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Firm internationalization and long-term impact of the Covid-19 pandemic

Viswanathan Nagarajan | **Prateek Sharma**

Finance and Accounting, Indian Institute of Management Udaipur, Udaipur, India

Correspondence
Viswanathan Nagarajan, Finance and Accounting, Indian Institute of Management Udaipur, Balicha, Udaipur, India.
Email: n.viswanathan@iimu.ac.in

We infer market expectations regarding the relationship between firm internationalization and the long-term impact of the Covid-19 pandemic by using a novel approach to decompose global stock prices into their short- and long-term value components. In general, firms with a greater proportion of foreign assets show greater losses in the long-term value component, suggesting investor expectations of higher supply-chain restructuring costs for such firms. Also, investors appear to have priced in the likely permanent benefits of such restructuring for firms from emerging Asian economies, as these economies may be well-placed as alternative sourcing bases to China.

1 | INTRODUCTION

The Covid-19 pandemic has had a significant negative impact on global economic activity and global supply chains. The World Economic Outlook update published in June 2020 by the International Monetary Fund projects a 4.9% decline in global GDP in 2020 (IMF, 2020). World merchandise trade volumes are expected to be at least 13% lower during 2020 compared to 2019 (WTO, 2020). Although global economic output and supply chain performance are expected to recover to prepandemic levels in course of time, other long-term consequences of the pandemic are less clear. The initial supply shock originating in China and the subsequent demand shock caused by worldwide lockdowns highlighted vulnerabilities in global supply chains and production strategies (Shih, 2020). This could make economic agents reassess risks inherent in global supply chains and result in a long-term impact on globalization trends. Against the backdrop of a slowdown in globalization after the global financial crisis and recent geopolitical developments like Brexit and the United States–China trade war, a pandemic-driven impact on global supply chains could have wide-ranging consequences for the world economy and globalization. In this paper, we estimate changes in the long-term components of equity values of firms across multiple countries and industries after the pandemic set in. We then relate these changes to measures of firm internationalization to test whether investors expect the pandemic to have lasting effects on global supply chains, and examine the value implications of such effects.

The world economy became increasingly globalized over the 19th and 20th centuries. After a decline during the first half of the 20th century, international trade has seen a consistent upward drift until recently (Altman & Bastian, 2019). Foreign direct investment (FDI) as a percentage of world GDP has also risen consistently since the 1980s (Altman & Bastian, 2019). Although there are many barriers to integration of economies, long-term trends in trade, capital flows, labor movements, and knowledge transfers show clear increases in globalization (Ghemawat, 2003). Firms increasingly structure their operations as global value chains, of which China-based operations are a significant part (Buckley, 2016). However, the period since the global financial crisis has witnessed some slowing in globalization (Claessens & Van Horen, 2015; Van Bergeijk, 2019). Global imports of goods and services peaked at 30.2% of GDP in 2007; similarly, global FDI peaked at a weighted average of 5.3% of GDP in 2007 (Witt, 2019). Multiparameter measures like the DHL Connectedness Index[1] (Altman & Bastian, 2019) and the KOF Globalization Index[2] (Gygli et al., 2019) also indicate a slowdown in globalization growth after the crisis.

This slowing in globalization has been attributed to various reasons. The global financial crisis led to a decline in labor costs in developed economies, causing multinational enterprises (MNEs) to backshore[3] operations to their home countries (Delis et al., 2019). MNEs may also backshore under such conditions to fulfill their corporate social responsibility (CSR) obligations and to satisfy home country political establishments (Delis et al., 2019). Further, digitalization-

based developments in manufacturing technology have enabled the fourth industrial revolution (or Industry 4.0). This has led to improvements in manufacturing costs, flexibility, and quality, thereby providing an added incentive for backshoring (Ancarani et al., 2019; Backer & Flaig, 2017; Dachs et al., 2019; Economist, 2020b; Seric & Winkler, 2020). In recent years, public opinion against globalization and immigration has also increased (Witt, 2019). Nationalist sentiment and populist government in various countries have manifested themselves in actions like Brexit and the United States–China trade war (Delis et al., 2019; Economist, 2020b; Witt, 2019).

It is against this backdrop that the Covid-19 pandemic has now affected global supply chains and capital flows. World merchandise trade volumes declined by about 17% during the first 5 months of 2020 (CPB, 2020). The World Trade Organization (WTO) which initially forecast a 13%–32% drop in global merchandise trade during 2020 now finds the optimistic outcome more likely and expects recovery to the prepandemic trend by 2021 (WTO, 2020). Worse hit is global FDI which is projected to fall by 40% in 2020–2021 and start recovering only by 2022 (UNCTAD, 2020). Would these declines be temporary with globalization and global supply chains returning to prepandemic levels once the pandemic is controlled? Or would the pandemic leave a lasting impact on them? This is the question we explore in this paper.

Witt (2019) points out that globalization trends are determined not only by actions of sovereign countries; they are also determined by individuals, firms, international organizations, and other nonstate actors. Thus, supply chain restructuring could be a consequence of actions initiated by countries, perhaps under the influence of other economic agents like citizens, firms, and nongovernmental organizations. But such restructuring may also be more directly a result of decisions taken by firms to backshore and/or reshore. Kedia and Mukherjee (2009) theorize that for offshoring, firms need to perceive value in disintegrating their value chains and relocating some activities to other geographies. Further, even when they choose to offshore an activity, firms decide whether to keep the activity captive or outsource it to an external agency. The internalization theory of globalization posits that firms trade off production cost advantages against the transaction costs involved in governing a value chain where certain components are external to the firm (Buckley, 2016). When faced with exogenous operational challenges, firms often opt to relocate (Manning, 2014). Firms can seek to gather more information regarding such potential challenges; however, some uncertainties may not permit enough prior knowledge (Buckley, 2016) and firms may change their risk preferences as more information becomes available (Buckley & Strange, 2011).

Globalization is associated with an increased risk of supply chain disruptions (Amankwah-Amoah & Wang, 2019; López & Ishizaka, 2019) and the pandemic has highlighted this. Firms may therefore respond by diversifying production, sourcing, and logistics (Caligiuri et al., 2020; Sharma et al., 2020) and reducing exposure to specialized assets overseas (Verbeke, 2020). This may imply the initiation of measures like backshoring and reshoring, even though such strategies might result in higher input costs and lower productivity (Bertasiute et al., 2020). These decisions may also be prompted by public opinion, political pressure, and government action. The pandemic has increased pressures for governments to take steps to mitigate supply chain disruptions (Seric et al., 2020) and increase domestic employment (Faiola, 2020).

In the words of Carmen Reinhart, Chief Economist of the World Bank, "the 2008-2009 crisis gave globalization a big hit, as did Brexit, as did the US-China trade war, but Covid is taking it to a new level" (Ward, 2020, May 21). But there are contrary views too. Altman (2020) believes that globalization and anti-globalization pressures will coexist and globalization gains made over the last seven decades will largely survive, particularly because more globalized economies enjoy better economic growth. He also argues that trends like e-commerce and remote working that the pandemic has necessitated may even aid the cause of offshoring and trade in goods and services. As Richard N. Haass, President of the Council on Foreign Relations of the World Economic Forum argues, "Globalization is not a problem for governments to solve; it is a reality to be managed" (Haass, 2020).

