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Foreign to all but fluent in many: The effect of multinationality on shock resilience

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\textbf{ABSTRACT}

The sudden COVID-19 pandemic sent shockwaves through international markets. This paper studies the relation between multinationality and risk. While IB literature agrees that internationalization, in times of relative stability, increases systematic risk, we argue that internationalization also improves resilience against exogenous shocks. Leveraging the sequential COVID-waves as a unique empirical laboratory, we show that although multinationality causes liability of foreignness that increases systematic risk, it also generates an asset of multinationality that enhances shock resilience. Yet this advantage of internationalized firms gradually erodes as less internationalized firms learn about the shock and investors adapt their valuations to the post-shock reality.

\section{Introduction}

“I know that history is going to be dominated by an improbable event, I just don’t know what that event will be” (Taleb, 2007).

The future is highly uncertain, exogenous shocks are more frequent than expected, and their consequences are more dramatic than anticipated (Beamish \& Hasse, 2022). The recent COVID-19 pandemic is a painful case in point. To International Business (IB) scholarship, this suggests the question, whether such exogenous shocks affect MNEs in the same way as they affect domestic firms. Literature in IB traditionally takes two perspectives on the relation between risk and multinationality. On the one hand, extant literature documents how multinationality, due to liability of foreignness, increases firms’ systematic risk (Amihud et al., 2002; Olibe et al., 2008; Reeb et al., 1998). On the other hand, seminal work by Johanson \& Vahlne (1977, 2017) shows that the internationalization process also offers myriad opportunities for organizational learning and provides MNEs with a diverse stock of knowledge. Through such learning, MNEs generate an asset of multinationality that enhances their flexibility and resilience in response to shocks. Yet to help MNEs to better manage the impact of shocks on their global operations (Contractor, 2022), IB scholarship needs to reconcile these perspectives that see multinationality either as a source of risk or as an opportunity for learning and should investigate the boundary conditions of these positions (Gravegna \& Michailova, 2022). To better understand the tension between these points of view, we investigate how an exogenous shock affects the relation between multinationality and risk and whether MNEs can leverage their multinationality to weather the shock’s fallout.

We theorize that the effect of multinationality on risk is contingent on the market environment and more specifically, the type of uncertainty that firms face. Specifically, we propose a framework that distinguishes between ergodic and non-ergodic uncertainty\textsuperscript{1}. We argue that, despite higher systematic risk in times of relative stability (i.e., ergodic uncertainty), firms with high degrees of multinationality achieve greater resilience (Li \& Tallman, 2011) to extraordinary exogenous shocks that create non-ergodic uncertainty. Further, we propose that this resilience advantage of highly internationalized firms erodes gradually as less internationalized competitors and investors learn about the shock.

For support of these hypotheses, we take advantage of the sequential, wave-like spread of the COVID-19 pandemic as an empirical laboratory using a sample of S&P 500 firms. In accordance with extant literature

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We contend that the application of the capital asset pricing model (CAPM) by investors relies on relative market stability. Since Beta captures historical, average co-movements of firms’ stocks with a reference market, we argue that this assessment implies an ergodic, or predictable market environment.

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2 Multinationality and systematic risk

The study of the relation between multinationality and systematic risk has a long history in Finance, IB, and Strategy (Hughes et al., 1975; Mikhail & Shawky, 1979; Shapiro, 1978). The relevance for this stream of literature derives, in part, from the hypothesized effect of systematic risk on firms’ cost of capital as described in the CAPM (Sharpe, 1964, 1970). Finance and Management theories allow for conflicting hypotheses about the relation between multinationality and systematic risk. On the one hand, the process of foreign expansion by MNEs naturally diversifies risk—i.e., diversification hypothesis (Berger et al., 2017). Portfolio theory (Markowitz, 1952) suggests that MNEs expanding into imperfectly correlated foreign markets “can dampen the effects of idiosyncratic shocks” (Gulambhussen et al., 2014, p. 31). As MNEs geographically diversify their operations, their returns become less correlated with the market and systematic risk decreases (Reeb et al., 1998). This, in turn, is expected to translate into lower costs of financial distress (Shaked, 1986) and lower costs of capital (Levine et al., 2021). Accordingly, for “decades, it has been assumed that [MNEs] should look at their foreign operations like they would an investment portfolio; international diversification reduces risk” (DeGhetto, 2020, p. 1; Rugman, 1976).

Other authors, most prominently in IB, have argued that diversification is not the sole byproduct of multinationality—i.e., market-risk hypothesis (Berger et al., 2017). Rather, the process of internationalization exposes MNEs to location-specific risk in their host countries e.g., terrorism (Czinkota et al., 2005, 2010), violent conflict (Dai et al., 2013; Lee & Chung, 2022; Oetzel & Getz, 2012; Oh & Oetzel, 2017), or natural disasters (McKnight & Linneueva, 2019; Mithani, 2017; Oetzel & Oh, 2014; Oh and Oetzel, 2011). Accordingly, “internationalization may also increase exposure to other pervasive economic factors, and therefore increase” the risk exposure of MNEs (Reeb et al., 1998, p. 266). Moreover, multinationality increases complexity and agency costs within MNEs (Berger et al., 2017; DeGhetto, 2020; Hennart, 2007; Laeven & Levine, 2007; Levine et al., 2021). Most importantly, these factors lead to and reinforce an MNE’s liability of foreignness in its host countries (Mithani, 2017; Zaheer, 1995). As MNEs are, by definition, foreign to all their host countries, they face costs not incurred by local firms. Due to these idiosyncratic costs, MNEs experience greater risk than domestic or less internationalized firms. Due to greater risk exposure, agency costs, and particularly greater liability of foreignness, multinationality increases systematic risk and results in a greater risk premium charged by investors. Combining these arguments from Finance and IB, a theoretical trade-off between risk-reducing benefits—i.e., diversification—and risk-increasing costs—i.e., liability of foreignness—from multinationality emerges.

Most empirical tests of the relation between systematic risk and multinationality find that the additional risks due to liability of foreignness outweigh the benefits from geographic diversification (Amihud et al., 2002; Berger et al., 2017; Olibe et al., 2008; Reeb et al., 1998). Especially, when MNEs expand down-stream into countries of lower institutional quality, greater local risks and thus greater liability of foreignness cause greater systematic risk (Kwok & Reeb, 2006; Zaheer, 1995).

Commonly, these studies use the firms’ stock market Beta as a measure for systematic firm risk. The measure is formally based on a firm’s historic, average co-movement with the reference market and, thus, captures average—as opposed to abnormal—variation in value over time—as opposed to a specific event. By its nature as a historic
3. Resilience to exogenous shocks and multinationality

The concept of resilience describes the “capacity for an enterprise to survive, adapt, and grow in the face of turbulent change” (Fiksel, 2006; Hamel & Valkenburg, 2003) and shapes a firm’s ability to absorb the impact of large-scale shocks (McCann, 2004). Theoretically, shock resilience is closely related to organizational learning (Do et al., 2022; Orth & Schuldis, 2021; Williams et al., 2017). Formally, shock resilience is different from systematic risk and the Beta construct as it focuses on a single extreme event rather than long-term variation. Beta as the most common measure of systematic risk, is formalized as a historic comparison, and refers to the normal or predictable part of covariation between stock value of a firm and a reference market. To be a reliable risk indicator for investors, Beta requires a certain degree of market functionality and stability—in our terminology ergodic uncertainty (Buckley, 2020; Perez-Batres & Treviño, 2020). Therein, systematic risk is conceptually different from a firm’s resilience to an extreme event or exogenous shock. Formally, shock resilience is captured in abnormal or unpredicted changes in firm value in response to a specific and extraordinary event—as opposed to historic average. Fig. 1 illustrates the impact of an exogenous shock on the relative importance of systematic and non-ergodic uncertainty over time.

