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Geographical diversification revisited: Examining context to date and moderating effects of crisis

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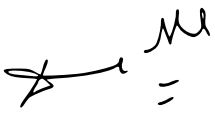
I hereby declare that this PhD dissertation is my original work
and it has been written by me in its entirety.
I have duly acknowledged all the sources of information
which have been used in this dissertation.

This PhD dissertation has also not been submitted for any degree
in any university previously.



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Abstract

**Geographical Diversification Revisited:
Examining Context to Date and Moderating Effects of Crisis**

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This study seeks to revalidate existing research insights on the relationship between internationalization and firm performance and to examine the role of the Global Financial Crisis (GFC) as a potential moderator to this relationship. The research uses a longitudinal database of US-listed manufacturing companies over the period 2000-19. It employs a foreign market penetration-based construct as well as a foreign production-based construct of internationalization and uses a fixed effects linear regression model for the analysis.

The study suggests that the relationship between foreign market penetration-based internationalization and firm performance shows a declining trend over the past two decades. This may not be a negation of the generally accepted relationship (inverted-U or S-shaped) but a reflection of the data set used and the economic conditions of the study period. The trend towards co-movement of global business cycles has eroded the benefits of internationalization while factors like protectionism and political and foreign currency risk continue to create challenges for diversified firms. Foreign Production based internationalization, on the other hand, does not have a significant relationship with firm performance.

Further, the GFC negatively moderated the relationship in the case of Foreign Market Penetration based internationalization. This could be due to heightened protectionism, increased complexity and cost pressures induced by the crisis. The moderation impact of the GFC in the case of Foreign Production was not significant. This can be attributed to the fact that the strong negative effects mentioned above were attenuated by the benefits of strong subsidiary linkages (i.e. financial support as well as internal markets in the case of vertical linkages.)

Finally, and drawing from these points, the study also suggested that the negative moderation impact of the GFC on firm performance was stronger in the case of foreign market penetration-based internationalization than in the case of foreign production -based internationalization.

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Acknowledgement

I would like to thank my dissertation supervisor Professor David GOMULYA and the committee members Professor TAN Wee Liang and Professor Denis LEUNG Heng Yan for their support and guidance throughout the research and dissertation process. Their feedback pushed me to sharpen my ideas, improve my arguments and tighten the communication in the dissertation document. Their contributions have been invaluable and have helped me tremendously in my learning and research journey.

Dedication

This work is dedicated to my husband Aniruddha and daughter Kavya both of whom have been a source of joy and strength to me and to the professors who have inspired and guided me on my PhD journey.

1. Executive Summary

This research seeks to renew and deepen our understanding of the relationship between internationalization and firm performance and to examine the role of the Global Financial Crisis as a potential moderator to this relationship. The research investigates internationalization as both, a foreign market penetration-based construct as well as a foreign production-based construct and uses an entropy-based operationalization measure. It focuses on the following 3 hypotheses:

Hypothesis 1: The Global Financial Crisis (2008-09) negatively moderated the relationship between foreign market penetration-based internationalization and firm performance.

Hypothesis 2: The Global Financial Crisis (2008-09) negatively moderated the relationship between foreign production -based internationalization and firm performance.

Hypothesis 3: The moderation impact of the Global Financial Crisis (2008-09) was stronger in the case of foreign market penetration-based internationalization than in the case of foreign production -based internationalization.

The sample used is a longitudinal database of US-listed manufacturing companies over the period 2000-19. The research employs a fixed effects linear regression model and incorporates linear and quadratic

terms for internationalization with crisis as a moderator variable. The study offers 5 broad conclusions:

- The relationship between foreign market penetration based internationalization and firm performance shows a declining trend over the past two decades. This may not be a rebuttal of the generally accepted relationship (inverted-U or S-shaped) but the result of the data set used and the specific economic conditions prevailing. The trend towards co-movement of global business cycles has eroded the benefits of internationalization while factors like protectionism and political and foreign currency risk continue to create challenges for diversified firms.