Estimating long-term effects of the pandemic on the various globalization metrics like trade and capital flows requires data that will not be available for some time to come. Instead, we rely on signals provided by equity markets to get early indications of potential effects of the pandemic on global supply chains and thereby, on globalization. Supply chain disruptions are known to adversely impact shareholder wealth (Hendricks & Singhal, 2003, 2005), and it would be reasonable to expect similar observations consequent to the pandemic. But what we seek to understand is if any part of this impact relates to the long-term component of firm values, as against the short-term impact that results from weak firm performance during the period of the pandemic. We develop a novel approach to decompose the equity values of firms into their short-term and long-term components by adapting the standard implied cost of equity models and apply this approach to our sample.

We then study the changes in the long-term components of the equity values of firms between December 2019 and June 2020. The intervening period from January to May 2020 was when the disease spread across various geographies and includes the date of formal announcement of the pandemic by the Director-General of the World Health Organization (WHO; Ghebreyesus, 2020). We interpret the changes in the long-term component of equity value as market expectations of the long-term economic consequences of the pandemic. Thereafter, we examine whether the changes in value are related to the degree of internationalization of a firm.

We find that changes in the long-term component of equity value vary across economic regions and industries. Also, there are regional variations in the performances of industries. While industries like healthcare services and equipment, pharmaceuticals and medical research, and food and drug retailing performed relatively well across regions, sectors like automobiles, mineral resources, real estate, banking and investment services, and fossil fuels performed relatively poorly across regions. Ceteris paribus, firms with greater proportions of foreign assets, suffered larger losses to the long-term components

of their value. We attribute this to the higher costs they would incur for restructuring their supply chains. In contrast, firms with greater proportions of foreign sales suffered lower losses to the long-term components of their value. This may be on account of the greater ability of such firms to weather recessionary conditions as geographic market diversification provides more stability in revenues and insulation from the impact of the pandemic.

We also study how the relations between internationalization indicators and changes in equity value vary across four major economic regions—the United States, Japan, China, and Emerging Asia (excluding China). The relationship between the proportion of foreign assets and change in the long-term component of equity value is negative across all regions, although it is not statistically significant for Chinese firms. Further, we find that the positive relation between the proportion of foreign sales and the change in long-term component of equity value is statistically significant only for firms belonging to emerging Asian economies. We suggest that this is because firms from these economies are more likely to benefit from restructuring of global supply chains as these economies may be well-placed as alternative sourcing bases to China; and among these firms, those that already have significant foreign sales are better positioned to capitalize on such opportunities. The relation between changes in the long-term component of value and firm internationalization cannot be explained by the standard determinants of equity returns, or industry-specific or region-specific shocks. The results are also robust to potential endogeneity concerns.

This paper extends the nascent literature that studies the economic consequences of the Covid-19 pandemic. Also, it contributes to the stream of international business literature which explores emerging trends in globalization and management of supply chain risks. We use changes in equity valuations to evaluate market expectations about the economic impact of the Covid-19 pandemic on businesses, and how this impact varies across different regions and industries. We also examine whether the degree of firm internationalization explains the changes in valuation. From a methodological perspective, this paper proposes a novel approach to decompose equity values into their short- and long-term components by extending well-established implied cost of equity models used in the accounting and finance literature. This approach allows us to distinguish businesses on which the pandemic's impact is likely to be transient from those that are likely to experience a more persistent impact.

The rest of the paper is structured as follows. In Section 2, we present relevant theory and hypotheses. In Section 3, we describe the data, and in Section 4, we outline the methodology used in this analysis. In Section 5, we present and discuss our results. Section 6 concludes.

2 | THEORY AND HYPOTHESIS DEVELOPMENT

Supply chain disruptions are a major source of business risk and owing to globalization and offshoring, modern supply chains are more susceptible to disruption (Amankwah-Amoah & Wang, 2019). The risks in tightly integrated global supply chains can be accentuated by major geo-political, weather, and health-related events because events which affect one part of the supply chain have repercussions in other parts (Manuj & Mentzer, 2008). Offshoring results in relatively inflexible and financially inefficient supply chains, which are less resilient to disruptions (López & Ishizaka, 2019).

With adequate foresight, firms would accurately factor in the likelihood of uncertain events like pandemics when designing their global supply chains. However, although firms do address uncertainty by gathering information on the probability distribution of the risks and using such knowledge for decision-making, some uncertainties are unknowable ex ante (Buckley, 2016). Moreover, as conditions change and new information becomes available, managers and consequently firms may change their risk preferences (Buckley & Strange, 2011). Entrepreneurs too respond to environmental uncertainty by modifying the scope of the firm and changing the way they do business (Reymen et al., 2015). Finance literature shows that prolonged periods of stability in financial markets can result in increased risk-taking (Danielsson et al., 2018), and crises provide investors with "wake-up calls" which make them reassess expectations (Bekaert et al., 2014).

The Covid-19 pandemic may have resulted in reassessments by firms of risks inherent in their supply chains (Seric et al., 2020). This could make firms take long-term measures to modify their global value chains by diversifying production, sourcing, and logistics (Caligiuri et al., 2020; Sharma et al., 2020). The higher level of uncontrollable risk highlighted by the pandemic may cause firms to reduce investments in specialized assets overseas (Verbeke, 2020), through the exercise of strategic choices like backshoring and reshoring. Although firms with offshored operations have the option of responding to operational challenges by mitigating or tolerating them, they often choose the relocation option especially when the challenge is exogenous (Manning, 2014). Firms would restructure their supply chains if they estimate that the cost of these measures is lower than the cost of uncertainties and disruption associated with continuation of their existing supply chain structures (Kedia & Mukherjee, 2009). They may also reevaluate decisions to outsource activities based on the trade-off between production cost advantages of outsourcing and the transaction costs involved in governing a value chain where certain components are external to the firm (Buckley, 2016).

Reorganization of supply chains by firms can also be expected as a result of public opinion, political pressure, and government action (Delis et al., 2019). The pandemic has resulted in calls for governments to protect value chains, reduce dependency on offshoring, and bring jobs back home (Faiola, 2020; Seric et al., 2020). Countries which have initiated steps in this direction include EU members, India, Japan, and the United States (Economist, 2020b). For instance, Japan announced subsidies for firms that would backshore production facilities (Denyer, 2020). Many countries have also announced measures to guard against acquisition of firms by foreign investors (Economist, 2020a). A case in point is the amendment to Germany's

Foreign Trade and Payments Ordinance tightening notification requirements for acquisition of substantial stakes by foreigners in the German healthcare sector.

Contrary to the above, some researchers have also argued that when faced with an exogenous shock, persevering with a well-considered existing strategy is preferable to changing strategic direction (Li & Tallman, 2011; Wenzel et al., 2020). Significant organizational changes implemented following economic crises could prove counter-productive as the firm may not be able to handle this additional complexity at a time when it also has to deal with other challenges thrown up by the crisis (Chakrabarti, 2015). So it is also possible that firms may opt not to make long-lasting modifications to their supply chains following the pandemic.