We argue that in times where ergodic uncertainty dominates, firms can rely on tested historical strategies, business models, and operational efficiency. From an investor perspective, relative market stability means that historic reference points provide valuable insights. In these times, Beta is therefore a reliable indicator of systematic risk for CAPM-oriented investors and, thus, drives stock prices.

Under conditions of non-ergodic uncertainty, however, firms must radically adjust their business models without precedent or knowledge about the shock. Previously optimal operations are suddenly interrupted and require experimentation and flexibility. From the perspective of investors, historic reference points provide less information. As a consequence, Beta exhibits extreme volatility and becomes an unreliable risk indicator (Horstmeyer & Vij, 2021). Investor panic and herding behavior challenge market consensus and abrogate fundamental market competitiveness.

### Table 1

| Definition | Endogenous uncertainty vs. non-endogenous uncertainty. |
|------------|--------------------------------------------------------|
| **Ergodic uncertainty** | Uncertainty related to developments that evolve around a long-term equilibrium. |
| | Temporal deviations from the equilibrium are possible, but over time, developments will reverse towards this equilibrium. |
| | Uncertainty does not relate to the eventual occurrence of the reversal but to the nature of the reversal process. |
| | In an environment where ergodic uncertainty dominates, established structures remain unchanged. Therefore, historic data serves as a reliable reference to assess the risk relating to future developments. |
| | When ergodic uncertainty prevails, investors focus on historic data for portfolio optimization. Investors consider shock resilience, flexibility, and learning in terms of portfolio optimization. Systematic risk, measured as Beta, is the central measure for corporate valuation. |
| | In an environment, where ergodic uncertainty dominates, investors put greater emphasis on liability of foreignness as a driver of systematic risk than on the asset of multinationality as a driver of shock resilience. |
| **Non-ergodic uncertainty** | Uncertainty related to developments that break from a long-term equilibrium. |
| | Deviations from the equilibrium constantly shift the state of the environment and establish a new equilibrium. Uncertainty does not relate to the occurrence of a re-balancing to a new state but to the nature of the new equilibrium. |
| | In an environment where non-ergodic uncertainty dominates, established structures lose their meaning. Therefore, historic data does not serve as a reliable reference to assess the risk relating to future developments. |
| | When non-ergodic uncertainty prevails, historic data becomes an unreliable reference for portfolio optimization. Investors consider shock resilience in terms of flexibility and learning as the central measure for corporate valuation. |
| | In an environment, where non-ergodic uncertainty dominates, investors put greater emphasis on the asset of multinationality as a driver of shock resilience than on liability of foreignness as a driver of systematic risk. |
| Under-ergodic uncertainty, negative effects from liability of foreignness dominate the positive effects from the asset of multinationality. |
| Under-ergodic uncertainty, positive effects from the asset of multinationality dominate the negative effects from liability of foreignness. |
mechanisms (Kirys et al., 2021; Su et al., 2021). Therefore, investors adjust their investment behavior to their individual assumptions about future risks (Tannenbaum et al., 2017) and thereby create abnormal stock returns.

In the process of internationalization, MNEs gain knowledge and learn about foreign markets (Johanson & Vahlne, 1977, 2017). Prior knowledge about foreign markets and historic experiences in these host countries provide MNEs with additional opportunities to learn about the exogenous shock (Ariño & de la Torre, 1998; Cuervo-Cazurra et al. 2018; McKnight & Linnenluecke, 2019; Oetzel & Oh, 2014; Oh & Oetzel, 2017; Rerup, 2009; Zahra, 2021). Multinationality exposes firms to more frequent, more diverse and potentially more severe shocks in a multitude of foreign countries (e.g., Sars pandemic in 2002-2003, Fukushima disaster in 2011) (Brakman et al., 2021; Cavusgil et al., 2020; Meiér & Pinto, 2020; Zajac Kejzar & Velic, 2020). When an exogenous shock paralyzes large parts of the economic system and creates non-ergodic uncertainty, the asset of multinationality allows MNEs to counter the resulting economic fallout and provides greater shock resilience (Lee & Makhija, 2009; Perez-Batres et al., 2020). When an exogenous shock causes market disruptions, MNEs have access to geographically diversified portfolios of alternatives (Chung & Beamish, 2005; Cuervo-Cazurra et al., 2018; Dai et al., 2013; Verbeke, 2020). Thus, the asset of multinationality allows MNEs to mitigate these disruptions by switching between suppliers and buyers across different host countries (Borino et al., 2021; Hyun et al., 2020) or by collaboration with global partners (Oetzel & Getz, 2012). Moreover, when foreign subsidiaries encounter difficulties in their host countries, MNEs can respond to these challenges by interaction with other subsidiaries in the subsidiary network (Buckley, 2020; Chung et al., 2010; Chung et al., 2013).

In addition to operational real options, multinationality creates market-side real options. Recognition of a firm in foreign markets results in a learning advantage. MNEs therefore hold operational real options to respond to environmental developments by coordinating operations, reconfiguring production activity, shifting sales, and transferring resources internationally across their multiple subsidiaries. Flexibility for value chain reconfiguration consequently provides an effective strategy in economic turmoil (Bloom, 2009; Garrido-Prada et al., 2019; Lee & Chung, 2022; Perez-Batres & Treviño, 2020). In case an exogenous shock causes market disruptions, MNEs have access to geographically diversified portfolios of alternatives (Chung & Beamish, 2005; Cuervo-Cazurra et al., 2018; Dai et al., 2013; Verbeke, 2020). Thus, the asset of multinationality allows MNEs to mitigate these disruptions by switching between suppliers and buyers across different host countries (Borino et al., 2021; Hyun et al., 2020) or by collaboration with global partners (Oetzel & Getz, 2012). Moreover, when foreign subsidiaries encounter difficulties in their host countries, MNEs can respond to these challenges by interaction with other subsidiaries in the subsidiary network (Buckley, 2020; Chung et al., 2010; Chung et al., 2013).

In addition to operational real options, multinationality creates market-side real options. Recognition of a firm in foreign markets reduces the costs of penetrating and developing these markets. This makes the firm more flexible and allows for faster reorganization of markets. In addition, a global presence creates market-side real options in financial markets. In response to an exogenous shock and the non-ergodic uncertainty it triggers, investors look for safe-haven investments rather than portfolio optimization (Cheema-Fox et al., 2021; Huber et al., 2021). A highly recognized firm has an advantage in reaching out to foreign investors, which are less affected by the shock. Funds from these investors can help to halt falling share prices and reduce losses in firm value. In addition, the asset of multinationality provides MNEs with greater financial flexibility (Jang, 2017; Shaver, 2011). In sum, the asset of multinationality offers MNEs market-side real options that provide financial flexibility in response to environmental developments (Flamm & Ioannou, 2020). During an exogenous shock, financial distress, failing access to liquidity, and underinvestment are substantial threats for firms (He et al., 2021; Li et al., 2020; O’Hara & Zhou, 2021). Therefore, the financial flexibility generated from multinationality, increases an MNC’s resilience to exogenous shocks.

Both operational and market-side real options are anticipated by investors who seek more secure assets in times of crisis. For investors, multinationality is therefore an asset that ensures greater shock resilience for MNEs. Accordingly, they respond to exogenous shocks by
shifting capital from domestic stocks to MNEs (Bartik et al., 2020). This increases stock prices and reduces negative abnormal returns of firms with more international real options. With a focus on periods of shock and the accompanying non-ergodic uncertainty, we therefore hypothesize that:

Hypothesis 2: In times of exogenous shocks and non-ergodic uncertainty, multinationality reduces abnormal destruction of firm value and increases cumulative abnormal returns.

