North Macedonia | 76.5 | Estonia | 43.1 | Chad | 49.1 | Bosnia and Herz. | 30.0 |
| Cyprus | 74.9 | Latvia | 27.7 | Greece | 49.1 | Slovenia | 27.3 |
| Montenegro | 74.8 | Sample mean | 70.6 | South Africa | 47.4 | Sample mean | 46.4 |

Source: Calculated with data from WBES.

more than 50%. For the entire sample, firms that experienced a negative sales impact saw their sales decrease by more than 46% on average.

To get some further insight into which countries experience the largest negative sales impact, we create Figure 1 which shows the two indicators of the sales impact, whereby the countries are sorted from left to right in ascending order according to their level of GDP per capita in 2019. The countries in the data set with the lowest levels of income per capita, such as Mozambique, Niger, Togo and Chad, are characterised by the largest negative sales impact, both in terms of the percentage of affected firms and the extent to which sales decreased among the affected firms. Next, a group of countries with medium levels of GDP per capita, starting with North Macedonia and Bosnia Herzegovina and running up until Latvia, is characterised by a negative association between the level of income per capita and the two indicators of the negative sales impact. A third group of countries with relative high levels of GDP per capita is characterised by a more heterogeneous sales impact, both in terms of the percentage of affected firms and the average percentage sales decrease.

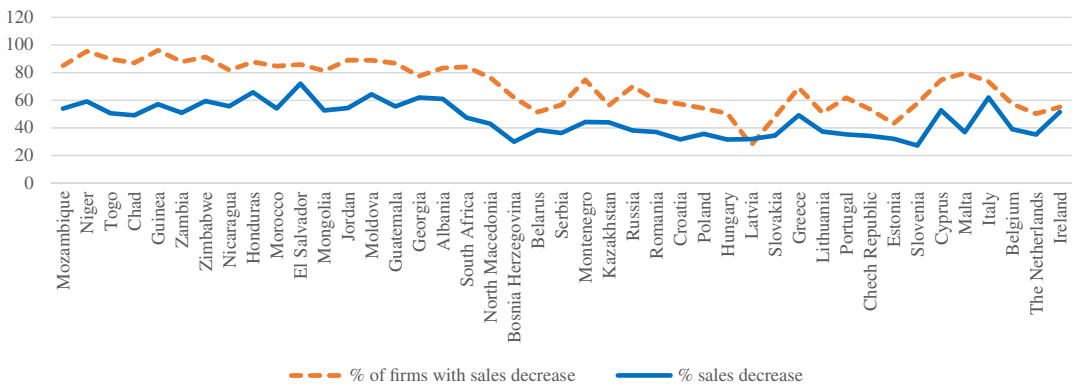


FIGURE 1 Sales impact of COVID-19. *Note:* Countries are sorted in ascending order according to their GDP/Capita level in 2019. [Colour figure can be viewed at wileyonlinelibrary.com]

Figure 2 shows the extent to which MNCs differ from domestic firms across the countries.⁵ We rank the countries according to the size of the percentage point difference in sales decrease between the two types of firm, indicated by the orange bars. A negative value indicates that the average percentage sales decrease among MNCs is smaller than among domestic firms. The blue bars indicate the overall average firm-level sales decrease in the countries. Although there is clear variation, in most countries, MNCs are characterised by a smaller negative sales impact. For Niger, Mozambique, Montenegro, Honduras, Ireland and Italy, the difference between MNCs and domestic firms lies between 20 and 30 percentage points. A smaller set of countries, starting with Lithuania, contains foreign-owned firms that experienced a larger average negative sales decrease compared with domestic firms.⁶

Figure 3 shows the variation of the negative sales impact across the various sectors. The blue bars indicate the average firm-level percentage sales decrease. The orange bars indicate the percentage point difference between MNCs and domestic firms. In a majority of sectors this difference is negative, indicating that foreign firms experienced a smaller average sales decrease. The largest differences can be found in the sectors of coke and refined petroleum, post and telecommunications, publishing and printing, leather, paper and paper products, other transport equipment, basic metals and motor vehicles. In the sectors of food and beverages, apparel and textiles and several service-related activities including retail trade, hotels and restaurants, transport activities and air transport, the average sales decrease is larger among MNCs.⁷

Summarising, the exploratory analysis of the dataset indicates that the COVID-19 pandemic has generated a large, short run negative impact, both in terms of the share of firms that experienced a negative sales impact and the average percentage decrease in sales among the firms that experienced a negative sales impact. Having said this, there is also substantial variation of these impacts across the countries and sectors in the data set. A broad comparison between MNC affiliates and domestic firms shows that in a majority of countries foreign-owned firms appear to have been less affected by the pandemic. This difference is also apparent when comparing the impact between the two types of firm across the various economic sectors.

⁵A firm is classified as foreign owned when at least 10% of its total assets are foreign-owned.

⁶Figure S1 in the online Appendix ranks the countries according to the difference between MNCs and domestic firms in terms of the percentage of firms that experienced a negative sales impact. Similar to Figure 2, foreign-owned firms appear to be less affected by the pandemic in most of the countries.

⁷Figure S2 in the online Appendix provides similar results from comparing the percentages of negatively affected foreign-owned and domestic firms across the sectors.