If reconfiguration of its supply chain is the preferred response of a firm to the pandemic, exercising this option would require the firm to incur certain costs. The costs involved could relate to factors such as wages, labor productivity, taxes, customs duties, currency fluctuations, and shipping (Chen & Hu, 2017; Tate et al., 2014). Apart from these recurring cost implications, supply chain restructuring also involves one-time costs of switching and set-up (Brandon-Jones et al., 2017; Tate et al., 2014). These costs would result in a decrease in the value of the firm relative to the pre-pandemic scenario.

We expect that the pandemic would result in considerable changes to the global supply chains of firms and these changes would have material impact on their valuations. In particular, firms which have more foreign assets would incur greater one-time and recurring costs for reconfiguring their supply chain and would therefore suffer a greater value loss. This value loss would not pertain only to the period when the pandemic continues; it would also affect firms in the long term. Based on the foregoing discussion, we propose the following hypothesis.

Hypothesis 1. Firms having a high ratio of foreign assets to total assets would suffer higher losses in the long-term component of their value than similar firms having a low ratio of foreign assets to total assets.

The ratios of foreign assets to total assets and foreign sales to total sales are widely used as measures of the degree of firm internationalization (see, for example, Marshall et al. (2020); Ruigrok et al. (2007)). Although the former captures the reliance of the firm on foreign resources, the latter captures reliance on foreign consumer markets (Attig et al., 2016; Sanders & Carpenter, 1998; Sullivan, 1994). Foreign assets of a firm may relate at least partly to its global supply chain from which it sources goods or services to serve its markets elsewhere, but foreign sales are an indicator of the extent to which the firm's sales are globally diversified.

Corporate diversification across industries has traditionally been viewed as value destructive (Berger & Ofek, 1995; Comment & Jarrell, 1995; Lang & Stulz, 1994). However, recent evidence suggests that diversified firms are better-positioned to weather recessionary conditions, both due to their better access to internal and external capital markets and the improved efficiency of their internal capital markets during recessions (Gopalan & Xie, 2011; Hovakimian, 2011; Kuppuswamy & Villalonga, 2016). During economic downturns, diversified conglomerates gain value relative to comparable focused firms (Kuppuswamy & Villalonga, 2016), especially when the conglomerates are based in regions with more developed capital markets (Rudolph & Schwetzler, 2013). Though less studied than industrial diversification, the findings regarding global diversification are also similar. Globally diversified firms display a valuation discount relative to single-country firms (Denis et al., 2002), but this discount decreases in recessionary conditions (Volkov & Smith, 2015). They are also more capable of riding out recessions without divesting their international assets (Hitt et al., 2016).

Therefore, we expect that firms with more globally diversified sales would be less affected by the pandemic, especially if they hail from emerging economies. Consequently, the long-term component of value would grow more (or show smaller losses) for firms which have more foreign sales in their revenue portfolio. This leads us to our second hypothesis.

Hypothesis 2. Firms having a high ratio of foreign sales to total sales would enjoy higher gains in the long-term component of their value than similar firms having a low ratio of foreign sales to total sales.

3 | DATA

Our initial sample comprises all publicly listed firms available on the Thomson Reuters Datastream database from the four regions considered in our analysis—the United States, Japan, China, and Emerging Asia (excluding China). We use the S&P Dow Jones Indices' 2018 Country Classification to identify emerging market countries within Asia and drop those countries which have fewer than 30 firms that meet all the data requirements (described below). We believe that these regions provide us a good setting for the study. The United States and Japan are developed economies which are home to many globalized firms as also large consumer markets which rely on global supply chains. Chinese firms are a key component of the supply chains which feed these developed economies, whereas Emerging Asia (excluding China) comprises countries which could be alternative sourcing bases to China and therefore could be expected to benefit from any reconfiguration of global supply chains.

For each firm, over the period from October 1, 2019, to June 30, 2020, we collect daily data on stock prices, I/B/E/S analyst consensus forecasts of earnings for financial years 2020 and 2021 (EPS_1 and EPS_2), forecasts of long term earnings growth (*LTG*), stock beta, stock momentum, size, and ratio of book value of equity to market value of equity. Stock betas are estimated by regressing stock returns against returns of the corresponding market index for the past 60 months. Stock momentum is measured as the trailing 12-month return skipping the most recent month. Size is the logarithm of market value of equity. We exclude those firms for which any one of these variables is not available. Industries are classified based on the four-

TABLE 1 Descriptive statistics

Panel A: Distribution of sample firms across regions			
Region	**Return**	**Std Dev**	***N***
Japan	−9.130	23.565	989
United States	−10.358	28.195	1396
China	15.783	37.042	1104
Emerging Asia (ex-China)	−9.652	31.699	966

Panel B: Country-wise distribution in Emerging Asia (ex–China) region			
Country	**Return**	**Std Dev**	***N***
India	−13.321	27.522	407
Indonesia	−26.65	15.481	66
Malaysia	−4.353	50.703	162
Philippines	−24.086	19.188	33
Taiwan	2.713	24.702	183
Thailand	−9.907	20.064	115

Panel C: Equality tests for mean returns across regions		
	Statistic	***p* value**
F test	194.9	(0.000)
Kruskal–Wallis test	578.73	(0.000)

Panel D: Pairwise comparison of returns across regions		
	Difference	***p* value**
Emerging Asia (ex–China)-China	−25.434	(0.000)
Japan-China	−24.912	(0.000)
United States-China	−26.141	(0.000)
Japan-Emerging Asia (ex–China)	0.522	(0.982)
United States-Emerging Asia (ex–China)	−0.706	(0.946)
United States-Japan	−1.228	(0.767)

Panel E: Distribution of sample firms across industries			
Industry	**Return**	**Std Dev**	***N***
Applied resources	−7.434	22.723	56
Automobiles and auto parts	−12.691	22.855	151
Banking and investment services	−22.859	18.274	419
Chemicals	2.605	32.169	221
Cyclical consumer products	−4.503	35.101	250
Cyclical consumer services	−13.121	30.328	201
Energy—fossil fuels	−24.720	15.458	81
Food and beverages	5.337	27.904	223
Food and drug retailing	7.442	30.447	66
Healthcare services and equipment	16.921	57.661	176
Industrial and commercial services	−7.773	29.874	315
Industrial goods	−3.155	28.649	432
Insurance	−14.203	23.523	75
Mineral resources	−8.922	26.907	152
Personal and household products and services	0.767	28.827	84
Pharmaceuticals and medical research	22.694	38.985	167
Real estate	−15.017	25.604	220
Retailers	−3.150	33.354	162
Software and IT services	11.079	33.128	315
Technology equipment	5.009	31.588	391
Telecommunications services	6.788	34.610	33
Transportation	−11.323	18.610	132
Utilities	−7.011	16.244	133

Panel F: Equality tests for mean returns across industries		
	Statistic	***p* value**
F test	29.91	(0.000)
Kruskal–Wallis test	760.31	(0.000)

Panel G: Variance in firm returns explained by region and industry effects			
	Region effects	**Industry effects**	**Region × industry**
F statistic	231.62	31.535	3.515
(*p* value)	(0.000)	(0.000)	(0.000)
% Variance explained	11.612%	11.590%	3.885%

Note. This table reports the descriptive statistics for the stock returns of the sample firms for the period from December 31, 2019 to June 30, 2020. In each row of Panels A, B, and E, "N" denotes the number of firms. "Return" and "Std Dev" denote the average stock returns and standard deviation of stock returns for these firms. Panel C (F) reports two equality tests (*F* test and Kruskal–Wallis test) with the null hypothesis that mean returns of all regions (industries) are equal. Panel D reports the pairwise differences in mean returns across regions and their statistical significance measured using Tukey's HSD test. Panel G reports results for a two-way ANOVA model where the dependent variable is firm-level stock returns and explanatory variables are region effects, industry effects, and their interactions.

digit level of the Thomson Reuters Business Classification (TRBC) scheme and we drop those industries which have less than 30 firms.