We summarize the differences between ergodic and non-ergodic uncertainty and their hypothesized effects on the relative importance of systematic risk and shock resilience in Table 1.

4. Persistence of uncertainty and resilience over time

Multinational operations allow MNEs to collect and leverage knowledge at a global scale and thereby convey and asset of multinationality (Mallon & Fainshmidt, 2017; Sethi & Judge, 2009). In our model, the asset of multinationality generated during the internationalization process provides MNEs with greater flexibility in response to an exogenous shock (Bloom, 2009). However, by nature, shocks are temporary and resolve over time (Ramelli & Wagner, 2020). Firms learn about the causes and effects of the shock (Bundy et al., 2017) and adapt their business models (Hitt et al., 2021). Thus, dominance of non-ergodic uncertainty reverts to dominance of ergodic uncertainty (Su et al., 2021). This gradual reduction of non-ergodic uncertainty affects the relation between multinationality and shock-resilience (H2) in three reinforcing ways: First, continuous learning about the shock allows less internationalized firms to react to the new realities (Ariño & de la Torre, 1998; de Vaan et al., 2021; McKnight & Linnens, 2019; Oetzel & Oh, 2014; Oh & Oetzel, 2017; Rerup, 2009) and devise strategies to counter the economic fallout from the exogenous shock—both in terms of operations and investor perception. The shock forces less internationalized firms to learn in order to catch up with MNEs. Since with enhanced information, all firms can optimize their ex-post strategies to the new status quo (Hynes et al., 2020), the asset of multinationality in terms of an advantage in historic learning evaporates. Second, the real options created by the asset of multinationality decrease in value as total uncertainty gradually subsides. As the causes and effects of the exogenous shock become known, the perceived value of flexibility for investors declines. As markets approach a new equilibrium, they become more predictable, and investors regain confidence in CAPM-informed portfolio optimization. Third, investors consider the decline in the value of crisis resilience provided by the asset of multinationality and appraise learning and adaptations by less internationalized firms. For investors, this offers an opportunity to capitalize on relatively low valuations of less internationalized firms that experienced abnormal value-destruction in comparison to MNEs. In other words, as investors reconsider the exogenous shock’s impact, they shift from MNEs to less internationalized firms that promise profitable investment opportunities after the exogenous shock is largely absorbed.

With a focus on phases of receding non-ergodic uncertainty and a return to ergodic uncertainty, we therefore hypothesize that:

Hypothesis 3: As non-ergodic uncertainty subsides over time, the value of shock resilience of multinationality gradually recedes and cumulative abnormal returns decrease.

It is important to stress that this does not imply that post-shock uncertainty affects only MNEs. Instead, the protection offered by the asset of multinationality erodes over time, as less internationalized firms learn about the shock and make up for the knowledge disadvantage.

At the same time, investors readjust their behavior as more information about the causes and effects of the shock becomes available and markets return to a post-shock equilibrium (Bloom, 2009). Once the exogenous shock is absorbed, general panic and herding (Kizys et al., 2021; Su et al., 2021) recedes and a new market equilibrium emerges. Market consensus becomes more reliable and expectations about discount rates and cash flows become more predictable (Campbell & Shiller, 1988). As the exogenous shock is absorbed into the “New Normal”, a historic comparison between firms and reference market again becomes a reliable risk-indicator. Once such a post-shock equilibrium is established, investors return to CAPM portfolio optimization and use Beta to assess systematic risk. Due to greater liability of foreignness, MNEs will, once again, exhibit comparatively greater systematic risk in the form of Beta than domestic or less internationalized firms until another exogenous shock triggers a new wave of non-ergodic uncertainty.

5. Empirical setting COVID-19

Our hypotheses compare normal and abnormal effects of multinationality in times of ergodic and non-ergodic uncertainty—i.e., systematic risk vs. shock resilience. Ergodic uncertainty describes a state in which investors can deduce certain properties of risk. To measure how multinationality, due to liability of foreignness, affects systematic risk under ergodic uncertainty, we use historical data from 2019. Non-ergodic uncertainty, on the other hand, is erratic, of ambiguous and changing relations that do not lend themselves to optimization from past parameters (Buckley, 2020; North, 1999). To study the value of the asset of multinationality under such non-ergodic uncertainty, we require an abnormal, black swan event that triggers a state of non-ergodic uncertainty (Buckley, 2020; Perez-Batres & Treviño, 2020). The recent COVID-19 pandemic therefore provides an ideal empirical laboratory for this study (Altig et al., 2020). The economic shock caused by the global COVID-19 pandemic is material and unprecedented (Caligiuri et al., 2020; van Assche & Lundan, 2020). COVID-19 triggered the worst economic crisis since the 1930s and led to a massive decline in industrial production (UNIDO, 2020). Over the near future, COVID-19 is estimated to cause a massive drop in global economic output (IMF, 2020) and severe disruptions in labor markets (ILO, 2020). In Fig. 2, we try to illustrate the differentiation between ergodic and non-ergodic uncertainty before and during the COVID-19 pandemic by comparing the volume of search queries for COVID-19 on Google (blue) to the development of the S&P 500 (green) (Costola et al., 2021). During 2019, the S&P 500 shows a stable upward trend and only modest volatility. This is what we refer to as an ergodic state of uncertainty. The COVID-19 pandemic originated in China in late December 2019 and started to gain public attention in January 2020. On March 11th, the WHO declared the outbreak of a pandemic leading to a massive surge in search volumes on Google and a series of the worst trading days in the S&P 500’s history. Major stock market indices experienced a sharp decline by more than 30% during the first month of the pandemic and registered the worst days of trading in their history (Baker et al., 2020; Mazur et al., 2020; Zhang et al., 2020). In the early stages of the outbreak, knowledge about the virus remained fragmented, superficial, and uncertain. It represented a situation without historic precedent for firms and investors alike. Predicting COVID-19, an unknown virus with unprecedented global spread or its dramatic consequences was impossible based on historic data. Firms and investors alike faced extreme volatility, uncertainty, complexity, and ambiguity. In other words, a situation of non-ergodic uncertainty. Although the spread of COVID-19 seemed under control during early summer 2020, the number of new cases in the US surged in July 2020.
After a brief respite in autumn, the US caseload went completely out of control in November 2020. However, there are some important differences between these three waves of COVID-19 infections. In March, COVID-19 was an unknown that created massive non-ergodic uncertainty. By July, the effects of COVID-19 had already unfolded across society and economy and created some first experiences with the virus. Moreover, reports from China and Russia fueled cautious optimism about vaccine development. Still, a substantial measure of uncertainty regarding the impact of COVID-19 remained. By November, COVID-19 had become an every-day nuisance for most people. Despite its dramatic consequences, the prospect of imminent vaccine availability had reduced COVID-related uncertainty. In addition, government agencies had gained valuable experience over time that led to better regulations and improved financial support for firms and individuals affected by COVID-19 (John & Li, 2021). Investors and less internationalized firms alike had gathered information from the first and second waves that allowed them to learn about the exogenous shock and to inform their decisions. This further reduced uncertainty regarding the potential outcomes of COVID-19. Search volumes on Google (Fig. 2), as an indicator for public interest in COVID-19 (Jun et al., 2021; Su et al., 2021), mimic these three waves and the decreasing level of uncertainty that accompanied them. Therefore, comparing the pre-COVID-19 period with the March, July, and November COVID-19 waves provides an ideal empirical setting to analyze the effects of multinationality under ergodic uncertainty (2019) and different degrees of non-ergodic uncertainty (Waves 1-3). This underlines the impact of the COVID-19 shock as an event vs. its impact as a process (Williams et al., 2017). While investors reacted to specific events, the wave-like spread of COVID-19 allows us to capture a learning process about the virus by less internationalized firms and investors.