- On the other hand, Foreign Production based internationalization does not have a significant relationship with firm performance. This could be on account of the economic and structural factors (eg. decrease in the global average return on foreign investment and policy uncertainty and protectionism) that are affecting FDI and asset ownership.

- In terms of the hypotheses, the study concludes that heightened protectionism, increased complexity and cost pressures during the Global Financial Crisis (GFC), led to a negative moderation impact of the GFC on the relationship between internationalisation and firm

performance. The moderation impact in the case of Foreign Market Penetration was significant.

- The moderation impact of the GFC in the case of Foreign Production was not significant, This could be due to the fact that the strong negative effects mentioned above were attenuated by the benefits of strong subsidiary linkages (i.e. financial support as well as internal markets in the case of vertical linkages.)

- Finally, drawing from the theorizing and conclusions in the two points above, the study supported the hypothesis that the negative moderation impact of the GFC on firm performance was stronger in the case of foreign market penetration-based internationalization than in the case of foreign production -based internationalization.

2. Introduction

International diversification represents a firm's expansion beyond its domestic market. The most commonly used dimension for international diversification is foreign market penetration i.e. accessing foreign markets for generating foreign sales. Hitt et al. (1997b) define internationalization as "a strategy through which a firm expands the sales of its goods or services across the borders of global regions and countries into different geographic locations or markets."

There are however many ways in which a firm can be a “multinational”. Madan Annavarjula and Sam Beldona (2000) suggest three possible dimensions: the first based on operations (eg. foreign sales, subsidiaries, or employees), the second based on ownership (i.e., the extent to which a firm owns value generating assets abroad) and the third based on orientation (i.e., attitudinal posturing of the firm in terms of its vision, strategy, and structure.) Thomas and Eden (2004) suggest three measurable dimensions: (1) Foreign market penetration or the dependence on foreign markets (2) Foreign production presence and (3) Country scope. Hennart (2011) identifies an additional fourth dimension in terms of the degree of diversity of markets that the firm operates in.

Some authors consider the different dimensions of internationalization to be distinct and independent in their characteristics and impact. There are other authors who have sought to integrate the different dimensions of internationalization into a single composite measure (Sullivan, 1994a; Thomas & Eden, 2004).

Internationalization began to gain research attention in the mid-1970s. Early researchers focused on explaining the existence of multinational enterprises (MNEs) using the Coasian theory of internalisation. The Coasian theory, which had evolved in the context of the industrially diversified organization, posited that hierarchical industrial organizations or conglomerates emerge when firms attempt to internalize processes

that the market cannot provide for efficiently. In a similar fashion, it was argued that MNEs arose when international markets failed.

Besides the above “origin theory”, other research concepts developed for industrial organizations also provided inspiration for research in MNEs. For instance, theories such as the resource-based view (RBV) of the firm and transaction cost economics (TCE) suggested that mechanisms that drive growth and performance in industrially diversified firms closely resembled those that operated under internationalization. For instance, transaction cost economics, organizational learning, agency theory, risk diversification and real options theory apply to both industrial and international diversification. Hence, to some extent, internationalization could be seen as a special case of business segment diversification (Fouraker & Stopford, 1968).

Internationalisation has emerged as an important explanatory variable for critical firm specific outcomes such as market power, firm growth, performance, value, and risk. Accordingly, the research interest in this topic has deepened and broadened across multiple disciplines e.g., finance (Riahi-Belkaoui & Alnajjar, 2002), strategy/ International Business (Buckley & Casson, 2009), Organization Learning (Ruigrok & Wagner, 2003), risk management, and marketing (Kotabe et al., 2002). The research insights across these disciplines have been rich and diverse and have uncovered many different facets of internationalization.

Notwithstanding this vast body of extant literature, internationalization remains relevant as a research topic and also a topic where additional insights remain to be uncovered. Most of the existing research in this domain belongs to the pre-internet and pre-Global Financial Crisis age. Hence, research insights need to be updated for the current context. Also, reviews of internationalisation literature continue to highlight research gaps and theoretical and methodological criticisms (Hennart, 2011; Kingsley et al., 2017). **Hence, while past research has provided a strong foundation, internationalization remains a topic of theoretical and practical importance for research today**.