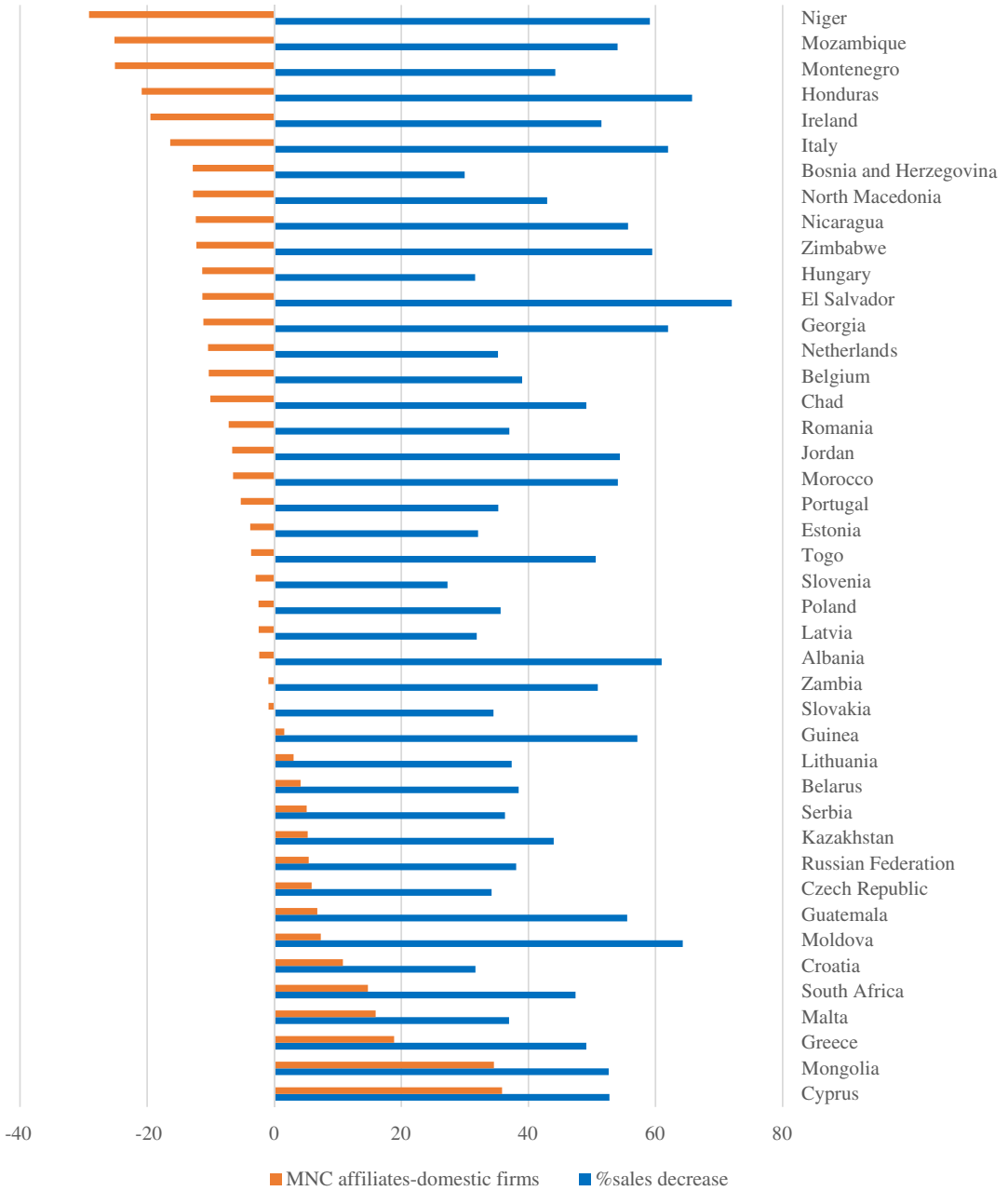


FIGURE 2 Percentage decrease in sales: Difference between multinational corporations (MNCs) and domestic firms across countries [Colour figure can be viewed at wileyonlinelibrary.com]

3.2 | Regression model specification

To analyse more formally whether MNCs differ from domestic firms in the prevalence and magnitude of the negative sales impact, we specify the following regression model where *i*, *s*, *c* and *t* capture the firm, sector, country and month_year dimensions of the dataset:

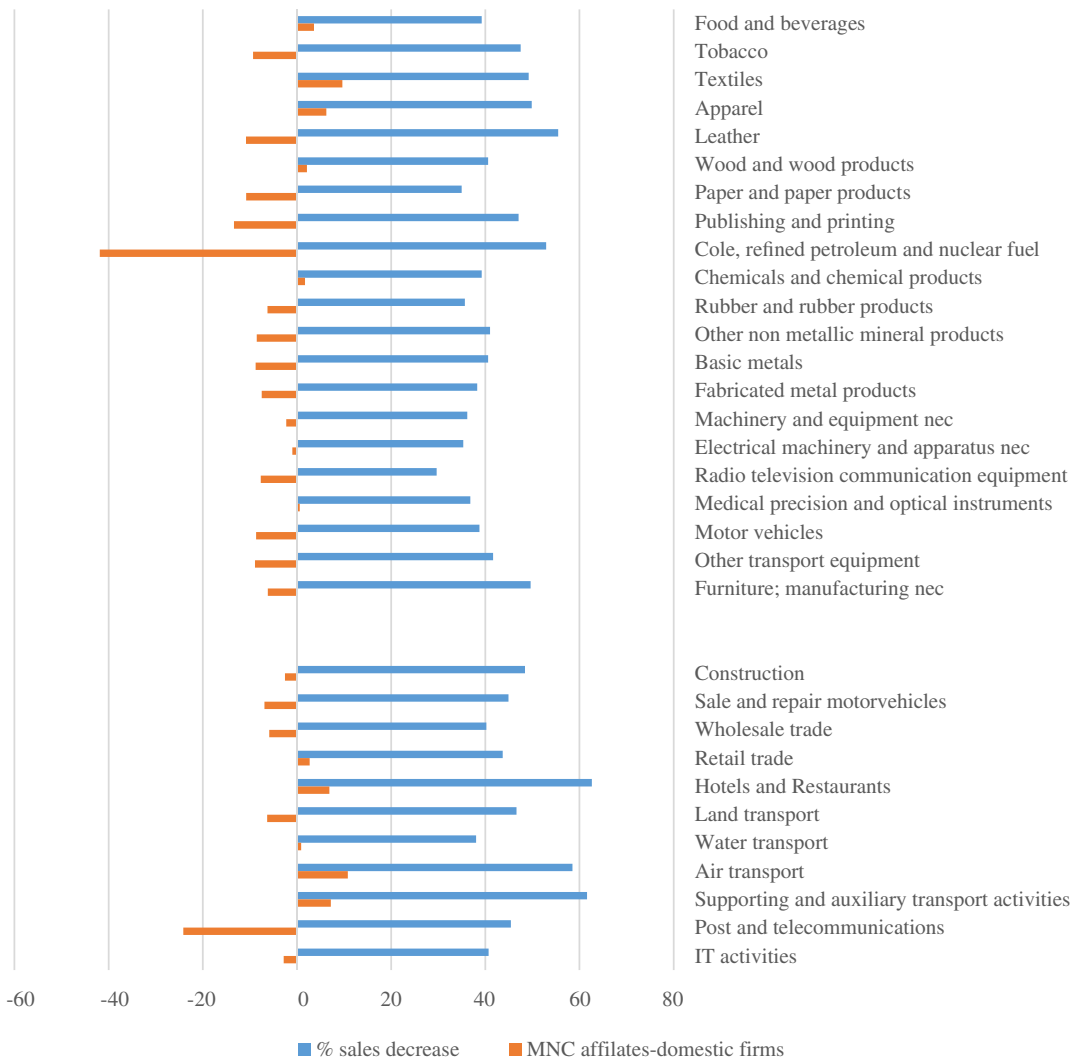


FIGURE 3 Percentage decrease in sales: Difference between multinational corporations (MNCs) and domestic firms across sectors [Colour figure can be viewed at [wileyonlinelibrary.com](https://onlinelibrary.wiley.com/doi/10.1111/twe.13392)]

$$Y_{isct} = \beta_0 + \beta_1 MNC_{isct} + \beta_2 Firm_{size}_{isct} + \beta_3 Firm_{age}_{isct} + \beta_4 Export_{isct} + \beta_5 Import_{isct} + \beta_6 LabProd_{isct} + \beta_7 ExtFin_s + \beta_8 Stringency_{ct} + \beta_s Sector_s + \beta_c Country_c + \beta_t Month_year_t + \epsilon_{isct} \quad (1)$$

The dependent variable is either a dummy variable capturing whether a firm has experienced a negative impact following the onset of the pandemic or the percentage decrease in sales that a firm experienced.⁸ Although the dependent variable capturing the occurrence of a negative sales impact is dichotomous, we estimate the model in this linear specification to avoid the possibility that the estimations are affected by the incidental parameter problem, as the model is saturated with country, industry and month_year effects (see e.g. Beck et al., 2020).

⁸Table S2 in the online Appendix provides a full list of the variables with definitions and data sources.



The model controls for several firm-level characteristics. The variable MNC captures whether a firm is foreign-owned. The variable Firmsize classifies firms into one of three size categories: small (1–20 employees), medium (21–100 employees) or large (>100 employees). The variable Firmage is measured as the difference between the year that the survey was applied and the starting year of the firm. The variables labelled Exports and Imports capture a firm's participation on international output and input markets. We define both variables dichotomously, taking the value of 1 when a firm is actively exporting and importing.

The cross-sectional nature of the dataset prevents us from controlling for time-invariant firm-level effects. To control for the effects of other firm-level characteristics we include a variable capturing labour productivity (LabProd), under the assumption that the effects of such firm characteristics that are important for the impact on sales performance are captured by the labour productivity variable. To minimise the occurrence of missing observations, we measure firm-level labour productivity by the ratio of total output over total number of employees (Waldkirch, 2015).⁹

The variable ExtFin captures the degree to which industries depend on external financing. Several studies present evidence that industries with a high dependence on external finance experience significantly larger negative effects from recessions and banking crises (Braun & Larrain, 2005; Kroszner et al., 2007), as firms in these sectors experience more difficulties in accessing external funds. To control for this, we use the industry-level indicator of financial dependence created by Rajan and Zingales (1998). They calculate for a set of US industries the fraction of capital expenditures that is not financed with cash flows from operations. The use of this indicator is based on the assumption that technological differences between industries (such as scale of production, reliance on R&D and required volumes of inventories) constitute an important explanation for industry differences in financial dependence and that these technological differences are similarly relevant in other economies (see e.g. Braun & Larrain, 2005).