6. Data & methods

We focus our analysis on firms in the S&P 500 index since it provides an excellent reflection of the US stock market. It includes top US firms with high visibility and represents approximately 80% of total US stock market capitalization. For our study, we obtain data from several sources. We compute systematic risk based on stock prices from Yahoo Finance and use WRDS to estimate abnormal returns. To obtain fundamental data for firms, we use Compustat. We apply a variety of measures of degree of internationalization to approximate a firms’ multinationality (Marshall et al., 2020). For our main analysis, we obtain data on foreign subsidiaries from Orbis Bureau van Dijk and extract share of foreign sales and assets from the firms’ annual reports. As an alternative, we use data from Google Trends to compute a novel and versatile measure for degree of internationalization. We control for each firm’s core industry with the help of classifications from the MSCI database. Our final dataset comprises data on systematic risk, stock-market reactions to COVID-19, and degree of internationalization on 464 US firms.

6.1. Dependent variables

We test the proposed hypotheses, in two separate stages with two different dependent variables. First, systematic risk to measure how multinationality affects historic, or normal, risk of firms during relative stability (ergodic uncertainty). Second, abnormal returns at different COVID-related dates to analyze the impact of multinationality on firm value during abnormal shocks (non-ergodic uncertainty).

6.1.1. Systematic risk

We follow extant literature to measure systematic risk of firms (Cochrane, 2009; Fama & French, 2004). As proposed by Reeb et al. (1998) and Kwok and Reeb (2000), we estimate systematic risk based on the CAPM relation between market returns $R_{m,t}$ and returns of firm $i$, $R_{i,t}$:

$$R_{i,t} = \alpha_i + \beta_i \times R_{m,t}.$$

In this firm-specific market model, the coefficient $\beta_i$ signifies firm $i$’s systematic risk. To account for differences in how investors react to downside losses versus upside gains (Ang et al., 2006; Estrada, 2006), we follow Reuer & Leibklein (2000) and estimate the market model only for those days where market returns fell below the US Treasury Bill rate\(^4\). We first estimate the CAPM relation for 2019, using daily log-returns for $R_{i,t}$ and $R_{m,t}$ from Yahoo Finance. Next, we compute the dependent variable $DS \ Beta$ (2019) by extracting coefficient $\beta_i$, indicating a firm’s pre-COVID-19 downside Beta, from the estimated models. For a test of our assumption that the reliability of CAPM changes between ergodic and non-ergodic uncertainty, we also compute $DS Beta$.
The COVID-19 pandemic hit countries sequentially. Therefore, we must select a particular country and country-specific events to study the immediate effect of uncertainty caused by the pandemic (Lyocsa et al., 2020). We follow extant literature that analyzes the impact of COVID-19 on the US stock market (Baker et al., 2020; Mazur et al., 2020). Because of the high market efficiency and the resulting sensitivity of stock prices, we choose the US as an empirical setting to study COVID-19 as a source of non-ergodic uncertainty. To capture differences between the three COVID-waves, we estimate cumulative abnormal returns for three separate dates in March, July, and November 2020. For the first wave, we chose March 11th, the day WHO declared the outbreak of a pandemic. For the second and third wave, we chose two dates—July 6th and November 12th—with high caseloads that we consider as the beginning of the respective wave. We computed the variable \( \text{CAR}(\text{-10/+10}) \) as cumulative abnormal returns in the ten days before and after each of these dates. MacKinlay (1997) argue that in the case of difficult to identify events, such as pandemics, event studies require careful determination of the event date or, preferably, several event dates to ensure the robustness of the results. Therefore, we chose two alternative dates for abnormal-return estimation in each wave: Wave 1—March 6th and 13th, Wave 2—July 1st and 8th, Wave 3—November 5th and 19th. In addition, we use \( \text{CAR}(\text{-5/+5}) \) with a shorter event window, five days before and after each date, as a robustness check.

### 6.3. Control variables

We control for factors that may affect stock-market reactions to the COVID-19 pandemic beyond the model variables. Following Reeb et al. (1998) and Kwok & Reeb (2000), we control for effects from firm size, profitability, financial leverage, and size of intangible assets. In our models, we use the natural logarithm of the total number of employees (in thousands) and total assets (in million USD) to capture the effect of firm size on stock-market reactions. Firm profitability may lead to greater resilience in terms of additional resources and increases investor confidence, which could explain stock-market reactions to the COVID-19 pandemic. To capture these effects, we include pre-pandemic return on sales in our models. While profitability facilitates corporate responses to COVID-19, indebtedness may have the opposite effect. Firms with greater financial leverage have fewer options in reaction to COVID-19 at their disposal and might face overreactions by investors. Accordingly, we control for financial leverage as the ratio of total debt to total assets in our models. Firms with a large share of intangible assets on their balance sheets offer substantial growth opportunities but also face concentration of foreign subsidiaries (Kim et al., 2006). For our robustness checks, we use foreign sales to total sales, foreign assets to total assets, and number of foreign subsidiaries to number of total subsidiaries (Olibe et al., 2008; Ou & Shyu, 2009; Reeb et al., 1998) as alternative measures for degree of internationalization.

The asset of multinationality, however, does not exclusively depend on an MNE’s operations and the operational real options embedded therein. Multinationality also creates market-side real options that MNEs can leverage in their marketing and financing activities. These real options are the outcome of consumer and market perceptions and an MNE’s general exposure to foreign markets (Crilly et al., 2016; Maruyama & Wu, 2015). In addition, abnormal returns, the focus of our study, strongly depend on investor perceptions (Bell et al., 2011). To complement the operation-focused Herfindahl index, we apply the globaltrends R-package (Puhr, 2021; Puhr & Müllner, 2021) to construct a market-based measure for degree of internationalization using data from Google Trends (Google-based DOI).

This Google-based measure does not approximate a firm’s degree of internationalization from its operations in terms of sales and assets but analyzes the distribution of the firm’s recognition across the world. Numerous studies especially in the fields of epidemiology, economics, and finance successfully use Google Trends in predictive analytics (Wilcoxson et al., 2020). Lyocsa et al. (2020) and Ding et al. (2020), in their studies on COVID-19 use Google search volumes to capture market-side uncertainty and show that stock prices strongly react to uncertainty reflected in Google search volumes. Cziraki et al. (2021), as well as, Maula & Lukkarinen (2022) argue that Google online search volume for firms accurately reflects investor attention and its global distribution. Along these lines, the studies approximate investor attention and asymmetry based on Google search volumes. Stock markets, particularly during a shock, mirror perceptions about uncertainty and resilience of investors, suppliers, and customers. Since search volumes capture these perceptions (Ramelli & Wagner, 2020), we believe that Google-based DOI, as a recognition-based measure for degree of internationalization is more efficient in capturing the hypothesized market mechanism than traditional, operations-based measures for degree of internationalization (Lyocsa et al., 2020). We use the globaltrends R-package to obtain country-level search scores from 2019 for the firms in our sample. Next, we compute the global dispersion of these search scores using an inverted Gini coefficient (Google-based DOI) to measure a firm’s degree of internationalization\(^5\).

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\(^5\) The formal specifications and further information on globaltrends can be obtained from the package documentation (Puhr, 2021) and the accompanying working paper by Puhr and Müllner (2021).
greater risk. To control for this effect on stock-market reactions of COVID-19, we add the ratio of market to book value of equity to our models. In addition, we control for industry, adding random industry intercepts to our models. To assess each firm’s industry classification, we rely on the Global Industry Classification Standard provided by MSCI.