The equity value decomposition we carry out (described in Appendix S1) requires the cost of equity as an input. We use four implied cost of equity models which are widely used in the accounting and finance literature (described in Appendix S2). Some additional constraints on our sample firms are required to implement these models. Following earlier literature (e.g., Boubakri et al. (2014); Cao (2017); El Ghoul et al. (2011)), we consider only firms with a positive book value of equity and for which $EPS_2 > EPS_1 \geq 0$. Although the condition that EPS_2 be greater than EPS_1 is required for implementing the Ohlson and Juettner-Nauroth (2005) and Easton (2004) models, the requirement of positive initial book value is required for implementation of the Claus and Thomas (2001) and Gebhardt et al. (2001) models.

After applying these filters, we are left with a sample of 4455 firms from nine countries and across 23 industry sectors. The

distribution of sample firms across regions is reported in Panels A and B of Table 1, and the distribution of sample firms across industries is reported in Panel E of Table 1.

4 | METHODOLOGY

Our empirical approach is based on studying changes in the values of stocks after the pandemic established itself and relating these changes to measures of internationalization of firms. By doing so, we aim to decipher market opinion regarding the likely impact of the pandemic on global supply chains. However, a conventional study of changes in the prices of stocks may be insufficient for the purpose since any changes we observe could merely be due to the immediate demand-side and supply-side shocks caused by the pandemic. If these shocks are transient, then corporate earnings will recover as the pandemic subsides such that there will be no lasting effect on the long-term earning potential of businesses. In contrast, more persistent effects, such as a permanent decline in global trade and reconfiguration of global supply chains, are likely to affect the long-term earnings potential of businesses.

To examine the market's expectations regarding the short- and long-term effects of the pandemic on corporate earnings, we decompose the values of stocks into components contributed by earnings expected in the short-term and in the long-term. We define the short-term component of equity value as the value which is derived from the expected earnings for the years 2020 and 2021. The remainder, that is, equity value derived from all expected earnings after 2021, is considered as the long-term component. We use this definition since as per the latest available forecasts, global trade and world GDP are expected to recover to pre-pandemic levels by the end of 2021. The World Trade Organization (WTO) which initially forecast a 13%–32% decline in global merchandise trade during 2020 later opined that the optimistic outcome was more likely and that recovery to the pre-pandemic trend could happen by 2021 (WTO, 2020). The World Economic Outlook update published in June 2020 by the International Monetary Fund projected a 4.9% decline in global GDP in 2020, followed by a growth of 5.1% in 2021 (IMF, 2020). Therefore, any effect observed in the value component relating to the period after 2021 is less likely to be related to the immediate disruptive effect of the pandemic on firm performance.

Given the uncertainty in these economic forecasts, the definition of the short-term component of equity value is somewhat arbitrary. We therefore use two alternative definitions of the short-term component—the value derived from expected earnings in year 2020 alone, and the value derived from expected earnings in the years 2020 through 2022. The decompositions of equity value using these alternative specifications yield qualitatively similar results (results available on request).

4.1 | Decomposition of value

We implement the decomposition of stock values by estimating the present value of the stream of dividends generated from the expected earnings of a particular future year. This stream includes the dividend that directly pertains to that year's earnings and all subsequent dividends generated by reinvesting some portion of that year's earnings. We provide a detailed description of the method used for equity value decomposition in Appendix S1. For discounting the stream of dividends, we require an estimate of the cost of equity of the sample firm. We obtain this by using well-established models which estimate the cost of equity implied by prevailing stock prices considered in conjunction with analyst forecasts of earnings per share. The models we use include those of Easton (2004), Ohlson and Juettner-Nauroth (2005), Gebhardt et al. (2001), and Claus and Thomas (2001), and we provide details on the implementation of these models in Appendix S2.

We use stock price data for the period from October 1, 2019, to December 31, 2019, to estimate implied cost of equity using each of the four models mentioned above. This period is suitable as an estimation period because it was shortly before the pandemic. We calculate implied cost of equity for every day when the stock was traded during the estimation period and use the average of these implied cost of equity estimates for value decomposition. Further, although supply chain disruptions result in an increase in total equity risk, they do not have a significant impact on systematic equity risk (Hendricks & Singhal, 2005), which is directly relevant to cost of equity. Even when costs of equity have increased during financial crises, such increases have been temporary (Boubakri et al., 2010; Breuer et al., 2018). Therefore, the implied cost of equity during the period immediately prior to the pandemic may be a good estimate of the cost of equity after its onset.

4.2 | Changes in components of equity value

For each stock, we estimate cost of equity using each of the four models—Ohlson and Juettner-Nauroth (2005), Easton (2004), Claus and Thomas (2001), and Gebhardt et al. (2001) For each stock, we do the value decompositions for every day from December 1, 2019, to December 31, 2019, (hereafter referred to as the pre-COVID period) and for every day from June 1, 2020, to June 30, 2020, (hereafter referred to as the post-COVID period). For each of the two periods, we calculate for each stock the average total value (i.e., average price) across all days for which observations are available. We do similarly for the short- and long-term components of value. We calculate the changes in total value, short-term component of value, and long-term component of value as given below.

$$Change_{Total_k} = \frac{P_{Post_k}}{P_{Pre_k}} - 1;\ Change_{STC_k} = \frac{STC_{Post_k}}{STC_{Pre_k}} - 1;\ \text{and}$$

$$Change_{LTC_k} = \frac{LTC_{Post_k}}{LTC_{Pre_k}} - 1.$$

Change refers to change in the relevant component of value in the post-COVID period over the pre-COVID period, *P* refers to average price, *STC* to the average short-term component of value, and

LTC to the average long-term component of value. The subscripts *Pre* and *Post* refer to the pre-COVID and post-COVID periods, respectively, and the subscript *k* refers to the stock.

An alternative approach could be to estimate *Change* variables from December 31, 2019, to June 30, 2020. This approach is likely to be more sensitive to any stock-specific shocks observed on these two cutoff dates. Nevertheless, to check the robustness of our results, we estimate *Change* variables using this alternative approach and the results remain qualitatively similar to our original results.