Next, we use data from the COVID-19 Government Response Tracker of the Blavatnik School of Government of Oxford University (Hale et al., 2021) to calculate an indicator of the variation of the stringency of government policies across the countries. The dataset from Hale et al. (2021) provides a daily government policy stringency index (capturing the severity of measures such as school and workplace closures, travel bans, etc.) for the countries in our dataset. For each country_firm combination, we create an indicator labelled 'Stringency' by calculating the monthly average of the stringency index for the month and year in which a firm was surveyed.

Finally, as Figures 1-3 show, there are substantial differences in the prevalence and the scale of the negative sales impact between countries and industries. We control for this by including full sets of country and industry dummy variables (4-Digit ISIC Rev. 3.1). Furthermore, we also capture the timing of the survey by adding dummy variables for the month_year combinations when the firms were surveyed. Doing so controls for the variation of the severity of the COVID-19 pandemic over the different month_years that the surveys were implemented.

⁹Other ways to capture labour productivity include value added over labour or a cross-sectionally derived measure of total factor productivity (following Asker et al., 2014), but doing so would come at the cost of a large number of missing observations. Waldkirch (2015) uses WBES data for 118 countries to estimate the effect of firm-level characteristics such as exports and foreign ownership on productivity and finds that the results with output over labour as productivity indicator are similar to results obtained with value added over labour and the cross-sectionally derived TFP measure, suggesting that we can use output over labour to capture labour productivity in the present study.

3.2.1 | Effect of MNC: Propensity score reweighting

The effect of foreign ownership on the negative sales impact is captured in the regression model by the coefficient β_1 . It is important that the regression model controls for firm-level characteristics such as size, productivity and international trade, as it is well-known that MNCs tend to be larger, more productive and more active on international markets. However, the inclusion of these control variables does not exclude the possibility that the estimated effect of MNC is influenced by a selection effect, caused by firms with particular characteristics being more likely to be foreign owned (Alfaro & Chen, 2012; Boddin et al., 2017). If these characteristics are associated both with the likelihood of a firm being foreign-owned and with the occurrence and/or scale of the negative sales impact, the estimated coefficient β_1 will be biased.

To correct for this possible bias, we use a propensity score reweighting approach (Busso et al., 2014; Hirano et al., 2003). Similar approaches have been applied to estimate the effect of foreign ownership on the composition of types of investment (Garicano & Steinwender, 2016) and international trade (Boddin et al., 2017; Eppinger & Smolka, 2020). In the present setting, the reweighting approach involves estimating a probit model on the probability that a firm was foreign-owned prior to the onset of the pandemic and then use the estimated propensity scores \hat{p} to weight the firms in the estimation of regression model (1).

Although the WBES dataset is primarily cross-sectional, it does contain information on firm-level sales and the total number of employees 3 years prior to the year of application of the survey, allowing us to calculate a lagged labour productivity variable. In addition to this variable, we also use country level GDP per capita for 2016, whether a firm is located in the capital city of a country as well as a full set of industry and year dummy variables as regressors in a model with foreign ownership as dependent variable. We use the estimated propensity scores \hat{p} from this probit estimation to weight the firms in the dataset. Foreign firms are weighted by $(1/\hat{p})$ and domestic firms are weighted by $(1/(1 - \hat{p}))$. By applying these weights, domestic firms that are more likely to have been foreign owned prior to the pandemic are given more weight in the estimation, improving the extent to which the estimated effect of the MNC variable in model (1) captures the effect of foreign ownership.¹⁰

4 | EMPIRICAL FINDINGS

4.1 | Determinants of the occurrence of a negative sales impact

The first part of the analysis focuses on identifying factors that impact on whether firms experienced a decrease in sales. Table 2 presents the results from estimating several specifications of the regression model. Column (1) contains the results from the model that controls for country, sector and month_year effects, foreign ownership and the size and age of firms. The estimated negative coefficients of the size categories medium and large firms indicate that small firms are more likely to experience

¹⁰An alternative way to improve the estimated effect of foreign ownership is to apply nearest neighbour matching techniques, comparing foreign firms and domestic firms that are most similar on a set of observable characteristics (e.g. Alfaro & Chen, 2012; Alvarez et al., 2017). A downside of this method is that it relies strongly on the quality of matching that can be achieved with the available data. This poses a problem for our estimations, given the relative low numbers of observations for several of the countries in the data set. In comparison, propensity score reweighting is less sensitive to this issue, as it essentially compares foreign-owned firms to all the domestic firms in the data set and the degree of comparability is captured by the weights that are assigned to all the firms (see Boddin et al., 2017).



TABLE 2 Determinants of the occurrence of negative sales impact.

| Estimator | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
|---------------------|---------------------|---------------------|---------------------|----------------------|----------------------|----------------------|---------------------|----------------------|----------------------|----------------------|
| | OLS | OLS | OLS | OLS | PSR | PSR | PSR | PSR | PSR | PSR |
| MNC | -0.025** (0.012) | -0.024* (0.013) | -0.007 (0.02) | 0.002 (0.02) | 0.02 (0.03) | 0.04* (0.026) | 0.02 (0.025) | 0.034 (0.03) | -0.002 (0.04) | -0.004 (0.04) |
| MNC x Exports | | -0.06** (0.024) | -0.07*** (0.025) | -0.074** (0.028) | -0.075** (0.031) | -0.071** (0.03) | -0.076** (0.03) | -0.083* (0.04) | -0.083** (0.04) | -0.08*** (0.04) |
| MNC x Imports | | 0.024 (0.023) | 0.03 (0.025) | 0.002 (0.03) | -0.005 (0.028) | -0.002 (0.026) | -0.026* (0.016) | 0.024 (0.05) | 0.02 (0.05) | 0.02 (0.05) |
| Firm size_medium | -0.026** (0.01) | -0.024** (0.01) | -0.024** (0.001) | -0.024** (0.012) | -0.024** (0.012) | -0.016 (0.015) | -0.023** (0.012) | -0.02 (0.014) | 0.007 (0.02) | 0.003 (0.02) |
| Firm size_large | -0.06*** (0.02) | -0.06*** (0.02) | -0.06*** (0.02) | -0.07*** (0.02) | -0.03* (0.019) | -0.03 (0.02) | -0.032* (0.02) | -0.032 (0.022) | -0.045 (0.03) | -0.05 (0.035) |
| Firm age | 0.014*** (0.004) | 0.014*** (0.004) | 0.014*** (0.004) | 0.017*** (0.004) | 0.011 (0.009) | 0.019** (0.008) | 0.009 (0.009) | 0.02*** (0.001) | 0.024** (0.11) | 0.026** (0.11) |
| Exports | | -0.02* (0.011) | -0.014 (0.10) | -0.008 (0.01) | -0.011 (0.015) | -0.02 (0.015) | -0.01 (0.014) | -0.018 (0.015) | -0.015 (0.02) | -0.003 (0.02) |
| Imports | | 0.008 (0.007) | 0.006 (0.008) | 0.006 (0.01) | -0.006 (0.01) | -0.025* (0.024) | -0.011 (0.011) | -0.026 (0.016) | -0.023* (0.014) | -0.019 (0.014) |
| Labour productivity | | | | -0.012*** (0.004) | -0.01** (0.05) | -0.027*** (0.005) | -0.009* (0.005) | -0.045*** (0.007) | -0.041*** (0.006) | -0.041*** (0.006) |
| Stringency | | | | | 0.003*** (0.0008) | 0.0014* (0.00078) | | | | |
| High stringency | | | | | | | | 0.086*** (0.026) | | 0.13*** (0.03) |
| External finance | | | | | | | | | 3.77*** (1.16) | 3.80*** (1.17) |

(Continues)

TABLE 2 (Continued)

| Estimator | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
|--------------|--------|--------|--------|--------|--------|--------|--------|--------|------|------|
| | OLS | OLS | OLS | OLS | PSR | PSR | PSR | PSR | PSR | PSR |
| Country | Yes | Yes | Yes | Yes | Yes | No | Yes | Yes | Yes | Yes |
| Sector | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Month_year | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 17,853 | 17,653 | 17,653 | 15,864 | 14,058 | 13,570 | 13,570 | 13,570 | 6675 | 6675 |
| R-squared | 0.16 | 0.16 | 0.16 | 0.16 | 0.22 | 0.19 | 0.22 | 0.18 | 0.19 | 0.20 |

Note: Standard errors in parentheses. All standard errors are clustered at the country level. PSR, propensity score reweighted, using as weights estimated propensity scores from a probit regression of foreign ownership on 3 year lagged labour productivity, GDP per capita 2016, whether a firm is located in the capital city and industry and year dummy variables.