6.4. Modelling strategy

In our hypotheses, we propose that, due to greater liability of foreignness, multinationality increases an MNE’s normal, or systematic, risk but, thanks to the asset of multinationality, also enhances its resilience to abnormal exogenous shocks. To test these hypotheses, we apply a two-stage modelling strategy. First, we estimate how multinationality increases systematic risk during times of relative stability. Next, we model the effect of multinationality on shock resilience during the COVID-19 pandemic. For the model’s first stage (Models 1-2), we regress systematic risk, measured as DS Beta (2019), on degree of internationalization DOI:

\[ DS Beta_{(2019)} = \alpha + \beta_1DOI + \beta_2control\ variables + \epsilon . \]

In the model’s second stage (Models 3-8), we use predicted DS Beta from stage 1 and degree of internationalization DOI to estimate cumulatively abnormal returns CAR to events related to COVID-19:

\[ CAR = \alpha + \beta_1DOI + \beta_2control\ variables + \beta_3DS Beta\ (predicted) + \epsilon . \]

We test our analysis for the three waves of the pandemic in the US. To test for fading shock resilience of multinational firms, we compare the coefficients of the three waves and test for equality of coefficients (Clogg et al., 1995). Furthermore, we pool all three waves and include the interaction of degree of internationalization DOI and wave indicator W (Model 9):

\[ CAR = \alpha + \beta_1DOI + \beta_2W + \beta_3DOI \times W + \beta_4control\ variables + \beta_5DS Beta\ (predicted) + \epsilon . \]

We estimate all regression models as linear mixed effects models with random industry intercepts and control for cumulative abnormal returns in the previous wave CAR (Wave-1) to avoid contaminating effects between the three waves. In Models 10-14, we re-run Models 1-9 but replace the inverted Herfindahl index by the Google-based DOI measure.

To expand the findings from our baseline analysis, we conduct Post-hoc tests (detailed results in the Online Appendix). First, we reconsider the relation between multinationality and systematic risk for February to June 2020, the early phase of the COVID-pandemic. To this end, we replicate Models 2 and 10 that relate Herfindahl DOI and Google-based DOI to DS Beta (2019) with DS Beta (Feb-Jun 2020) and DS Beta (Jul-2020) as dependent variables. We then compute Z-scores to test for differences between the coefficients (Clogg et al., 1995). Thereby, we analyze how the multinationality-risk relation evolved between 2019 (ergodic uncertainty) and the beginning of the COVID-19 pandemic (non-ergodic uncertainty). Second, we consider the impact of exposure to particularly hard-hit countries. In the early phase of the pandemic, China and Italy experienced a dramatic spread of COVID-19 infections. For firms, high exposure to these two countries therefore meant severely negative impact on their foreign operations. To control for the effects of high exposure to China and Italy, we replicate Models 4 and 11. In Models 19-20, we add the number of subsidiaries in China and Italy to the number of total subsidiaries as an indicator for exposure to the respective country. We also conduct the analysis based on exposure-data from Google Trends. Frist, we compute search scores in China and Italy for each firm. Next, we compare this search score to the firm’s search score in the US.

7. Results

7.1. Descriptive statistics

Table 2 shows the descriptive statistics for the sample. The median firm has 19,682 employees and controls 20.5 billion USD of assets. It generates 16.9% return on sales and makes 17.7% of its sales outside of the US. On average, firms have a DS Beta (2019) below one (0.993) and faced negative stock-market reactions to COVID-19 in the Waves 1 (-4.4%) and 2 (-3.4%). In Wave 3, however, average stock-market reactions were positive (4.4%). The correlation coefficients show that the model variables are mostly independent of each other (Table A1 in the Online Appendix). Across all our models, variance inflation factors are below 2.54. We observe low correlation between DS Beta (2019) and abnormal returns in Waves 1 CAR 2020-03-11 (0.103) and 2 CAR 2020-07-06 (0.085). However, we find that Beta (2019) is positively correlated with returns in Wave 3 CAR 2020-11-12 (0.378). This hints at differences between ergodic and non-ergodic uncertainty, as proposed in our hypotheses. Moreover, Herfindahl DOI is positively correlated to Google-based DOI (0.405). This indicates that both measures operationalize degree of internationalization but capture slightly different aspects of the construct.

7.2. Hypothesis tests

Models 1-9 in Table 3 show baseline results for the two stages used to test our hypotheses. In Model 1, we estimate systematic risk as DS Beta (2019) using control variables only. We observe that Return on Sales (p

| Variable | SD | Min. | Mean | Median | Max. |
|----------|----|-----|------|--------|------|
| DS Beta (2019) | 0.440 | -0.175 | 0.993 | 1.022 | 2.415 |
| DS Beta (Feb-Jun 2020) | 0.417 | 0.102 | 1.114 | 1.055 | 3.016 |
| DS Beta (Jul-Dec 2020) | 0.337 | -0.050 | 0.818 | 0.757 | 2.296 |
| CAR (10/10) 2020-03-11 | 0.152 | -0.832 | -0.044 | -0.020 | 0.386 |
| CAR (10/10) 2020-07-06 | 0.082 | -0.377 | -0.034 | -0.025 | 0.201 |
| CAR (10/10) 2020-11-12 | 0.146 | -0.275 | 0.044 | 0.014 | 0.806 |
| Herfindahl DOI | 0.307 | 0.000 | 0.425 | 0.479 | 0.974 |
| Google-based DOI | 0.154 | 0.001 | 0.189 | 0.152 | 0.700 |
| Foreign Sales to Total Sales | 0.234 | 0.000 | 0.228 | 0.177 | 1.000 |
| Foreign Assets to Total Assets | 0.217 | 0.000 | 0.170 | 0.106 | 1.000 |
| Foreign Subsid. to Total Subsid. | 0.276 | 0.000 | 0.365 | 0.380 | 0.998 |
| Total Employees | 129,718 | 0.175 | 55.360 | 19.682 | 2200 |
| Total Assets | 232,517 | 955 | 74,978 | 20,547 | 2,687,379 |
| Return on Sales | 0.125 | -0.418 | 0.196 | 0.169 | 0.655 |
| Financial Leverage | 0.229 | 0.119 | 0.666 | 0.669 | 2.532 |
| Market-to-Book Ratio | 91.428 | -1.423 | 3.622 | 3.293 | 1102 |
| Share of Subsidiaries China | 0.023 | 0.000 | 0.013 | 0.001 | 0.237 |
| Share of Subsidiaries Italy | 0.007 | 0.000 | 0.004 | 0.000 | 0.054 |
| Relative Score China | 1.870 | 0.000 | 0.460 | 0.000 | 27.925 |
| Relative Score Italy | 0.554 | 0.000 | 0.241 | 0.104 | 8.818 |

Notes: The sample consists of S&P 500 firms. DS Beta coefficients were obtained from Yahoo Finance. Cumulative abnormal returns were calculated using Wharton Research Services (WRDS) for (10/-10) event windows. The baseline specification uses 2020-03-11 in Wave 1, 2020-07-06 in Wave 2, and 2020-11-12 in Wave 3 as event dates (alternative dates as robustness checks available). Fundamental data for firms were sourced from Compustat and Orbis Bureau van Dijk. In our models, Total Employees and Total Assets were logged for better distribution. Variables for degree of internationalization were obtained from different sources. Information on foreign subsidiaries is derived from subsidiary lists in Orbis Bureau van Dijk. Google-based DOI is based on data from Google Trends. Data on foreign sales and foreign assets are extracted from SEC filings.
degree of internationalization. Models 3-8 are second stage models including predicted Beta and cumulative abnormal returns (CARs) from the preceding wave as all other coefficients remain unchanged. Next, we use coefficients from test Hypothesis 1, we add degree of internationalization as

efficients between Models 4, 6, internationalization on shock resilience, we test the equality of co





0.017) and Financial Leverage (p = 0.029) decrease Beta (2019). To test Hypothesis 1, we add degree of internationalization as Herfindahl DOI to Model 2. In line with Hypothesis 1, we observe a positive relation between Herfindahl DOI and DS Beta (predicted) (p = 0.000). Estimates for all other coefficients remain unchanged. Next, we use coefficients from Model 2, stage 1 of our analysis, to estimate systematic risk as DS Beta (predicted). We then use this prediction as independent variable in Models 3-9 of stage 2 where we estimate cumulative abnormal returns within a 21-day window (-10/-10) around start of each COVID-wave.