In this research, the terms internationalization, international diversification, multi-nationalism, geographic diversification, and geographic segment diversification (GSD) have been used interchangeably. Internationalization has been studied along two dimensions i.e., foreign market penetration and foreign production. Finally, internationalization has been explored as an inter-regional concept (and not an intra-regional concept.)

3. Research Objective(s)

This research seeks to renew and deepen our current understanding of internationalisation (as a foreign market penetration construct and a foreign production construct) and its relationship with firm performance under the current market conditions. It focuses on two specific research objectives:

a. to **revalidate received knowledge** on the relationship between internationalisation (foreign market penetration and foreign production) and firm performance by analysing a broader and more current data set and by incorporating methodological improvements.

b. To **examine the Global Financial Crisis as a potential moderator** that may influence the relationship between the two dimensions of internationalization and firm performance.

We examine the relevance of the above-mentioned objectives in the following paragraphs.

As regards the first objective, there have been significant political, economic, and business changes over the past 20 years that warrant a revalidation of received wisdom. Following are some of the examples of recent changes in the environment:

a. **Rapid improvements in transport, communication and logistics** are positively impacting the cost dynamics of operating overseas and are facilitating tighter global supply chains.
b. An increase in the **political trend towards protectionism** has begun to impact the risks and returns for expanding internationally.
c. The **increasing use of collaborative arrangements and networks** has had a direct impact on the traditional construct and theories of internationalization.
d. The World Investment Report (2018) reported a **decline in FDI returns** on account of structural changes such as reduced fiscal and labour-cost arbitrage opportunities in international operations.
e. Finally, there is evidence that the **international trade, vertical linkages in production and FDI are contributing to greater integration of the business cycles across different countries** (di Giovanni & Levchenko, 2010; Jansen & Stokman, 2004). They may in turn have an impact the diversification benefits of internationalization.

All the above factors indicate important changes in the context in which internationalization operates and such changes can potentially impact its effects on firm performance.

The second objective mentioned above focuses on the **Global Financial Crisis as a moderator**.

While the relationship between geographical diversification and risk has been widely covered in research studies, there has been relatively little focus on large exogenous risk events such as the Global Financial Crisis (GFC). The GFC merits attention for many reasons. First, it is the most recent large-impact crisis for which archival data is available. Second, contrary to the pre-GFC view that the world economy had entered a state of low volatility (dubbed the Great Moderation) due to improved monetary policy (Leeson et al., 2013), the GFC firmly established that economic cycles had not been eradicated and that events such as the GFC are likely to recur periodically. Hence, businesses should remain vigilant to economic shocks. Finally, the GFC confirmed the theory that financial crises result in severe credit contraction thereby transmitting financial market dislocations into the real economy. Hence, building resilience to such credit shocks is vital for business survival.

4. Literature review

In line with the overarching research objectives, this literature review is organized in three parts.

The first section covers previous studies that have investigated the relationship between internationalization and performance. This helps build a foundation for revalidating the relationship.

The second section covers internationalization and risk. The reason for focusing on risk is that the GFC which is arguably the largest exogenous risk event in recent history has been explored as a potential moderator.

The third section explores literature that focus on the two dimensions that measure the depth of internationalisation i.e., foreign market penetration and foreign production.

4.1. Relationship between Internationalization and Performance

The relationship between internationalization and performance has received significant research attention. However, despite the large number of studies done in this space, the findings have been mixed. This is, in part, because the variables involved are complex and multi-faceted, and methodologies employed are diverse. There are 4-5 different methods of operationalizing internationalization. Similarly, performance

has been operationalized based on accounting or market-based measures. Additionally, the relationship itself is deeply complex, nuanced and is significantly influenced by context.