Abbreviation: OLS, ordinary least squares.

* $p < .1$, ** $p < .05$, *** $p < .01$.



a negative sales impact, in line with findings from other studies (e.g. Bartik et al., 2020; Buchheim et al., 2020). The estimated positive coefficient of the Firmage variable suggests that the negative sales impact occurs more frequently among older firms. The estimated effect of foreign ownership is significant and negative, indicating that MNCs are less likely to have experienced a negative sales impact.

In columns (2) and (3) we add controls for international trade participation. According to the results in column (2), there is only modest evidence that international trade has a negative effect on the occurrence of a negative sales impact, indicated by the mildly significant negative coefficient of the exports variable. Involvement in importing activities does not generate a significant effect. However, the results change when we add interaction terms between foreign ownership and international trade, as shown in column (3). Doing so renders the estimated effects of foreign ownership and involvement in exporting activities insignificant. Instead, the results now show that it is foreign firms that are involved in exporting activities that are less likely to have experienced a negative sales impact. This suggests that by producing for international markets, foreign-owned firms are able to (partly) avoid the negative economic shock in their host economies. This effect is likely to be facilitated by MNCs being better able to diversify products and exports markets or by benefiting from more stable demand for their products from MNC affiliates located in other countries.

Next, we include a control for firm-level labour productivity to assess whether the productivity premium of foreign ownership may provide an alternative explanation for the finding that exporting MNCs are less likely to experience a sales decrease. The estimated effect of labour productivity is negative, confirming that more productive firms have been less impacted by the pandemic. The effect of the interaction term between foreign ownership and exporting persists to be significant and negative, supporting the notion that it is the involvement in international trade that facilitates MNCs in dealing with the negative economic shock. In column (5), we assess the robustness of this finding by applying the propensity score reweighting approach that corrects for a possible bias of the estimated effect of foreign ownership. The significance of some of the other regressors is affected, but the estimated effect of the interaction between foreign ownership and exporting is stable.

In columns (6)–(8), we include a control variable for the effect of the level of stringency of government policy measures. In column (6), we add the stringency variable whilst omitting the country dummy variables. The estimated effect of the stringency variable is positive and significant, indicating that firms located in countries where governments implemented more restrictive measures are significantly more likely to experience a decrease in sales. The inclusion of the country dummy variables in column (7) lowers the size of the estimated effect and the significance of the stringency variable, suggesting that most of its estimated effect is absorbed by the country effects. As alternative, in column (8) we include a dummy variable labelled ‘High stringency’, taking the value of 1 for those countries that have a level of stringency above the sample median. The estimated effect of this dummy variable is positive and significant, confirming the negative economic effect of highly restrictive government policies. In all three estimations, the negative effect of the interaction between foreign ownership and exporting remains stable.

Finally, in the last two columns we include the variable that captures the industry level of dependence on external finance. The downside of this variable is that it is only available for firms in the manufacturing sector, causing a substantial drop in the number of observations. The estimated effect of the industry level of dependence on external finance is positive and significant, confirming that industries with a high dependence on such finance are impacted more strongly when experiencing a negative economic shock. Again, the estimated negative effect of the interaction between foreign

ownership and exporting remains stable and is unaffected by the inclusion of this additional control variable.¹¹

4.2 | Drivers of the scale of the negative sales impact

In the next step of our analysis, we substitute the variable measuring the magnitude of the sales decrease for the dummy variable capturing whether a firm experienced a sales decrease. Another difference with the model estimated in section 4.1. is that we replace the dummy variables capturing involvement in exporting and importing activities with variables measuring exports as a percentage of total sales (export intensity) and imports as a percentage of total inputs (import intensity).

Table 3 presents the results from estimating a variety of specifications of the regression model. The first column contains the results from the PSR estimation. The two size category variables carry significant negative coefficients, indicating that small firms experienced a significantly larger decrease in sales. The age of a firm is also important but the nature of the effect switches, as older firms experience a smaller negative impact. An explanation for this change may be that older firms have built up more experience in dealing with economic downturns. The estimated effect of labour productivity is also significant and negative. In strong contrast, there is little evidence that foreign ownership and/or trade intensity are important. The variable MNC and its interactions with export and import intensity carry insignificant coefficients; only the estimated positive association of export intensity is mildly significant, suggesting that among negatively impacted firms, a high level of exports magnifies the negative impact.

To examine this further, we conduct a Heckman selection model estimation (Heckman, 1976, 1979). By using the percentage decrease in sales as dependent variable, we use a sub-section of the dataset as we only observe this variable for those firms that experienced a negative sales impact. This may introduce a selection bias that affects the estimated effects of the variables as reported in column (1). We apply the Heckman selection model to control for this possible bias. This involves a first stage estimation of a probit model on the probability that a firm experienced a negative sales impact (selection equation), followed by a second estimation on the drivers of the scale of the negative sales impact (outcome equation). In the estimation of the outcome equation, we weight the firm-level observations with the estimated propensity scores on the likelihood of a firm being foreign-owned prior to the pandemic. The two equations are jointly estimated with maximum likelihood techniques, with the expected value of the selection equation residuals incorporated into the outcome equation.¹²

Column (2) presents the results from applying the Heckman selection model estimation. The estimated effects of the firm-level characteristics related to size, age and labour productivity are similar to column (1). The main difference lies in the effects of foreign ownership and trade intensity. The estimated effect of export intensity is larger and is estimated more precisely, indicating that a large exposure to export markets strengthens the negative sales impact. Furthermore, the interaction between foreign ownership and export intensity now also carries a significant and positive coefficient. This suggest that when MNCs are negatively impacted by the pandemic, the negative effect on sales is

¹¹We also estimated model 1 with logistic regression techniques. The results are presented in the online Appendix in Table S3. The findings are very similar to those presented in Table 2 in terms of the nature and significance of the estimated effects of the control variables.

¹²In the selection equation we include the regressors underlying the estimations of Table 2 and we add a regional identifier variable to capture that the occurrence of a negative sales impact is subject to some form of general regional variation within the countries in the sample.