4.3 | Regressions

We estimate the following model to measure the effects of firm internationalization on the change in long-term component of equity value.

$$\begin{aligned}\text{Change}_{\text{LTC}_k} = {} & \beta_0 + \beta_1.\text{FATA}_k + \beta_2.\text{FSTS}_k + \beta_3.\text{Beta}_k + \beta_4.\text{Size}_k \\ & + \beta_5.\text{Book}-\text{to}-\text{Market}_k + \beta_6.\text{Momentum}_k \\ & + \beta_7.\text{Industry Effects} + \beta_8.\text{Region Effects} \\ & + \beta_9.\text{Country Effects} + \in_k,\end{aligned}$$

where the subscript *k* stands for the firm. Based on our hypotheses, the independent variables of interest are *FATA*, the ratio of foreign assets to total assets, and *FSTS*, the ratio of foreign sales to total sales. We run regressions using both the independent variables separately as well as jointly. We also run similar regressions using $Change_{Total_k}$ as the dependent variable. All models are estimated using robust regression to mitigate the effect of outliers. We also run instrumental variable regressions to address the possibility of endogeneity.

We control for parameters which are known to be related to stock returns, namely the beta of the stock (*Beta*), the natural logarithm of the firm's market capitalization (*Size*), the book-to-market equity ratio (*Book – to – Market*), and the returns on the stock in the previous 12 months skipping the most recent month (*Momentum*). All these variables were measured as at December 31, 2019. We also control for the industry, country, and region fixed effects. The industry classification is based on 4-digit TRBC codes. The TRBC is robust in the sense that the price movements of securities within the same group show statistically significant correlations at all hierarchical levels (Horrell & Meraz, 2009). Also, the classification has been used widely in literature (e.g., Adachi-Sato and Vithessonthi (2019); Bertoni and Lugo (2018); Roulet and Touboul (2015)).

TABLE 2 Mean returns across region-industry groups

	Returns from December 31, 2019, to June 30, 2020				Relative ranking of industries			
Industry	Japan	United States	China	Emerging Asia (ex–China)	Japan	United States	China	Emerging Asia (ex–China)
Applied resources	−7.617	−14.686	19.709	−20.709	10	14	8	20
Automobiles and auto parts	−22.790	−18.043	9.998	−19.637	21	18	15	17
Banking and investment services	−14.243	−26.089	−8.662	−24.532	17	22	21	22
Chemicals	−5.878	−14.922	18.701	0.270	7	15	10	5
Cyclical consumer products	−15.944	−9.582	9.797	−9.706	19	10	16	11
Cyclical consumer services	−13.516	−19.909	17.254	−29.033	16	20	11	23
Energy—fossil fuels	−23.704	−35.085	−18.503	−20.004	22	23	23	19
Food and beverages	−3.598	−1.256	27.227	−6.707	6	7	4	8
Food and drug retailing	5.152	0.486	23.483	−4.333	3	6	5	6
Healthcare services and equipment	−1.100	2.947	68.324	40.211	5	5	1	1
Industrial and commercial services	−9.573	−13.204	11.023	−14.827	12	13	14	16
Industrial goods	−15.465	−15.722	18.725	−4.837	18	16	9	7
Insurance	−10.388	−16.079	−16.684	−9.516	14	17	22	10
Mineral resources	−26.917	−18.625	3.233	−13.861	23	19	18	15
Personal products and services	−8.144	−3.733	30.512	−11.393	11	8	3	14
Pharmaceuticals and medical research	8.854	3.637	38.528	24.644	2	2	2	2
Real estate	−19.440	−21.310	5.226	−23.434	20	21	17	21
Retailers	−7.320	−5.272	15.125	−10.353	9	9	12	12
Software and IT services	4.984	16.256	21.543	−10.784	4	1	6	13
Technology equipment	−11.726	3.091	21.011	1.387	15	4	7	4
Telecommunications services	10.958	3.157	11.059	4.067	1	3	13	3
Transportation	−10.186	−9.854	−6.339	−19.672	13	11	20	18
Utilities	−6.025	−12.104	0.737	−7.471	8	12	19	9

5 | RESULTS AND DISCUSSION

Table 1 reports the descriptive statistics for the stock returns of our sample firms over the period from December 31, 2019, to June 30, 2020. Panel A presents the region-wise distribution of the sample firms, and Panel B shows the country-wise distribution of firms within the Emerging Asia (excluding China) region. Except for China, the stock prices declined on average in all regions. All countries in the Emerging Asia (excluding China) region show negative returns except Taiwan which by virtue of its wage levels, industry focus, and export intensiveness, could be considered distinct from other countries in the grouping. Nevertheless, we consider Taiwan within the Emerging Asia (excluding China) region based on the S&P Dow Jones Indices' 2018 Country Classification. Our results remain consistent if we exclude Taiwanese firms from the Emerging Asia (excluding China) region.

The *F* test and Kruskal–Wallis test results reported in Panel C show that the average stock returns are statistically different across the four regions. Panel D reports pairwise comparisons of regions using Tukey HSD tests. We observe that it is only for China that the average returns are significantly higher than each of the other three regions; average returns in the other regions are statistically indistinguishable from each other. Panel E presents the distribution of the sample firms across industries. As may be expected, average stock returns over the period differ across industries (Panel F). Overall, region and industry effects explain over 27% of total variance in stock returns (Panel G). Also, the interaction of region and industry is statistically significant which shows that there are regional variations in the performance of industries.

A closer look at interindustry variation across the four regions (Table 2) reveals that industries like healthcare services and equipment, pharmaceuticals and medical research, and food and drug

TABLE 3 Effect of internationalization on shareholder value

	Change in long-term component of value				Change in total value
Dependent variable	**Easton (1)**	**OJN (2)**	**GLS (3)**	**CT (4)**	**(5)**
Foreign assets/total assets	−14.555*** (−4.122)	−14.342*** (−4.067)	−15.024*** (−4.133)	−14.114*** (−3.949)	−12.185*** (−4.097)
Beta	−13.132*** (−9.721)	−12.747*** (−9.448)	−13.098*** (−9.419)	−13.221*** (−9.670)	−12.363*** (−10.865)
Size	0.669** (2.349)	0.719** (2.530)	0.736** (2.512)	0.758*** (2.631)	0.705*** (2.939)
Book to market	−4.239*** (−4.104)	−4.520*** (−4.381)	−4.425*** (−4.161)	−4.128*** (−3.948)	−3.018*** (−3.469)
Momentum	11.061*** (9.701)	10.991*** (9.652)	10.661*** (9.082)	10.959*** (9.496)	12.331*** (12.839)
Intercept	9.945** (2.052)	9.543** (1.971)	11.195** (2.243)	9.699** (1.977)	10.111** (2.476)
Number of firms	2802	2802	2802	2802	2802
Panel B: Regression of change in value on the ratio of foreign sales to total sales					
Foreign sales/total sales	−0.302 (−0.189)	−0.129 (−0.081)	−0.398 (−0.241)	−0.225 (−0.138)	−0.054 (−0.040)
Beta	−12.516*** (−9.314)	−12.200*** (−9.081)	−12.385*** (−8.916)	−12.475*** (−9.127)	−11.918*** (−10.461)
Size	0.026 (0.092)	0.072 (0.256)	0.024 (0.082)	0.072 (0.253)	0.125 (0.526)
Book to market	−6.391*** (−6.312)	−6.624*** (−6.543)	−6.293*** (−6.012)	−6.353*** (−6.167)	−5.113*** (−5.956)
Momentum	10.333*** (10.651)	10.309*** (10.628)	10.311*** (10.281)	10.153*** (10.287)	11.694*** (14.217)
Intercept	20.757*** (4.605)	20.227*** (4.488)	20.966*** (4.500)	21.077*** (4.597)	19.388*** (5.073)
Number of firms	3644	3644	3644	3644	3644
Panel C: Regression of change in value on both internationalization variables					
Foreign assets/total assets	−17.446*** (−4.260)	−17.645*** (−4.294)	−17.459*** (−4.122)	−17.099*** (−4.110)	−15.016*** (−4.326)
Foreign sales/total sales	3.495* (1.677)	3.806* (1.820)	3.145 (1.459)	3.594* (1.698)	3.499** (1.981)
Beta	−13.102*** (−9.511)	−12.669*** (−9.164)	−12.919*** (−9.066)	−13.228*** (−9.452)	−12.338*** (−10.566)
Size	0.501* (1.707)	0.561* (1.904)	0.574* (1.891)	0.594** (1.990)	0.566** (2.275)
Book to market	−4.404*** (−4.193)	−4.715*** (−4.473)	−4.610*** (−4.243)	−4.322*** (−4.050)	−3.106*** (−3.488)
Momentum	10.819*** (9.348)	10.707*** (9.219)	10.410*** (8.695)	10.691*** (9.092)	12.159*** (12.394)
Intercept	10.289** (2.066)	9.718* (1.945)	10.870** (2.110)	10.081** (1.993)	10.254** (2.429)
Observations	2802	2802	2802	2802	2802