We analyze shock resilience in Wave 1 as CAR (-10/-10) 2020-03-11. In Model 3, comprising control variables only, Total Employees (p = 0.001) and Return on Sales (p = 0.000) increase abnormal returns. Total Assets (p = 0.000) and Financial Leverage (p = 0.030), on the other hand, decrease abnormal returns. We add Herfindahl DOI to Model 4. As corroboration for Hypothesis 2, we find a positive effect of Herfindahl DOI on CAR (-10/-10) 2020-03-11 (p = 0.010). In Models 5-6, we conduct the analysis for Wave 2 and control for abnormal returns in Wave 1 CAR (Wave-1). Results indicate that, in line with Hypothesis 2, the effect of Herfindahl DOI on abnormal returns CAR (-10/-10) 2020-07-06 remains positive (p = 0.000). We use Models 7-8 to analyze the effect of Herfindahl DOI on abnormal returns in Wave 3. As a control, we add abnormal returns from Wave 2 CAR (Wave-1) to the model. We observe a negative effect for Total Employees (p = 0.052) and Return on Sales (p = 0.000) and positive effects for Total Assets (p = 0.041) and DS Beta (p = 0.000). In addition, Herfindahl DOI (p = 0.998) loses its significantly positive effect on CAR (-10/-10) 2020-11-12. We consider the positive relation between degree of internationalization and abnormal returns in Waves 1 and 2 (Models 4 & 6) as support for Hypothesis 2.

To test Hypothesis 3, that posits a weakening effect of degree of internationalization on shock resilience, we test the equality of coefficients between Models 4, 6, & 8 (Clogg et al., 1995). We compute Z-scores for differences between the coefficients for Herfindahl DOI in each of the models. While we observe no difference between coefficients in Waves 1 and 2 (p = 0.347), we find greater effects for Herfindahl DOI in Waves 1 (p = 0.019) and 2 (p = 0.003) than in Wave 3. In Model 9, we pool data from all three waves and interact with an indicator for COVID-Wave. We find a positive effect of Herfindahl DOI on CAR (-10/-10) (p = 0.000). The negative interaction between Herfindahl DOI and COVID-Wave (p = 0.000) indicates that the effect of degree of internationalization on abnormal returns decreases between the three COVID-waves in our study. We see these findings as support for Hypothesis 3.

For our hypothesis tests in Models 1-9, we defined a firm’s multi-natality as its degree of internationalization in terms of within-country concentration of the firm’s operations measured by an inverted Herfindahl index. To complement this operations-based measure, we use Google-based DOI as an alternative, market-based operationalization. In Models 10-14 (Table 4), we replicate the tests from Models 1-9 with Google-based DOI instead of Herfindahl DOI. Results from the tests with Google-based DOI resemble those from models with Herfindahl DOI. In Model 10, we find that Google-based DOI increases DS Beta (p = 0.009). We also find that during Waves 1 (p = 0.021) and 2 (p = 0.001), Google-based DOI increased abnormal returns. During Wave 3 of the COVID-19 pandemic, the effect of degree of internationalization on abnormal returns vanished (p = 0.342). Again, we compute Z-scores for differences between the coefficients for Google-based DOI in each of the models (Clogg et al., 1995). As for Herfindahl DOI, we observe no difference between Waves 1 and 2 (p = 0.347) and find greater effects for Google-based DOI in Waves 1 (p = 0.019) and 2 (p = 0.003) than in Wave 3. In Model 14, we replicate the pooled analysis from Model 9. Again, we find that Google-based DOI increased CAR (-10/-10) (p = 0.000). As the interaction Google-based DOI × COVID-Wave (p = 0.002) shows, this effect diminishes between the COVID-waves. These results further
provide additional support for our hypotheses. These findings, positive coefficients for Herfindahl DOI as well as Google-based DOI, support our argument that multinationality provides market-side real options based on greater international recognition in addition to operational real options. In times of non-ergodic uncertainty, MNEs can leverage both to achieve superior shock resilience.

We illustrate this fading effect of multinationality on shock resilience in Figs. 3 and 4. Panel A of Fig. 3 shows a density plot for the effect of Herfindahl DOI in Models 4, 6, & 8. While there is a clear positive effect on abnormal returns in Wave 1 (red), the distribution for Wave 2 (green) moves closer to zero and becomes insignificant in Wave 3 (blue). In Panel B, we plot coefficient densities for Google-based DOI. Panel A of Fig. 4 illustrates the effect as an interaction plot for Model 9. While we find a positive relation between degree of internationalization and abnormal returns in Wave 1 (red), this relation flattens in Wave 2 (green) and turns slightly negative in Wave 3 (blue). In Panel B, we show the effects for Google-based DOI for each COVID-wave. These illustrations provide further support for our Hypotheses 2 and 3.

### 7.3. Post-hoc analyses

In the descriptive statistics (Table 2), we observe greater average systematic risk for the first phase of the COVID-pandemic, $DS\ Beta$ (Feb-Jun 2020) = 1.114, than for 2019, $DS\ Beta$ (2019) = 0.993. This increase is statistically significant ($p = 0.000$) and has been documented by practitioners (Horstmeyer & Vij, 2021). We also observe that systematic risk decreases as non-ergodic uncertainty about COVID-19 abates and returns to pre-crisis levels, $DS\ Beta$ (Jul-Dec 2020) = 0.818. The reduction, compared to Beta in February to June, is statistically significant ($p = 0.000$). We therefore analyze how the relation between degree of internationalization and systematic risk changes between phases of ergodic uncertainty (Hypothesis 1) and non-ergodic uncertainty. We present detailed results from this analysis in the Online Appendix.

We compute the increase in Beta from 2019 to February-June 2020 and plot it against degree of internationalization (Fig. A1). In Panel A, we observe a negative correlation between $Herfindahl\ DOI$ and $Change\ in\ DS\ Beta$ (-0.468, $p = 0.000$). Panel B shows $Change\ in\ DS\ Beta$ against $Google-based\ DOI$ and, again, indicates a negative correlation (-0.279, $p = 0.000$). Moreover, we re-run Models 2 and 10 with $DS\ Beta$ (Feb-Jun 2020) instead of $DS\ Beta$ (2019) as dependent variable (Table A2). Neither in Model 15 nor in Model 16, we find a positive relation between

corroborate our results from the analysis with $Herfindahl\ DOI$ and $Google-based\ DOI$.