TABLE 3 Determinants of the size of negative sales impact.

| | (1) | (2) | (3) | (4) | (5) | (6) |
|-------------------------------|---------------------|---------------------|----------------------|----------------------|---------------------|---------------------|
| Dependent variable | % sales decrease | % sales decrease | % sales decrease | % sales decrease | % sales decrease | % sales decrease |
| Estimator | PSR | Sel. Model | Sel. Model | Sel. Model | Sel. Model | Sel. Model |
| Sample | Full | Full | Full | Full | Manufacturing | Full |
| MNC | 0.015 (0.05) | 0.016 (0.018) | 0.01 (0.02) | 0.045* (0.026) | 0.06** (0.03) | -0.03 (0.022) |
| Exports | 0.06* (0.038) | 0.10*** (0.02) | 0.10*** (0.026) | 0.07** (0.034) | 0.057* (0.033) | 0.14*** (0.04) |
| Imports | -0.006 (0.04) | 0.024 (0.20) | 0.022 (0.02) | 0.002 (0.03) | 0.009 (0.03) | 0.001 (0.02) |
| Exports x MNC | 0.014 (0.07) | 0.10*** (0.03) | 0.10*** (0.03) | -0.014 (0.04) | -0.02 (0.04) | 0.15*** (0.05) |
| Imports x MNC | -0.06 (0.06) | -0.11*** (0.026) | -0.11*** (0.03) | -0.12*** (0.04) | -0.13*** (0.04) | -0.06** (0.03) |
| Manufacturing | | | | | | 0.08 (0.09) |
| Manufacturing x MNC | | | | | | 0.12*** (0.03) |
| Manufacturing x MNC x Exports | | | | | | -0.12** (0.06) |
| Manufacturing x MNC x Imports | | | | | | -0.15*** (0.05) |
| Firm size_medium | -0.12*** (0.035) | -0.06*** (0.014) | -0.063*** (0.014) | -0.13*** (0.02) | -0.13** (0.02) | -0.06*** (0.014) |
| Firm size_large | -0.28*** (0.04) | -0.17*** (0.02) | -0.16*** (0.016) | -0.28*** (0.02) | -0.29*** (0.02) | -0.17*** (0.02) |
| Firm age | -0.04** (0.02) | -0.09*** (0.009) | -0.10*** (0.009) | -0.003 (0.01) | -0.005 (0.01) | -0.09*** (0.009) |
| Labour productivity | -0.03*** (0.01) | 0.03*** (0.004) | 0.03*** (0.004) | -0.044*** (0.009) | -0.04*** (0.008) | 0.029*** (0.004) |
| High stringency | | | 0.10*** (0.024) | 0.18*** (0.04) | 0.19*** (0.04) | 0.10*** (0.02) |
| External finance | | | | 5.27*** 0.81 | | |
| Observations | 8936 | 8933 | 8933 | 4212 | 4278 | 8933 |
| R-squared | 0.33 | | | | | |
| Wald Chi(2) | | 5713.07 | 5729.62 | 3554.08 | 3458.82 | 5782.12 |

Note: Standard errors in parentheses. All standard errors are clustered at the country level. PSR, propensity score reweighted, using as weights estimated propensity scores from a probit regression of foreign ownership on 3 year lagged labour productivity, GDP per capita 2016, whether a firm is located in the capital city and industry and year dummy variables. Sel. Model = results from the outcome equation of Heckman selection model. Selection equation contains control variables similar to Table 2 and dummy variables identifying the regions of the countries. Propensity scores on likelihood of being foreign owned prior to the pandemic are applied in estimating the outcome equation. Outcome equation also contains controls for firm size, age and productivity.

*p < .1, **p < .05, ***p < .01.

magnified by a high export intensity. This effect can be explained by the global nature of the effect of the pandemic. As the economies of many countries have been impacted negatively by the pandemic, a strong dependence on international markets for sales performance increases the negative effect on sales. Having said this, we also obtain an estimated significant and negative effect of the degree to which MNCs rely on international markets for inputs. An explanation for this effect may be that MNCs are better able to resolve host–economy-specific supply bottlenecks by sourcing from alternative international suppliers. Alternatively, this effect may be caused by MNCs benefitting from having more stable supply relationships with MNC affiliates located in other countries.

Columns (3) and (4) present the results from adding controls for the stringency of government policies and the industry level of external finance. The stringency variable carries a positive coefficient, indicating that, similar to its effect on the likelihood of a negative sales impact, firms located in countries with strongly intervening government policies are characterised by significantly larger decreases in total sales. The estimated effect of external dependence is also positive, indicating that a high dependence on external finance increases the size of the negative impact. Furthermore, the effect of the interaction between MNC and export intensity is no longer significant. Instead, there is evidence that foreign ownership increases the scale of the negative impact. To assess whether these findings are caused by the fact that the external dependence variable is only available for manufacturing industries, we re-estimate the model on a sub-sample of firms that operate in the manufacturing sector. This appears to be the case, given the similarity of the results in columns (5) and (4).

To further explore whether there are structural differences between firms operating in manufacturing and non-manufacturing sectors, we add a dummy variable to the model identifying firms that operate in the manufacturing sector and we include interaction terms between the manufacturing sector dummy variable, foreign ownership and trade intensity. The results are reported in column (6). The estimated positive effect of the interaction between foreign ownership and export intensity is re-established, as is the negative effect of the interaction between foreign ownership and import intensity. MNCs operating in the manufacturing sector experience a larger negative impact on their sales, suggesting that foreign-owned firms in this sector are subject to a liability of foreignness effect. However, there are significant dampening effects among those MNCs in the manufacturing sector that are characterised by high export or import intensities. This suggests that manufacturing MNCs are able to use their international trade relations to lower the negative sales impact of the pandemic.

4.3 | Multinational corporations and global production networks

So far, the findings show that MNCs, in combination with their participation on international markets, have been impacted differently by the COVID-19 pandemic compared with domestic firms. Foreign ownership and international trade participation appear to generate various effects. On the one hand, MNCs that are involved in exporting activities are significantly less likely to have been subject to a negative sales impact. On the other hand, among MNCs that do experience a sales decrease, export intensity appears to strengthen the magnitude of the negative sales impact. A heavy reliance on imports lowers the scale of the negative impact. Additional results show that MNCs are subject to a liability of foreignness effect, which appears to apply in particular to foreign-owned firms in the manufacturing sector. Having said this, manufacturing MNCs with relative high levels of import and export intensity are characterised by a smaller negative sales impact.

Next, we examine whether there are further structural differences between MNCs that are related to their participation on international markets. In broad terms, the literature distinguishes between two types of foreign direct investment (FDI) (Barba Navaretti & Venables, 2004; Dunning & Lundan, 2008).



Horizontal FDI refers to MNCs that locate in a host economy to avoid trade costs, whereas vertical FDI locates in host economies to exploit factor costs advantages by producing (intermediate) products for international markets or (affiliates of) their parent companies. Vertical FDI is most closely related to GVCs or international production networks, whereby MNCs locate and coordinate various stages of production processes in different countries (Hanson et al., 2005; UNCTAD, 2013; Zhenwei Qiang et al., 2021). Given the global nature of the pandemic, it may be that the negative sales impact is magnified among this type of MNC, due to their strong reliance on both import and export markets. Alternatively, it may be that trading relationships within global production networks are more stable, provide more flexibility and contain a larger share of intra- and inter-MNC trade flows, in which case the impact of the pandemic may be weaker among MNCs that operate in these production networks.

To examine whether MNCs that operate in GVCs are impacted differently by the pandemic, we augment the regression model with several variables that are related to international production networks. We are prevented from calculating direct measures of involvement in these networks, as the WBES dataset only provides information on the import and export intensities of the firms, without information on origin and destination markets. Therefore, we resort to the use of several proxy variables to assess whether MNCs that are (most likely to be) involved in international production networks are impacted less or more strongly by the pandemic.

One proxy variable that we use relates to the levels of import and export intensity. MNCs that participate in international production networks are likely to be characterised by joint high levels of imports and exports, when their production processes consist of the treatment or assembly of imported intermediate products which are subsequently exported to other countries for further treatment or assembly. To identify these firms, we specify a dummy variable—labelled high trade MNC—that takes the value of 1 for those MNCs that, calculated for the full set of MNC affiliates in the data set, have above sample mean values of both export and import intensities.