Note. This table reports regression coefficients, and the corresponding *t*-statistics are presented in parentheses below the coefficients. All regression models are estimated with region, country, and industry fixed effects that are not reported for brevity. "Easton," "OJN," "GLS," and "CT" refer to value decompositions done using implied costs of equity as estimated using the Easton (2004), Ohlson and Juettner-Nauroth (2005), Gebhardt et al. (2001), and Claus and Thomas (2001) models respectively.

*Statistical significance at 10% level.

**Statistical significance at 5% level.

***Statistical significance at 1% level.

retailing performed relatively well across regions. These are sectors that either became more relevant due to the pandemic or continued to maintain their relevance for consumers despite the pandemic. At the other end are sectors like automobiles, mineral resources, real estate, banking and investment services, and fossil fuels which performed relatively poorly across regions.

We now turn to our main hypotheses regarding the relationships between measures of firm internationalization and stock returns after the onset of the pandemic. In Panels A and B of Table 3, we present results from regressions of stock returns using *FATA* and *FSTS* respectively as independent variables. In Panel C, we present results using both independent variables together. In each case, we show results using both total stock returns and changes in the long-term component of stock values. We present results using changes in the long-term component with decompositions based on implied costs of equity derived from each of the four models, namely, Easton (2004), Ohlson and Juettner-Nauroth (2005), Gebhardt et al. (2001), and Claus and Thomas (2001). From Panel A, we note that firms with higher *FATA* displayed lower returns, both overall and in respect of the long-term value component. The results are statistically significant and consistent with Hypothesis 1. This lends support to the argument that investors expect firms, especially those with greater reliance on offshoring, to undertake costly restructuring of their supply chains in light of the pandemic.

However, we do not observe statistically significant results using *FSTS* as the independent variable (Table 3, Panel B). But when we use both independent variables together (Table 3, Panel C), we find that the coefficients for *FSTS* turn positive and statistically significant, which lends support to Hypothesis 2. Thus, relative to other firms, firms with high foreign sales have gained value during the period under consideration. This may be related to their greater ability to ride out recessionary conditions. The differences in significance of *FSTS* between Panels B and C could be occurring because although *FATA* and *FSTS* are highly correlated, they relate differently to our measures of return. Consequently, *FATA* acts as a suppressor variable and the effect of *FSTS* becomes apparent only after controlling for *FATA*. Similar observations of *FATA* suppressing the effects of *FSTS* have been reported earlier in Krapl (2015). It may be noted that all the models in Table 3 and subsequent tables are estimated using robust regression to mitigate the effect of outliers.

Although not the focus of our study, it is interesting to observe the signs of the coefficients for some of our control variables. Normally, *Beta* and *Book to Market* are expected to be positively correlated with stock returns, whereas *Size* is expected to be