The relationships hypothesized vary from linear declining (Denis et al., 2002; Riahi-Belkaoui & Alnajjar, 2002), linear increasing (Grant et al., 1988), U-shaped (Capar & Kotabe, 2003; Lu & Beamish, 2001; Ruigrok & Wagner, 2003; Yip et al., 2006), inverted U (Elango & Sethi, 2007; Gomes & Ramaswamy, 1999; Hitt et al., 1997b; Qian et al., 2008, 2010), and S-shaped (Contractor et al., 2003; Lu & Beamish, 2004; Thomas & Eden, 2004) to nil or minimal impact (Brewer, 1981). Please refer to Appendix 1 for a summary of past research.

The positive relationship (or positive section of the curvilinear relationship) is explained by factors such as internalization theory (Caves, 1971; Morck & Yeung, 1991), economies of scale and learning as a mechanism to build firm specific advantages (Teece, 2014). The negative relationship is attributed to factors such as agency cost and managerial inefficiencies, increase in coordination costs, liability of foreignness, overinvestment, and cross-subsidization (Berger & Ofek, 1995; Denis et al., 2002).

More recent studies have pointed out theoretical and empirical limitations in internationalization-performance research. For instance, Abdi & Aulakh (2018) indicate that traditional research models overlook

the duration-dependent nature of the relationship and do not factor the impact of the scale effects of internationalization by comparing similar sized domestic firms. In their study of 2,620 US manufacturing firms over the period 1976–2008 they corrected for these limitations and found that internationalized firms generally underperform their domestic counterparts. This negative relationship changes only after the internationalized firms accumulate of experience, which in turn can take several years (- up to a decade.)

Hennart (2007) points out that theoretical rationale for the multinationalism-performance relationship (especially transaction cost/ internalisation) does not necessarily imply a one way positive relationship. Hennart (2011) argues that multinationalism is the result of a firm trying to optimize between internalization and market access. Firms internationalize only when they believe the net gains will be positive. Each firm has a firm-specific optimum internationalization level and profitability impact of internationalization comes from firms having made the wrong choice and being over-internationalized or under-internationalized compared to the optimum.

Despite the divergent results, taken cumulatively, the inverted U-relationship and the S-shaped relationship (which represents a unified theory combining the U and inverted U theories), have found the most support over the years. However, they deserve

further exploring and revalidation given the complex and nuanced nature of the underlying relationship.

4.2. Internationalization and Risk

Risk is central to any internationalization decision. MNEs are more than just cross-national extensions of domestic firms. Given that these firms are subject to multiple legal jurisdictions and operate in diverse cultural, political and currency environments, they have unique and substantially different characteristics to domestic firms. Expanding across multiple geographies is more complex and requires greater commitment than expanding across multiple product segments (Sundaram & Black, 1992).

Risk has been operationalized in a variety of ways in internationalization research. Some of the more commonly used measures include volatility in earnings (A. M. Rugman, 1976a), volatility in investors returns (Hughes et al., 1975), survival (Shaver, 1998a) and loss (Figueira-de-Lemos & Hadjikhani, 2014). Risk can also take the form of uncertainty (Vahlne & Johanson, 1977) and uncertainty can further be bifurcated as pure uncertainty, which is unchangeable and contingent uncertainty, which can be reduced through knowledge and learning (Figueira-de-Lemos et al., 2011).

Several studies have pointed to the risk reducing role of internationalisation. Following the line of Markowitz (1959), a number of internationalization studies have highlighted the benefits of diversification on reducing systematic risk (A. M. Rugman, 1976a; Shapiro, 1978). On the other hand, arguments of operational flexibility (Chang et al., 2016b) and the “escape hypothesis” (Rumelt, 1986), point to the benefits of Real Options Theory (Li & Rugman, 2007). There is also evidence that international diversification at a firm level solves for incomplete capital markets from an investor perspective and hence contributes to excess value (Agmon & Lessard, 1977). On the other hand, there is also evidence of a positive relationship between internationalization and systematic risk (measured using portfolio beta) on account of the countervailing effects of foreign exchange risk, political risk, agency problem, asymmetric information, and managers' self-fulfilling prophecy (Baek et al., 1998). Specifically, this occurs when the additional risk that an internationalized firm faces (eg. political risk, foreign exchange risk etc) is greater than the decrease in risk due to uncorrelated markets. One can therefore conclude that internationalization may generally reduce risk due to diversification benefits, however the outcome depends on whether the costs and risks outweigh the benefits.