Next, we use data from UN Comtrade to calculate the Grubel-Lloyd index of intra-industry trade (Grubel & Lloyd, 1975) for all the country_industry combinations in the manufacturing sector.¹³ The main downside of the high trade MNC variable is that it does not capture the degree that trade is linked to global production networks. Under the assumption that trade within an individual global value chain is more likely to involve trade within the same sector, the degree of intra-industry trade of an industry provides an indication of the extent to which production in the industry is linked to global production networks (Brakman et al., 2015; Brüllhart, 2008). We use UN Comtrade export and import data for 2019 at the SITC revision 2 classification to calculate the Grubel-Lloyd index as follows:

$$GL_{sc} = 1 - \frac{|Ex_{sc} - Im_{sc}|}{Ex_{sc} + Im_{sc}};$$

where Ex and Im are the values of exports and imports of sector s in country c . The GL index ranges between 0 and 1, where a higher value indicates a higher degree of intra-industry trade. In the present analysis, we take a high value of the GL index to reflect that an industry is more likely to be linked to global production networks compared to an industry with a low-GL index value.

Finally, we use information on international trade in value-added to capture the involvement of MNCs in international production networks. To construct a variable capturing trade in value added we use two different databases. One database is the UNCTAD-Eora GVC database (Casella et al., 2019). The advantage of this data set is that it covers most of the countries in our data set; the downside is that the data are only available at a high level of industry aggregation, forcing us to use information at

¹³Data on exports and imports are taken from <http://comtrade.un.org>

the country level. The second database is the Trade in Value Added (TiVA) dataset from the OECD.¹⁴ This database provides industry-level information that can be matched with most of the country_ industry combinations in our data set, but this matching comes at the expense of a lower coverage of the number of countries. To capture the importance of global production networks we use the same variable that is available in the two databases (labelled FVA_VA), measuring the share of foreign value added in the value added of exports. This variable captures the extent to which exports consist of value added previously imported from other countries. We use this variable under the assumption that a high share reflects a high degree of participation by an industry in global production networks.

Table 4 presents the main findings from augmenting the regression model with the additional variables described above. The first two columns contain the results from distinguishing between the general effects of international trade and the reliance on joint high levels of exports and imports. With the full sample of firms, the findings are similar to those in Table 3, with a positive effect of the interaction between foreign ownership and export intensity and a negative effect of foreign ownership and import intensity. There appears to be no separate effect among high trading MNCs. When estimating the model on the sub-sample of manufacturing firms (column 2), the findings change. There are significant negative effects from both the interactions between foreign ownership and export and import intensity. The exception to this is high trading MNCs, as they are characterised by a significantly larger decrease in sales. Also similar to the results in Table 3 is that the variable capturing foreign ownership carries a significant positive coefficient when estimating the model for manufacturing firms, indicating the presence of a liability of foreignness effect.

Column (3) contains the findings from adding the controls for intra-industry trade. Similar to the previous results, import intensity allows MNCs to experience a smaller negative impact, whereas there are estimated positive effects of the foreign ownership variable and the interaction between foreign ownership and exporting. As for the effects of intra-industry trade, the results are mixed. The effect of the level of intra-industry trade itself is significant and positive, indicating that firms that operate in industries that are likely to be linked into global production networks experience a larger negative sales impact, reflecting the global nature of the effects of the pandemic. The triple interaction term between foreign ownership, intra-industry trade and export intensity is significant and negative, suggesting that MNCs are able to use their relationship with these production networks to circumvent country-specific negative effects on their sales. However, the interaction between foreign ownership, intra-industry trade and import intensity carries a positive coefficient. Compared to the general dampening effect of import intensity, MNCs with links into global production networks appear to be subject to a larger negative effect through their dependence on these networks as source of inputs.

Columns (4) and (5) contain the results from adding the share of foreign value added in exports (FVA_VA) from the OECD database to the model. Looking first at the results for the full sample of firms, the estimated positive effect of FVA_VA indicates that the pandemic has generated a larger impact among firms that operate in industries linked to global production networks. Having said this, both the interactions between foreign ownership, FVA_VA and export or import intensity carry significant negative coefficients, indicating that foreign-owned firms that operate in these industries have been better able to absorb the negative economic shock through exporting and importing activities that are linked to GVCs. When estimating the model for manufacturing firms, the findings again indicate that foreign ownership itself is positively associated with the magnitude of the negative impact. In this estimation, the interaction between foreign ownership and export intensity carries a negative coefficient. As for the effect of global production networks, the results indicate that there is a general dampening effect on the negative sales impact among firms operating in industries with a relative high level

¹⁴<https://www.oecd.org/sti/ind/measuring-trade-in-value-added.htm>

TABLE 4 Size of negative sales impact: MNCs and international production networks

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
|----------------------------|--------------------|--------------------|------------------------|----------------------|---------------------|--------------------|--------------------|
| Dependent variable | % sales decrease | % sales decrease | % sales decrease | % sales decrease | % sales decrease | % sales decrease | % sales decrease |
| Sample | Full | Man | Man | Full | Man | Full | Man |
| Source FVA_VA | | | | OECD | OECD | Eora | Eora |
| MNC | 0.016 (0.018) | 0.09*** (0.03) | 0.14*** (0.03) | 0.11*** (0.02) | 0.27*** (0.04) | 0.05** (0.02) | 0.16*** (0.03) |
| Exports | 0.10*** (0.026) | 0.056* (0.032) | 0.067** (0.034) | 0.04 (0.03) | -0.017 (0.04) | 0.07** (0.03) | 0.06 (0.036) |
| Imports | 0.02 (0.02) | 0.009 (0.03) | 0.03 (0.03) | 0.05* (0.027) | 0.036 (0.039) | 0.02 (0.02) | 0.012 (0.03) |
| Exports x MNC | 0.09** (0.035) | -0.09** (0.046) | 0.001 (0.0075) | 0.17** (0.07) | -0.35*** (0.12) | 0.21*** (0.05) | 0.14* (0.08) |
| Imports x MNC | -0.12*** (0.03) | -0.22** (0.05) | -0.0025*** (0.0007) | -0.13** (0.06) | -0.11 (0.12) | 0.02 (0.04) | 0.03 (0.07) |
| High trade MNC | 0.025 (0.024) | 0.14*** (0.04) | | | | | |
| GL | | | 0.11*** (0.04) | | | | |
| GL x MNC x Exports | | | -0.0023** (0.001) | | | | |
| GL x MNC x Imports | | | 0.002** (0.009) | | | | |
| FVA_VA | | | | 0.03*** (0.01) | -0.005** (0.002) | 0.15 (0.27) | -0.18 (0.45) |
| FVA_ VA x MNC x Exports | | | | -0.006*** (0.002) | 0.006 (0.004) | -0.40*** (0.12) | -0.47** (0.18) |
| FVA_ VA x MNC x Imports | | | | -0.003* (0.0017) | -0.0045 (0.003) | -0.66*** (0.10) | -0.80*** (0.18) |
| Observations | 8933 | 4278 | 4011 | 5397 | 2731 | 7794 | 3736 |
| Wald Chi(2) | 5732.22 (0.00) | 3488.87 (0.00) | 2939.11 (0.00) | 4319.34 (0.00) | 1987.85 (0.00) | 5558.04 (0.00) | 2851.49 (0.00) |

Note: Standard errors in parentheses. All standard errors are clustered at the country level. Reported results are from the outcome equation of Heckman selection model. Selection equation contains control variables similar to Table 2 and dummy variables identifying the regions of the countries. Propensity scores on likelihood of being foreign owned prior to the pandemic are applied in estimating the outcome equation. Outcome equation also contains controls for firm size, age and productivity. Calculation of FVA_VA variable: columns (4) and (5) based on TiVA database from OECD; columns (6) and (7) based on Eora GVC database from UNCTAD.

* $p < .1$, ** $p < .05$, *** $p < .01$.

of re-exported foreign value added, irrespective of the type of ownership of the firms. Both the estimations identify a positive effect of foreign ownership in line with the notion of a liability of foreignness effect; this effect is substantially larger in the estimation on the sub-sample of manufacturing firms.