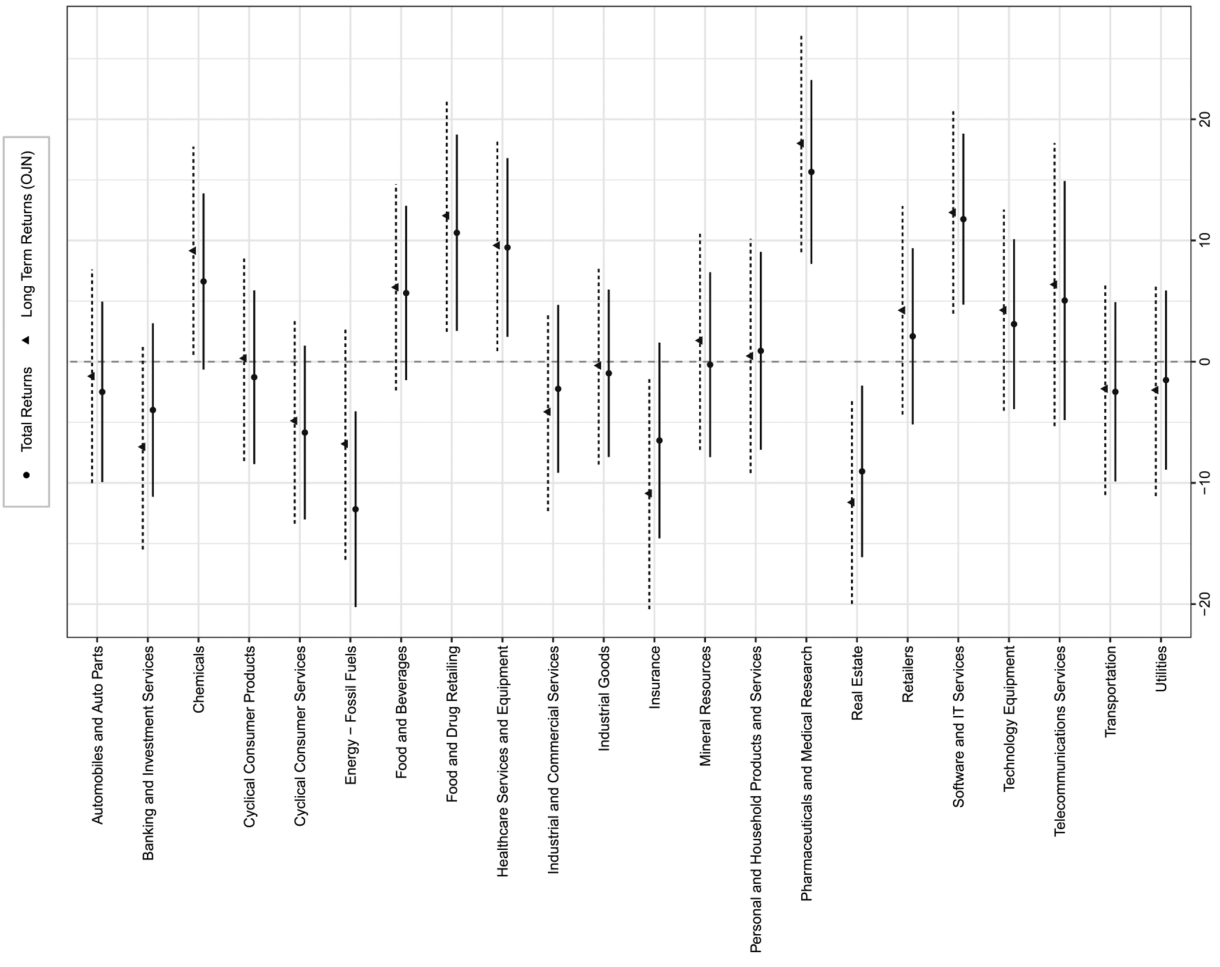

FIGURE 1 Variation in total returns and long term returns across industries

negatively correlated with stock returns. However, it has been observed that in times of crisis, there is a flight-to-safety which increases demand for less risky stocks (i.e., stocks with low *Beta*, low *Book to Market*, and high *Size*), thereby increasing prices of such stocks and reversing the relationships between measures of systematic risk and stock returns (Ghysels et al., 2014). The signs we observe for the coefficients of these control variables are in line with such behavior of investors.

Figure 1 presents the coefficients for industry effects for regression models 2 and 5 reported in Table 3. The dependent variable in model 2 is the change in the long-term value component (estimated using the Ohlson and Juettner-Nauroth (2005) model) and the dependent variable in model 5 is the change in total value. All industry coefficients presented in Figure 1 are relative to the "Applied Resources" industry, which is arbitrarily chosen as the reference category. Unlike the mean returns for various industry groups reported in Table 2, these industry coefficients control for region and country effects as well as firm-specific explanatory variables such as stock beta, momentum, book-to-market ratio, and the internationalization variables. We find that the three best performing industries are pharmaceuticals and medical research, food and drug retailing, and software and IT services, whereas the bottom three industries are insurance, real estate and fossil fuels. This is perhaps expected owing to nature of the healthcare crisis and work from home trends emerging from lockdowns across the globe. Although commercial real estate such as office space and malls suffer from lockdowns, work from home trends have made tenants move to suburbs and thus placed downward pressure on occupancies and rents in residential real estate in cities (Fung, 2020; Putzier & Maurer, 2020). Demand for online services and digital infrastructure has exploded (Strusani & Houngbonon, 2020), whereas fossil fuel demand has plummeted as a significant proportion of workforce works remotely (Prabheesh, Padhan & Garg, 2020).

A comparison of changes in the long-term component of value and total value provides a more nuanced interpretation of the market expectations imputed in stock valuations. Although valuations of fossil fuel stocks have declined sharply, the impact on the long-term component of value is smaller than on total value. This implies an expectation of at least partial recovery in oil demand and prices as the pandemic subsides, and is consistent with the upward sloping term structure of crude oil futures prices that factor at least a partial recovery in crude prices. As on October 12, 2020, NYMEX WTI crude oil futures for December 2020, 2022, and 2024 traded at $39.63/barrel, $43.0/barrel, and $44.01/barrel, respectively. In contrast, the changes in valuations for insurance sector stocks suggest an expectation of considerable damage to long-term value components. This finding is consistent with recent evidence from Wang et al. (2020) who examine the impact of Covid-19 on China's insurance market, and find that insurance density, insurance depth, and growth rate of premium have all declined due to the pandemic.

TABLE 4 Effect of internationalization on shareholder value across regions

Panel A: Regression of change in long-term component of value on internationalization variables				
	Japan	**United States**	**China**	**Emerging Asia (ex–China)**
Foreign assets/total assets	−20.198** (−2.110)	−13.765** (−2.075)	−5.983 (−0.291)	−12.527** (−2.034)
Foreign sales/total sales	3.552 (0.890)	0.700 (0.202)	−2.643 (−0.232)	5.905* (1.858)
Beta	−18.710*** (−6.823)	−12.348*** (−5.012)	6.087 (0.760)	−14.324*** (−6.970)
Size	1.252** (2.342)	1.212** (2.560)	−2.580* (−1.821)	0.118 (0.206)
Book to market	−5.939*** (−3.278)	−10.374*** (−4.038)	−14.008*** (−3.820)	1.403 (0.842)
Momentum	6.768*** (3.315)	7.971*** (3.549)	23.532*** (6.443)	9.867*** (5.110)
Intercept	3.055 (0.372)	−6.558 (−0.828)	47.496* (1.749)	−7.771 (−0.953)
Panel B: Regression of change in total value on internationalization variables				
Foreign assets/total assets	−14.192* (−1.770)	−10.933* (−1.831)	−3.145 (−0.201)	−12.775** (−2.492)
Foreign sales/total sales	2.125 (0.636)	0.339 (0.108)	−1.183 (−0.136)	5.603** (2.119)
Beta	−16.897*** (−7.357)	−12.552*** (−5.660)	0.318 (0.052)	−13.433*** (−7.855)
Size	0.819* (1.829)	1.309*** (3.073)	−2.433** (−2.255)	−0.095 (−0.199)
Book to market	−4.188*** (−2.760)	−9.024*** (−3.902)	−10.345*** (−3.704)	1.08 (0.779)
Momentum	7.892*** (4.617)	9.674*** (4.785)	23.712*** (8.523)	11.908*** (7.411)
Intercept	5.222 (0.759)	−8.363 (−1.173)	46.347** (2.241)	−3.702 (−0.546)
Number of firms	726	909	378	686

Note. This table reports regression coefficients, and the corresponding *t*-statistics are presented in parentheses below the coefficients. All regression models are estimated with region, country, and industry fixed effects that are not reported for brevity.

*Statistical significance at 10% level.

**Statistical significance at 5% level.

***Statistical significance at 1% level.

TABLE 5 Effect of internationalization on shareholder value across regions (IV Estimates)

Panel A: Regression of change in long-term component of value on internationalization variables				
	Japan	**United States**	**China**	**Emerging Asia (ex–China)**
Foreign assets/total assets	−12.572 (−0.838)	−17.535** (−2.390)	−1.682 (−0.049)	−12.468* (−1.826)
Foreign sales/total sales	0.726 (0.062)	0.897 (0.223)	−6.86 (−0.499)	5.901* (1.702)
Beta	−19.266*** (−6.565)	−12.486*** (−5.044)	3.398 (0.419)	−14.017*** (−6.755)
Size	1.114* (1.921)	1.375*** (2.850)	−2.923** (−1.977)	0.205 (0.352)
Book to market	−6.001*** (−3.227)	−9.578*** (−3.722)	−14.202*** (−3.861)	1.462 (0.869)
Momentum	7.641*** (3.448)	8.512*** (3.787)	22.335*** (6.100)	9.769*** (5.015)
Intercept	2.419 (0.274)	−7.946 (−1.006)	54.206* (1.956)	−8.224 (−0.963)
Panel B: Regression of change in total value on internationalization variables				
Foreign assets/total assets	−9.478 (−0.758)	−13.959** (−2.117)	8.192 (0.318)	−12.549** (−2.202)
Foreign sales/total sales	0.646 (0.066)	0.069 (0.019)	−6.163 (−0.592)	5.417* (1.871)
Beta	−16.885*** (−6.907)	−12.623*** (−5.673)	−1.419 (−0.231)	−13.265*** (−7.656)
Size	0.772 (1.598)	1.435*** (3.311)	−2.828** (−2.525)	−0.067 (−0.136)
Book to market	−3.947** (−2.547)	−8.377*** (−3.622)	−10.769*** (−3.864)	1.124 (0.800)
Momentum	8.877*** (4.809)	10.082*** (4.990)	23.138*** (8.341)	11.913*** (7.323)
Intercept	3.633 (0.495)	−9.267 (−1.305)	52.450** (2.498)	−3.335 (−0.468)
Number of firms	704	894	366	673