### Table 4

| CAR (10/100 + 10) | 2020-03-11 | 2020-07-06 | 2020-11-12 | All Waves |
|-------------------|------------|------------|------------|-----------|
| Total             | 0.000      | 0.000      | 0.000      | 0.000     |
| Employees         | (0.058)    | (0.063)    | (0.060)    | (0.055)   |
| Total Assets      | -0.027     | -0.216***  | -0.284***  | -0.117*** |
| (log)             | (0.054)    | (0.060)    | (0.057)    | (0.053)   |
| Return on Sales   | -0.103**   | -0.250***  | -0.150***  | 0.048     |
| (predicted)       | (0.041)    | (0.052)    | (0.047)    | (0.042)   |
| Financial         | -0.081**   | -0.137***  | -0.062     | -0.045    |
| Leverage          | (0.037)    | (0.046)    | (0.042)    | (0.038)   |
| Market-to-Book    | -0.001     | 0.025      | 0.016      | 0.001     |
| Ratio             | (0.033)    | (0.037)    | (0.036)    | (0.033)   |
| Google-            | 0.098***   | 0.114**    | 0.146***   | -0.039    |
| based DOI         | (0.038)    | (0.050)    | (0.044)    | (0.041)   |
| COVID-Wave        | 0.000      | -0.100***  | -0.039     | 0.266***  |
|                   | (0.032)    | (0.032)    | (0.032)    | (0.032)   |

Notes: Models 10–14 replicate our results using the degree of internationalization based on data from Google Trends. Model 10 introduces the first stage-regression using pre-crisis $DS\ Beta$ (2019) as dependent variable and $Google-based\ DOI$. Models 11-13 are second stage models including predicted Beta and cumulative abnormal returns (CARs) from the preceding wave as control variables. Like in the baseline specifications, firms’ CARs for the baseline event days of the COVID-waves (2020-03-11, 2020-07-06, and 2020-11-12) serve as dependent variable. Model 14 pools the data from three waves in a single model and interacts the COVID-wave indicator with $Google-based\ DOI$. We indicate p-values as follows: *p < 0.1; **p < 0.05; ***p < 0.01; standard errors in parentheses.

![Fig. 3. Coefficient density plots for COVID-waves in the US](image-url)

Notes: Fig. 3 provides density plots for coefficients on our respective measures on firm multinationality (x-axis) in Models 4, 6, and 8 with $Herfindahl\ DOI$, as well as Models 11-13 with $Google-based\ DOI$. Waves 1 (red) and 2 (green) exhibit strong positive coefficients indicating superior shock resilience of firms with greater multinationality. Wave 3 (blue) shows no clear and significant pattern related to degree of internationalization.
degree of internationalization and Beta. Instead, we find negative effects for Herfindahl DOI \((p = 0.080)\) and Google-based DOI \((p = 0.108)\). For a comparison, we compute Z-scores (Clogg et al., 1995) for the coefficients of Herfindahl DOI in Models 2 and 15 \((p = 0.000)\), and Google-based DOI in Models 10 and 16 \((p = 0.002)\). In addition, we compute Beta for Waves 2 and 3 (July to December 2020). In Models 17 and 18, we re-run the analysis with DS Beta (Jul-Dec 2020) as depend variable. In both models, the relation between degree of internationalization and Beta turns positive (Herfindahl DOI \(p = 0.271\), Google-based DOI \(p = 0.003\)). We consider these findings as support for the notion that CAPM becomes less reliable as non-ergodic uncertainty increases and that this effect reverses over time.

In the early phase of the COVID-19 pandemic, China and Italy were among the countries hit worst. We analyze whether multinationality also contributes to shock resilience when accounting for exposure to China and Italy (Table A3 in the Online Appendix). In Models 19 and 20, we re-run baseline Model 4 for Wave 1 with an indicator for exposure to China and Italy, respectively. In both models the effect for Herfindahl DOI remains positive \((p = 0.000, p = 0.018)\). We also observe that greater foreign exposure to Italy, Share of Subsidiaries Italy, reduces abnormal returns \((p = 0.001)\). In addition, we replicate the analysis with the Google-based DOI measure and operationalize exposure to China and Italy with Google data. In Models 21 and 22, the effects for Google-based DOI remain robust. These findings indicate that multinationality contributes to shock resilience despite exposure to countries that were hard-hit by COVID-19. Yet, such exposure seems to slightly reduce the benefits of multinationality.

### 7.4. Robustness checks

Several robustness checks allow us to reaffirm the results from baseline Models 1-9. We separate these robustness checks into three groups: other measures for degree of internationalization, different CAR specifications, and alternative model structures. We present these robustness checks in Tables A4–12 of the Online Appendix. In Tables A13–17, we replicate the robustness checks with Google-based DOI instead of Herfindahl DOI.

In Table A4, we replace the country-based inverted Herfindahl index, as our main measure for degree of internationalization, with the region-based measure of concentration Herfindahl-region DOI (Kim et al., 2006). Results from Models 23-26 resemble those from our base analysis. We observe that Herfindahl-region DOI increases systematic risk in stage 1. During the first and second COVID-waves, Herfindahl-region DOI leads to greater abnormal returns. As expected, we do not find these effects during Wave 3.

In addition, in Tables A5–7, we use foreign sales to total sales, foreign assets to total assets, and number of foreign subsidiaries to number of total subsidiaries as measures for degree of internationalization (Olibe et al., 2008; Ou & Shyu, 2009; Reeb et al., 1998). For all three alternative measures, we observe positive effects on systematic risk in stage 1 (Models 27, 31, and 35). In stage 2, we find positive effects of Foreign Sales to Total Sales, Foreign Assets to Total Assets, and Foreign Subsidiaries to Total Subsidiaries on abnormal returns in Wave 1 (Models 28, 32, and 36) and Wave 2 (Models 29, 33, and 37). In Wave 3, effects for all three measures vanish (Models 30, 34, and 38). The highly robust findings highlight the validity and reliability of our proposed measure for degree of internationalization.

In Table A8, we test the robustness of our results to alternative computations of cumulative abnormal returns in response to COVID-19. The baseline models use cumulative abnormal returns estimated for a 21-day window around March 11th in Wave 1, July 6th in Wave 2, and November 12th in Wave 3. For the robustness checks, we selected alternative dates based on changes in infection rates to capture the COVID-wave’s dynamics. As a robustness check, we compute cumulative abnormal returns for additional key dates: Wave 1—March 6th and 13th, Wave 2—July 1st and 8th, Wave 3—November 5th and 19th. In addition, we use shorter abnormal return windows of eleven days (-5/+5) for our baseline key dates (Table A9). We observe that the effects for Herfindahl DOI are robust across a variety of alternative abnormal return specifications. These findings underline that the validity of our findings is not contingent on a particular measurement of cumulative abnormal returns. We show robustness checks for abnormal return specification using Google-based DOI in Tables A13 and 14.

As a complement to the robustness checks above, we use additional model specification and subsample analysis. To control for effects from model structure, we replicate our baseline linear mixed-effects models as OLS regressions with industry fixed-effects (Table A10). Positive effects in stage 1 and Wave 1-2 for Herfindahl DOI remain robust. In Table A11, we show that our results for the second stage also hold when using observed Beta rather than predictions from stage 1. Since COVID-19 may have a different impact on healthcare and pharmaceutical firms, we exclude firms from this industry. Effects of Herfindahl DOI remain robust in both model stages (Table A12). We show robustness checks for alternative model specifications using Google-based DOI in
8. Discussion

In this paper, we separate two antipodal effects of multinationality on firm risk and we explain how the trade-off between these antipodal effects is contingent on the uncertainty of the environment—ergodic vs. non-ergodic. Specifically, we first analyze firm’s systematic risk due to liability of foreignness in a time of relative stability and prior to an exogenous shock. In line with previous literature, we show that, due to greater risk exposure, agency cost, and particularly liability of foreignness, multinationality generally increases systematic risk (Reeb et al., 1998). From this systematic risk, we distinguish resilience to exogenous shocks in the form of lower negative abnormal stock returns. We hypothesize and show that during times of extreme shocks and non-ergodic uncertainty, highly internationalized firms experience lower negative abnormal stock returns. This is because organizational learning during their internationalization endows MNEs with an asset of multinationality that allows for superior flexibility during shocks. Thus, as non-ergodic uncertainty increases in the early phase of the shock, multinationality provides MNEs with greater shock resilience and allows them to attract fleeing investors. However, as the shock-induced crisis proceeds (Williams et al., 2017), non-ergodic uncertainty subsides over time as less internationalized firms learn about the causes and effects of the exogenous shock and make up for the initial advantage of MNEs (Bundy et al., 2017). As a result, the resilience enhancing effect of multinationality gradually fades over time.