Columns (6) and (7) contain the results when we use the UNCTAD-Eora database to calculate the extent to which exports contain foreign value added. In both estimations, foreign ownership carries a significant positive coefficient; again, the estimated effect is substantially larger among manufacturing

firms. Also similar is the estimated positive effect of the interaction between foreign ownership and export intensity. As for the effect of global production networks, the findings contain relatively strong evidence that international trade related to such networks alleviates the negative sales impact of the pandemic. Both for the full sample and for the sample of manufacturing firms, there are significant and negative effects of the interaction terms between foreign ownership, export or import intensity and the share of foreign value added in exported value added. These findings indicate that foreign-owned firms whose production and trade is likely to be linked to global production networks experience smaller negative effects.

Overall, the findings in Table 4 contain several indications that MNCs with high trade volumes or links to global production networks are impacted differently. However, the results are also characterised by a degree of variability, which is not surprising given that we are forced to rely on the use of proxy variables. Furthermore, it is well-known that firm-level characteristics such as age, size and productivity are related to whether a firm produces for international markets (Bernard & Jensen, 1999). Similarly, it may be that such firm characteristics are also related to the extent to which firms are able to use international trade to absorb the impact of negative economic shocks.

To examine this, we proceed to estimate the model separately for different groups of firms. For each country, we classify the firms according to whether they rank below or above median levels of firm size, age and productivity. We also classify firms according to whether or not they operate in an industry that has an above median share in a country's aggregate exports. We estimate the models on the sub-samples of firms that have above median levels of firm size, age and productivity and industry share of exports. Focusing on these sub-samples also serves as a further test of the estimated effect of the foreign ownership variable. MNCs are more likely to fall into the sub-samples with above median values of these classification variables, as they are known to be large, productive and active on international markets. By estimating the model for these sub-samples of firms, we obtain additional evidence on whether MNCs differ significantly from those domestic firms that share these characteristics with the foreign-owned firms.

We present the results from estimating the models with the variable high trade MNC or the percentage foreign value added in exports from the Eori database in Table 5.¹⁵ Panel A contains the results from augmenting the model with the high trade MNC variable. We estimate the model for the full sample and for the sample of manufacturing firms. Considering first the results for all firms, in most estimations the effect of foreign ownership is significant and positive, in line with the notion that MNCs are negatively affected due to their liability of foreignness. In several estimations export intensity also generates a positive effect. The estimated negative effect of the interaction between import intensity and foreign ownership materialises in all estimations. The positive effect of high trade MNC is most prominent in the estimations for older firms and among firms operating in industries with a relative high share in the countries' aggregate exports.

Turning to the results for manufacturing firms, again there is a prevalence of a larger positive effect of foreign ownership. Whereas the estimated negative effect of the interaction between import intensity and foreign ownership is similar, the sub-samples of manufacturing firms are also characterised by a significant negative effect of export intensity and foreign ownership. This suggests that foreign-owned manufacturing firms are able to use their relationships with both international import and export markets to absorb the impact of the pandemic. Also similar is the prevalence of the positive effect of the variable high trade MNC, indicating that MNC firms with relative high levels of joint exports and imports are negatively affected by the global nature of the pandemic.

¹⁵The results with the Grubel-Lloyd index and foreign value added exports from the OECD database are presented in Tables S4 and S5 in the online Appendix.



TABLE 5 MNCs and international production networks: Firm size, age, productivity and industry export share.

| Sample Indicator | Full | Full Size | Full Age | Full prody | Full Export | Man | Man Size | Man Age | Man Prody | Man Export |
|--|--------------------|--------------------|--------------------|-------------------|---------------------|--------------------|--------------------|--------------------|-------------------|--------------------|
| Panel A: High trade MNC | | | | | | | | | | |
| MNC | 0.016 (0.018) | 0.05** (0.023) | 0.10*** (0.03) | -0.04 (0.029) | 0.05** (0.025) | 0.09*** (0.027) | 0.25*** (0.04) | 0.14*** (0.04) | 0.05 (0.04) | 0.09** (0.036) |
| Exports | 0.10*** (0.03) | 0.04 (0.034) | 0.10*** (0.03) | 0.12*** (0.04) | 0.02 (0.03) | 0.056* (0.032) | 0.05 (0.04) | 0.06 (0.045) | 0.10** (0.05) | -0.01 (0.04) |
| Imports | 0.02 (0.019) | 0.013 (0.03) | 0.04 (0.025) | -0.015 (0.02) | -0.07*** (0.027) | 0.009 (0.03) | -0.03 (0.04) | 0.026 (0.035) | -0.03 (0.045) | -0.05 (0.034) |
| Exports x MNC | 0.08** (0.035) | 0.02 (0.05) | -0.19*** (0.05) | 0.06 (0.05) | -0.06 (0.04) | -0.09** (0.046) | -0.15*** (0.05) | -0.22*** (0.06) | -0.07 (0.07) | -0.12** (0.05) |
| Imports x MNC | -0.12*** (0.03) | -0.18*** (0.04) | -0.25*** (0.04) | -0.075* (0.04) | -0.17*** (0.04) | -0.22*** (0.05) | -0.36*** (0.06) | -0.28*** (0.07) | -0.11 (0.07) | -0.31*** (0.06) |
| High trade MNC | 0.024 (0.024) | 0.04 (0.03) | 0.27*** (0.04) | 0.06* (0.032) | 0.14*** (0.033) | 0.14*** (0.04) | 0.21*** (0.04) | 0.31*** (0.05) | 0.11** (0.04) | 0.28*** (0.05) |
| Observations | 8933 | 4462 | 4456 | 3829 | 4037 | 4278 | 2566 | 2406 | 1693 | 2586 |
| Wald Chi(2) | 5732.22 (0.00) | 5369.23 (0.00) | 5094.67 (0.00) | 4223.23 (0.00) | 5363.87 (0.00) | 3488.87 (0.00) | 2811.36 (0.00) | 2431.43 (0.00) | 2857.19 (0.00) | 3085.89 (0.00) |
| Panel B: Foreign value added in exports | | | | | | | | | | |
| MNC | 0.053** (0.02) | 0.09*** (0.024) | 0.06** (0.03) | -0.036 (0.031) | 0.016 (0.03) | 0.17*** (0.03) | 0.22*** (0.04) | 0.04 (0.04) | 0.02 (0.04) | 0.19*** (0.04) |
| Exports | 0.07** (0.03) | 0.02 (0.04) | 0.04 (0.04) | 0.06 (0.04) | -0.01 (0.03) | 0.06 (0.036) | 0.04 (0.04) | 0.027 (0.04) | 0.06 (0.05) | -0.06 (0.043) |
| Imports | 0.02 (0.02) | -0.007 (0.03) | 0.026 (0.028) | -0.027 (0.03) | -0.065*** (0.03) | 0.013 (0.03) | -0.039 (0.04) | 0.017 (0.037) | -0.065 (0.05) | -0.036 (0.039) |
| Exports x MNC | 0.21*** (0.05) | 0.29*** (0.07) | 0.29*** (0.07) | 0.27*** (0.07) | 0.30*** (0.06) | 0.13* (0.07) | 0.09 (0.08) | 0.30*** (0.10) | 0.16 (0.11) | 0.15* (0.08) |

(Continues)