Additionally, research also suggests that the risk reducing impact of diversification is also dependent on the correlation across world markets and the co-movement of the business cycle across countries (J. Lee et

al., 2018). A study on firm level stock returns for 3200 US multinationals from 1987 to 2009 indicates that MNCs with affiliates in countries where shocks correlate more with the home country and where entry costs are high tend to have higher risk premia (Fillat et al., 2015).

A number of factors such as cultural distance (Reuer & Tong, 2007a), stage of entry (Johanson & Wiedersheim-Paul, 1975), ownership structure (David et al., 2010), and knowledge and experience (Figueira-de-Lemos et al., 2011) have been studied as moderators for the relationship between risk and internationalization.

A review of 134 peer-reviewed journal articles published between 1971 and 2018 on internationalisation and risk suggests that given the complex and conflicting nature of the results, more research is needed to understand the gap between the potential and realised benefits from internationalisation (Eduardsen & Marinova, 2020). Also, prior studies examining the impact of internationalisation on risk are restricted to a limited number of contexts and future research should broaden the contexts examined in view of understanding the transferability of findings.

4.3. Dimensions of Internationalization

Foreign market penetration and foreign production are two important dimensions that represent the depth of internationalization in overseas markets. Of the two measures, foreign market penetration is the more

commonly used measure, and it is typically operationalized using the variable of foreign sales. Foreign production, on the other hand, is typically operationalized through variables like the proportion of foreign assets, level of Foreign Direct Investment and/ or foreign employment (Blonigen, 2001; Daniels & Bracker, 1989; Sambharya, 1995; Thomas & Eden, 2004).

The two dimensions of depth have been found to be linked in terms of their evolutionary sequence (Conconi et al., 2016; Vahlne & Johanson, 1977) and are occasionally complementary and occasionally substitutable (Blonigen, 2001; Svensson, 1996). Despite these close inter-linkages, there are theoretical reasons that suggest that they impact firm performance through different causal mechanisms. Table 1 summarizes 14 causal arguments that operate under these two dimensions.

Table 1: 14 Arguments that explain the impact of foreign market penetration-based internationalisation and foreign production-based internationalisation on firm performance

	Mechanisms that operate under Foreign Market Penetration-based internationalisation	**Mechanisms that operate under Foreign Production-based internationalisation**	**Mechanisms that operate under both Foreign Market Penetration-*and* Foreign Production-based internationalisation**
Positive Impact on Firm Performance	• Lower systematic risk due to diversification across markets with asynchronous business cycles and multi-currency cash flows (Hughes et al., 1975; A. M. Rugman, 1976a; Shapiro, 1978)	• Access to cheaper inputs abroad and global rationalization of the value chain (Dunning, 1981) • Scale economies of amortization of R&D/ intangible assets/ HQ overheads (Markusen, 1984) • Access to foreign lenders due to reduced information barriers resulting from foreign asset ownership (Houston et al., 2017)	• Economies of scale and higher productivity (Chaney, 2013; Chen & Tang, 1990; Thangavelu & Owyong, 2003) • Access to foreign knowledge and experience that the firm lacks i.e. learning by exporting (Loecker, 2013; Martins & Yang, 2009; Salomon & Shaver, 2005) • Access to credit during periods of credit constraints (Chang et al., 2016a; Jang, 2017) • Operational flexibility to navigate varying economic and business conditions (Chang et al., 2016a)

Negative Impact on Firm Performance	• High costs of market access (e.g. transport and logistics) (Conconi et al., 2016)	• Global value chain complexity (Gereffi et al., 2005)	• Agency risk and poor decisions related to internationalisation (Denis et al., 1997) • Exposure to foreign market risk eg. political risk, foreign currency risk etc (Baek et al., 1998) • Organizational complexity and duplication (Reuer & Tong, 2007b) • Liability of foreignness (Qian et al., 2013)

These mechanisms can result in very different firm performance outcomes under Foreign Market Penetration and Foreign Production. Rugman et al (2011) recommends a typology for foreign subsidiaries based on their activity in the value chain i.e., innovation, production, sales and administrative support activities. Each value chain activity represents a different combination of internal competences and accessible, external location advantages and hence represents a different level of impact on the overall firm performance. It is important to also note that foreign operations models are not discrete choices but may represent combinations of configurations (Asmussen et al., 2009; Benito et al., 2011).