8.1. Managerial relevance

Managers take decisions and define strategies based on extreme, non-ergodic events (Andriani & Mckelvey, 2007, 2009) rather than “normal”, ergodic developments that are the focus of most management and strategy scholarship (Beamish & Hasse, 2022). However, forecasting and understanding of these “fat tail” events is still erroneous (Makridakis & Taleb, 2009; Taleb et al., 2009). Given persistent uncertainty due to exogenous shocks in global value chains (Buckley, 2021; Delios et al., 2021; McKnight & Linnenluecke, 2019; Zahra, 2021), our findings have some implications for practice. Our results highlight a previously undocumented trade-off in the managerial decision to internationalize. Much of the existing empirical literature argues that multinationality increases systematic risk and, consequently, capital market risk premium. Our theoretical framework and empirical results, however, add that multinationality increases resilience to exogenous shocks in times of non-ergodic uncertainty. Such shock resilience is particularly important in industries and firms with high costs of financial distress. The more financial distress a firm faces, the more it should be willing to invest in the asset of multinationality to generate resilience. However, as our results indicate, the resilience of MNEs fades as less internationalized firms learn about the exogenous shock and investor assumptions converge towards a “New Normal”. Consequentially, MNEs should inform investors explicitly of their internationalization efforts and the shock resilience they generate (Bansal & Clelland, 2004; Bundy et al., 2017). Even more so, as the growing importance of automated production and the ongoing “Zoomification” of global teams reduce the location-dependence of operations (Brakman et al., 2021; Caligiuri et al., 2020) and enhance the potential of multinationality for shock resilience. This gives MNEs the opportunity to emphasize the long-term benefits of shock resilience (Ortiz-de-Mandojana & Bansal, 2016) thanks to multinationality. If MNEs succeed in educating shareholders of the benefits of their assets of multinationality, shareholders become less sensitive to financial market sell-offs during exogenous shocks and navigate more successfully through times of economic distress.

8.2. Contributions

Our study aims at four theoretical contributions to the literature in IB. First, by acknowledging an advantage in shock resilience for MNEs, we contribute to the long-standing discussion on the relation between multinationality and risk. To this debate, we add a positive aspect (i.e., asset of multinationality) that may counter detrimental consequence of liability of foreignness. Second, we extend the theoretical trade-off between multinationality and firm risk by identifying the prevailing type of uncertainty (non-ergodic vs. ergodic) as a defining contingency. However, we also observe that the relative prevalence of non-ergodic uncertainty is dynamic and gradually shifts back towards ergodicity as firms learn and adapt. Third, our theory and findings provide novel insights into the sources of the resilience advantage of highly internationalized firms. On the one hand, MNEs suffer from liability of foreignness, greater systematic risk (Kwok & Reeb, 2000; Olihe et al., 2008)—they are “foreign to all” their host countries. On the other hand, their exposure to foreign markets allows MNEs to learn about these markets and thereby provides them with an asset of multinationality, since they are “fluent in many” of their host countries. Specifically, the knowledge gained from multinationality translates into operational and market-side real options that can be exercised by firms in times of uncertainty (Hartwell & Devinney, 2021). Investors appraise such real options and thereby support the value of internationalized firms. In sum, assets of multinationality dominate the trade-off between the benefits and costs of multinationality when markets experience extreme shocks of non-ergodic uncertainty that require substantial operational and market-side adjustments (i.e., real options) by firms. From a managerial perspective, this implies that risk incurred by multinationality, is an investment—much like insurance—to increase the value of the MNE’s asset of multinationality and its shock resilience. This provides MNEs with competitive advantage under the globally persistent and increasing VUCA conditions (Buckley, 2020; Delios et al., 2021; Kano & Oh, 2020; Zahra, 2021). As non-ergodic uncertainty gradually abates, less internationalized firms can learn about the exogenous shock and adapt their strategies to the new post-shock reality. Taking the viewpoint of domestic and less internationalized firms, our findings highlight the Schumpeterian effect of extreme shocks that forces firms to learn, adapt, and catch up with highly internationalized firms that initially are at a knowledge advantage. From the perspective of MNEs, this implies that the knowledge advantage from internationalization is not static but may become the victim of creative destruction by domestic or less internationalized firms.

Fifth and in addition to these theoretical contributions, we intend to add to methodology in IB. While most studies in IB consider degree of internationalization from an operations-based perspective, we supplement this view with a market-based measure for degree of internationalization and show that this market-side internationalization also contributes to our hypothesized resilience advantage of MNEs. We apply data from Google Trends to introduce a novel and uniquely versatile measure for multinationality that captures the global distribution of consumer and market perceptions about MNEs. To this end, we use country-level time series of search volumes on the Google search engine to measure degree of internationalization and market-side real options. We use the measure as a novel approach to measure firms’ multinationality in the eyes of market participants and to provide an approach to measuring internationalization beyond operations. Yet scholars can also apply our approach to study the global footprint of many other concepts related or relevant to management. For example, data from Google Trends can be used to study global recognition of products, brands, persons, or organizations. It can be applied to study the proliferation of ideologies, trends, and values within and across countries. As such, the application of data from Google Trends provides a myriad of empirical opportunities in Journal of World Business and beyond.
8.3. Limitations and future research

Naturally, our research has some limitations that point to potential avenues for future researchers. Using the COVID-19 pandemic as an empirical laboratory to study shock resilience, the question is if the protecting effect of the asset of multinationality is the same in other types of exogenous shocks or crises of different magnitudes. We selected the COVID-19 pandemic purposively because of its extreme and abrupt nature and the opportunity to trace changes in uncertainty across clearly identifiable waves. Future researchers could look at other events, like the Brexit vote, to test if the asset of multinationality protected British firms against negative market reactions.

In addition, we use firms’ stock prices to measure systematic risk and shock resilience. Using on the parameters of Beta and abnormal returns, we focus on capital markets’ appraisal of firm value in different states of uncertainty. As such, our focus is on financial value reflected in investors’ expectations. To study the relation between multinationality, ergodic uncertainty, and non-ergodic uncertainty, we intentionally do not study or theorize on operational performance effects of multinationality. Though our findings suggest that MNEs may face lower stock market valuations due to greater systematic risk, we also observe higher valuations during an exogenous shock. Future research should therefore investigate whether greater shock resilience translates into long-term performance benefits for MNEs. Deviation from our study’s perspective on risk/uncertainty towards an accounting perspective will provide valuable insights on how MNEs leverage their asset of multinationality to mitigate the impact of exogenous shocks (e.g., production shifts, supply chain strategies).

9. Conclusion

Does risk affect MNEs with expansive foreign operations more negatively than their domestic peers or does multinationality enhance resilience and thereby reduce the negative impact of risk? In this study, we respond to this question with a definite “It depends.” During times of relative stability and ergodic uncertainty, negative effects from liability of foreignness dominate and greater multinationality results in greater risk. In times of exogenous shock and non-ergodic uncertainty, however, positive effects from the asset of multinationality enhance resilience and firms with greater multinationality are affected less negatively by risk (Table 1). To conclude, this study underlines that multinationality creates liabilities as well as assets. Yet whether liabilities or assets dominate the relationship between risk and multinationality is contingent on the type of environmental uncertainty firms face.

Supplementary materials

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