TABLE 5 (Continued)

| Sample Indicator | Full | | Full | | Full | | Man | | Man | | Man | |
|------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|-----|-------|--------|
| | Size | Age | prody | Export | Size | Age | Prody | Export | Size | Age | Prody | Export |
| Imports x MNC | 0.02 (0.04) | -0.22*** (0.06) | -0.05 (0.06) | 0.013 (0.05) | 0.03 (0.07) | -0.016 (0.08) | -0.23** (0.09) | -0.03 (0.10) | -0.06 (0.08) | | | |
| FVA_VA | 0.15 (0.27) | 1.03** (0.39) | -1.72*** (0.43) | -1.51*** (0.38) | -0.19 (0.45) | -0.46 (0.56) | -0.19 (0.59) | -4.05*** (0.75) | -3.09*** (0.66) | | | |
| FVA_VA x MNC x Exports | -0.39*** (0.12) | -0.84*** (0.19) | -0.49*** (0.17) | -0.54*** (0.14) | -0.47** (0.19) | -0.37* (0.21) | -1.28*** (0.28) | -0.26 (0.30) | -0.44** (0.20) | | | |
| FVA_VA x MNC x Imports | -0.65*** (0.10) | 0.10 (0.16) | -0.14 (0.15) | -0.57*** (0.14) | -0.80*** (0.19) | -0.85*** (0.22) | 0.73*** (0.27) | -0.30 (0.31) | -0.63*** (0.21) | | | |
| Observations | 7794 | 3874 | 3289 | 3355 | 3736 | 2213 | 2096 | 1477 | 2153 | | | |
| Wald Chi(2) | 5558.04 (0.00) | 5137.25 (0.00) | 4168.98 (0.00) | 6413.90 (0.00) | 2851.49 (0.00) | 2809.80 (0.00) | 2412.82 (0.00) | 2824.79 (0.00) | 3159.41 (0.00) | | | |

Note: Standard errors in parentheses. All standard errors are clustered at the country level. All results are from outcome equation of Heckman selection model. Selection equation contains control variables similar to Table 2 and dummy variables identifying the regions of the countries. Propensity scores on likelihood of being foreign owned prior to the pandemic are applied in estimating the outcome equation. Outcome equation also contains controls for firm size, age, and productivity. Columns labelled size, age, prody and export contain results for sub-samples of firms with above sample median levels of firm size, age, productivity and industry share in country-level exports.

* $p < .1$, ** $p < .05$, *** $p < .01$.



Next, panel B contains the findings from augmenting the model with the variable capturing the percentage share of foreign value added in exports. With the full sample of firms there is a positive effect of the interaction between foreign ownership and export intensity. In contrast to the estimations with high trade MNC—except for the sub-sample containing relative older firms—there is no evidence of a significant negative effect of the interaction between foreign ownership and import intensity.

Most of the significant effects concern the variables that relate to the extent of foreign value added in exports. In particular, the effect of the triple interaction between FVA_VA, foreign ownership and export intensity is negative and significant in all estimations, indicating that MNCs with a high export intensity operating in industries that are linked to global production networks experience a significantly smaller negative effect from the pandemic. A similar effect from importing appears to be important in the estimations for large firms and for firms operating in industries with a relative high export share. Looking at the results for manufacturing firms, the estimated effects of the interaction between MNC and export intensity and the triple interaction term between FVA_VA, MNC and export intensity are clearly confirmed; to an extent, the same applies to the interaction effect between FVA_VA, MNC and import intensity. Finally, irrespective of the sample, most of the results again indicate that the individual effect of foreign ownership is significant and positive, supporting the presence of a liability of foreignness effect.

5 | SUMMARY AND SUGGESTIONS FOR FURTHER RESEARCH

In this paper we provide an empirical microeconomic analysis of drivers of the short run impact of COVID-19. We use a multi-country firm-level data set from the WBES to examine whether and how foreign ownership, international trade and their interaction influence both the prevalence and the size of the impact of the pandemic on firm-level sales. As such, our paper also relates to the broader literature that examines whether MNCs differ from domestic firms regarding the impacts of and responses to negative economic shocks. MNCs may be better able to absorb the negative effects from the pandemic, as they are better equipped to engage in both product and market diversification. Also, they may benefit from stable trading relationships with other MNC affiliates and easier access to external finance. However, MNCs may also be impacted more strongly when the pandemic increases the importance of their liability of foreignness; also, the global reach of the effects of the pandemic may magnify the negative impact among trading MNCs.

Our results show that the short run impact of the pandemic has been large, both in terms of the number of firms that experienced a decrease in sales and the size of the sales decrease experienced by negatively affected firms. Our estimations on factors that influence the likelihood that a firm has been negatively impacted show that various firm-level characteristics are important, including firm size, age and productivity, as well as the level of stringency of government policymaking and the degree to which industries rely on external finance. As for the effects of foreign ownership and international trade, we identify a significant negative effect of an interaction term between foreign ownership and exporting, suggesting that MNCs that produce for international markets are able to lower the likelihood that they are negatively impacted by the impact of the pandemic. This estimated effect is robust to the use of a propensity score reweighting approach based on the likelihood that a firm was foreign owned prior to the start of the pandemic.

Turning to firm-level characteristics that influence the scale of the negative sales impact, our empirical results are more varied. Findings from a first set of estimations indicate that MNCs with a high level of import intensity are characterised by a smaller negative impact; however, MNCs with a

high level of export intensity experience a larger negative impact. Furthermore, MNCs operating in the manufacturing sector experience a significantly larger negative impact, suggesting the presence of a liability of foreignness effect among these firms. At the same time, manufacturing MNCs do appear to be able to lower the negative impact through their use of international input and export markets.

In a second set of estimations, we deploy various proxies of the extent to which MNCs are likely to be linked to international production networks. Adding a separate variable that identifies high trade MNCs generates results showing that trading manufacturing MNCs experience a smaller negative impact. High trade MNCs are the exception to this, as they experience a larger negative sales decrease. Findings from estimations with control variables that are more directly linked to international production networks show that trading MNCs that operate in sectors that are most strongly linked to such networks tend to experience smaller negative impacts. The results from these estimations consistently show that, after controlling for the effects of international trade and its interaction with foreign ownership, foreign ownership is positively associated with the size of the sales decrease, showing that the operations of MNCs are impacted by a liability of foreignness effect. This effect is the largest when conducting the estimations on sub-samples of firms operating in the manufacturing sector. Additional estimations on sub-samples of large, older and more productive firms (as well as firms operating in industries with a high export share) further confirm the effect that trading MNCs experience in industries that are linked to global production networks, as well as the presence of a liability of foreignness effect among the foreign-owned firms.

We see several avenues for further research. First, more research is required into the effects of international trade and how MNCs may be able to use their trade relationships to absorb negative economic shocks. For such research, it is important to be able to analyse trade statistics that contain more detail than levels of export and import intensity. In particular, information on the composition and relative importance of input and export markets—as well as the importance of the extent of trade between MNC affiliates—will allow for a better estimation of the effects of trade. Equally, more detailed trade statistics will help in further analysing why and how the participation of MNCs in international production networks can influence the impact of negative economic shocks.

Second, we believe that the effect of liability of foreignness needs further examination. Our results indicate that, compared with domestic firms, MNCs are disadvantaged when trying to absorb the effects of negative economic shocks. Compared with previous research that tries to identify the presence of liability of foreignness effects by comparing exit rates of foreign-owned and domestic firms we believe that our findings are more revealing, as they directly relate foreign ownership to the magnitude of the negative sales impact from the pandemic. One approach to obtain more insight into the effects of liability of foreignness may be to use information on cultural and economic differences between the home and host economies of MNCs and relate these differences to the size of the estimated positive effect of foreign ownership on the decrease in sales.

Finally, our analysis is focused especially on identifying the direct and short run impact of the pandemic. It is of course important to continue and examine the impact of the pandemic using a wider time horizon, to see whether the effects of foreign ownership persist or whether they peter out over time. Conducting the analysis for a longer period will also make it possible to start analysing what drives firm-level recovery and whether there are differences between MNCs and domestic firms in the speed and nature of their recovery. To do this, it is important to examine whether and how MNCs differ from domestic firms in how they respond to the pandemic in terms of their strategies and actions towards the size of their workforces, levels and types of investment, changes in export and import intensity and participation in support programmes. What our results do indicate is that such research needs to account for the fact that MNCs and domestic firms, in combination with international trade participation, appear to differ both in terms of the prevalence and the size of short-term



negative impacts, which subsequently will affect the strategies and actions that these firms take in their attempts to deal with the effects of the pandemic.

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CONFLICT OF INTEREST STATEMENT

None.

DATA AVAILABILITY STATEMENT

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SUPPORTING INFORMATION

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