A study of 116 US companies representing the eight largest industry groups in Forbes over the period 1974-83 suggested that while returns on sales and assets both increased with increased dependence on foreign sales and foreign production, the firms in aggregate were less able to continue increasing returns by higher internationalization of production (Daniels & Bracker, 1989). This research was done during a period of high dollar volatility and hence may not necessarily hold true under other circumstances. Nevertheless, it is noteworthy. In another study covering 42,529 firm-year observations for U.S. nonfinancial corporations during the period 1984-97, Click & Harrison (2000) concluded that multinationals that access overseas markets through exports experience an “export premium”, however, foreign asset

expansion destroys value. A similar conclusion is implied in the World Investment Report (2018) which indicates a decrease in the global average return on foreign investment from 8.1% in 2012 to 6.7% in 2018 driven by rising labour costs and declining commodity prices.

An overwhelming majority of studies focus on the market penetration dimension and have produced diverse results. However, the broadest consensus is for an inverted-U relationship. As for the impact of foreign production, early studies have used foreign assets as a measure (Daniels & Bracker, 1989; Sambharya, 1995) while more recent studies have focused on FDI, notwithstanding its limitations (Lehmann & Kang, 2004). Similar to the findings on the market penetration dimension, studies on the relationship between foreign production and performance have also produced a range of results. Early studies (Daniels & Bracker, 1989) suggest a less pronounced inverted-U relationship (as compared to foreign market penetration), while recent empirical studies suggest declining return on FDI (United Nations Conference on Trade and Development, 2018).

Barring a small number of early studies, there is no recent research that compares the two dimensions in terms of their impact on performance. Also, there are no studies that examine the impact of the recent GFC on effect of internationalization on firm performance along these two dimensions. These omissions in literature are worth examining for two reasons:

a. They have practical strategic implications for industry players seeking to expand abroad
b. Combining these dimensions into a single study (i.e., common data set, methodology etc) using a moderator can provide fine-grained insights into the underlying mechanisms for these dimensions and this can be a valuable contribution to theory of internationalisation.

5. Research Hypotheses

The literature review on internationalization and risk indicates the need for deeper contextual research in understanding the impact of internationalisation on performance under different risk situations. Motivated by this observation, this research leverages the Global Financial Crisis (GFC) of 2008-09 to explore the role of a major exogenous risk event in moderating the relationship between internationalization and performance under foreign market penetration-based expansion and foreign production-based expansion.

Moderation occurs when a third variable (i.e. a moderator) affects the latent mechanisms that underpin the relationship between an independent variable and a dependent variable (Haans et al., 2016). Table 1 details the various mechanisms that explain the impact of foreign market penetration and foreign production on firm performance. To investigate the moderation impact of these mechanisms, we can

thematically organize these 14 arguments into 3 broad dimensions: human dimension, scale dimension and diversity dimension:

- Human dimension: This includes mechanisms whose impact is linked to intrinsic human capabilities to act, manage, and organise as well as to the failings associated with such capabilities. Hence, mechanisms related to learning, managerial incentives, ability to handle complexity and the ability to tide cultural factors are included in this dimension. Many of these mechanisms are closely linked to the temporal aspect of internationalization since human capability building happens over time.
- Scale dimension: The mechanisms included in this group are closely linked to the spatial dimension of internationalization and arise out of the scale of operations of the firm. Economies of scale that help improve productivity or transport costs that reduce profitability of far-flung markets are typical examples.
- Diversity dimension: This dimension includes mechanisms are rooted in the element of diversity associated with internationalization i.e., the unrelatedness of the markets in which a firm operates.