Note. This table reports regression coefficients, and the corresponding *t*-statistics are presented in parentheses below the coefficients. All regression models are estimated with region, country, and industry fixed effects that are not reported for brevity.
*Statistical significance at 10% level.
**Statistical significance at 5% level.
***Statistical significance at 1% level.

In Table 4, we take a closer look at variations across various economic regions in the relationships between internationalization measures and changes in value.[4]

We find that FATA has a negative relationship with stock returns across regions, and the relationship is statistically significant for all regions except China.[5] We also note that FSTS has a statistically significant positive relationship only for firms from Emerging Asia. This could be on account of firms from Emerging Asia being more likely to benefit from restructuring of global supply chains as these economies are well-placed as alternative sourcing bases to China (Cohen et al., 2018; Cohen & Lee, 2020). Firms which already have significant foreign sales may better understand their customers and market (Gaur et al., 2014; Mudambi & Navarra, 2004) and be more innovative (Wu et al., 2016) and hence be better placed to gain from such restructuring-led opportunities. Further, geographical diversification of sales across countries provides firms from emerging economies more stability in revenues (Hitt et al., 2016).

The concern regarding the direction of causality between firm internationalization and our outcome variables is somewhat mitigated by the fact that our explanatory variables are measured 6 months prior to the outcome variables. In addition, degree of internationalization is a relatively stable firm characteristic. Nonetheless, to examine the robustness of our results to potential endogeneity issues, we estimate additional two-stage least-squares instrumental variable regressions. The instruments we use are one-year lagged values of *FATA* and *FSTS*, averages of *FATA* and *FSTS* for all firms within the same country-industry category, and *MID* which is a dummy variable that takes a value of one for firms which show a minority interest on their balance sheet. *MID* has been used because minority interest is an indicator of acquisition activity and acquisition is a common mode of internationalization (Attig et al., 2016). Further, minority interest is a consequence of past acquisition activity that is unlikely to be related to stock returns during the pandemic.

We regress *FATA* and *FSTS* on the set of instrumental variables along with all control variables used in earlier regressions. Thereafter, we use the predicted values of *FATA* and *FSTS* from the first-stage regressions in regressions with changes in long-term value component and total value as dependent variables. The results of the instrumental variable regressions are reported in Table 5, and they are largely consistent with our original results.

6 | CONCLUSION

We study changes in global equity valuations after the onset of the Covid-19 pandemic to infer market expectations regarding the likely long-term impact of the pandemic on global supply chains. We present evidence which suggests that firms are likely to undertake costly restructuring of their supply chains in response to the pandemic, and this can benefit firms from emerging Asian economies which may provide a sourcing alternative to China. In order to gather this evidence, we have adapted methods hitherto used in literature for estimating

implied cost of equity of firms and applied them to decompose stock prices into the values emanating from expected earnings in the short-term (the years 2020 and 2021) and over the long-term (expected earnings after the year 2021).

As may be expected, we find that there are inter-industry and inter-economy variations in changes to the long-term components of equity values of firms after the onset of the pandemic. Firms with higher proportions of foreign assets which may incur more costs to restructure their supply chains lost a greater proportion of their long-term equity values. For firms based in emerging Asian economies (other than China), we find a significant positive relation between the proportion of foreign sales and change in value. However, this relation is absent in the other three regions. This suggests that firms from emerging Asian economies are positioned to benefit from restructuring of global supply chains, especially if they have prior experience of international sales, as they may serve as supply chain alternatives to Chinese firms. The results are robust to endogeneity concerns and they cannot be explained by standard determinants of equity returns, or by industry and region fixed effects.

Our results provide early evidence on expectations regarding long-term impact of the pandemic on different industries and regions. These findings can inform strategic decision making by managers such as those relating to supply chain risk, geographical diversification, and mergers & acquisitions. As immediate actions, managers would need to evaluate the concentration of their supply chains and consider de-risking them. However, perhaps more significant from a managerial perspective are the insights for internationalization strategy. Our findings suggest that geographical diversification of sales is less risky than geographical diversification of assets. Thus, at least initially, firms which choose to internationalize may want to do so with regard to their sales and marketing establishments than asset-intensive manufacturing facilities. Firms could even consider relying on contract manufacturing facilities and letting these contractors manage such supply chain risks. The results of our study are of relevance to policymakers also. Policymakers can align decisions to benefit from reconfiguration of global supply chains. As businesses diversify their supplier bases, emerging Asian countries can focus policy initiatives on making their exporters more competitive, so as to benefit from the emerging opportunities. At the same time, they could also encourage critical domestic industries to either source locally or use a diversified pool of suppliers to mitigate risks of future supply chain disruptions. For instance, the pandemic highlighted the concentration risks of global pharmaceutical supply chains. A case in point is that India, which is the largest supplier of generic medicines and vaccines in the world, depends on China for 80% of its active pharmaceutical ingredients (Yap, 2020). Countries can look at enacting policies to encourage domestic pharmaceutical manufacturers, which could not only cater to reallocated demand as global pharmaceutical sourcing diversifies, but also mitigate the risk of domestic shortage of critical medicines in the event of a future disruption. Finally, our results could also be of value for business valuation, for example to augment models used to value businesses with expectations regarding the long-term impact of the pandemic on the industry's prospects.

ENDNOTES

[1] The DHL Connectedness Index published by DHL and the NYU Stern School of Business measures globalization based on metrics for international flows of goods and services, capital, labor, and information. The index increased from 100 in 2000 to 112 in 2007, and from 108 in 2008 to 121 in 2018.

[2] The KOF Globalization Index is published by the KOF Swiss Economic Index and measures globalization along its economic, social, and political dimensions. As against an increase from 38.4 in 1970 to 58.8 in 2007, it increased from 59.3 in 2008 to 62.1 in 2017.

[3] In this paper, we use the term "backshoring" to refer to the shifting of operations from offshore locations back to the firm's home country, and the term "reshoring" to refer to shifting of operations from one offshore location to another.

[4] The results presented in this table are based on value decomposition using the implied cost of equity estimated by the Ohlson and Juettner-Nauroth (2005) model. Results using other models are substantially similar.

[5] It is possible that the lack of statistical significance is due to the relatively small number of observations of Chinese firms for which the data on proportion of foreign assets is available. Out of the 1104 Chinese firms considered in our sample, 978 firms report data on foreign sales, whereas only 378 report data on foreign assets.

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SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section at the end of this article.

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