Table 2 below reorganises the 14 arguments from table 1 into the human, scale and diversity dimensions.

Table 2: 14 Arguments for the impact of internationalisation on firm performance reorganized by dimension

	Human Dimension	Scale Dimension	Diversity Dimension
Positive Impact on Firm Performance	• Access to foreign knowledge and experience that the firm lacks i.e. learning by exporting (Loecker, 2013; Martins & Yang, 2009; Salomon & Shaver, 2005)	• Economies of scale and higher productivity (Chaney, 2013; Chen & Tang, 1990; Thangavelu & Owyong, 2003) • Access to cheaper inputs abroad and global rationalization of the value chain (Dunning, 1981) • Scale economies of amortization of R&D/ intangible assets/ HQ overheads (Markusen, 1984) • Access to foreign lenders due to reduced information barriers resulting from foreign asset ownership (Houston et al., 2017)	• Lower systematic risk due to diversification across markets with asynchronous business cycles and multi-currency cash flows (Hughes et al., 1975; A. M. Rugman, 1976a; Shapiro, 1978) • Access to credit during periods of credit constraints (Chang et al., 2016a; Jang, 2017) • Operational flexibility to navigate varying economic and business conditions (Chang et al., 2016a) • Exposure to foreign market risk eg. political risk, foreign currency risk etc (Baek et al., 1998)

Negative Impact on Firm Performance	• Global value chain complexity (Gereffi et al., 2005) • Agency risk and poor decisions related to internationalisation (Denis et al., 1997) • Organizational complexity and duplication (Reuer & Tong, 2007b) • Liability of foreignness (Qian et al., 2013)	• High costs of market access (e.g. transport and logistics) (Conconi et al., 2016)	

Of the various arguments within the three dimensions, the risk diversification and operational flexibility arguments within the diversity dimension have received the maximum research attention in terms of their role in financial crises, shocks, and dislocations. This is because these elements help reduce variance in the overall portfolio of subsidiaries and create managerial flexibility to respond to challenges by rebalancing and arbitraging between subsidiaries based on the differential impact of the crisis (Campa & Kedia, 2002; Kogut & Kulatilaka, 1994).

Risk Diversification

The risk diversification mechanism has its origin in portfolio theory. The idea is that an MNC can reduce overall systematic risk by diversifying operations across markets that are uncorrelated in terms of their business cycles (Hughes et al., 1975; A. M. Rugman, 1976b). This mechanism can help explain the positive relationship between internationalization and performance during times of crisis, but only under the assumption that markets are uncorrelated.

Operational Flexibility

Operational flexibility has been identified as a significant advantage during times of crises and economic downturns. Kogut (1986) argued that "the unique content of a global versus a purely domestic strategy

lies less in the methods to design long-term strategic plans than in the construction of flexibility which permits a firm to exploit the uncertainty over future changes in exchange rates, competitive moves or government policy." Operational flexibility can be exercised through arbitrage strategies (eg. production shifting, tax arbitrage, financial markets and information arbitrage) as well as through leveraging bargaining power through the firm's international position. Studies have shown that operational flexibility helps drive excess market returns and that that stock market response to earnings fluctuations (i.e. investor expectations about future earnings) is also far stronger for multinationals that are diversified than for domestic firms (Allen & Pantzalis, 1996; Tang & Tikoo, 1999). Li & Rugman (2007) formulate this idea of operational flexibility as a real options model. In a turbulent environment, flexibility options allow for a greater degree of responsiveness (Dixit, 1994; S.-H. Lee & Makhija, 2009; Volberda, 1997). Hence, the value of a real options increases in during times of economic crises and downturns.

The level of operational flexibility that MNE subsidiaries offer, differs greatly depending on the way the subsidiaries are set up. Resource commitment, particularly that related to production and manufacturing, is an important barrier to strategic flexibility as well as to divestiture (Harrigan, 1981; Hill et al., 1990; Porter, 1976).

Accordingly, the two dimensions of internationalization (i.e., foreign market penetration and foreign production) can be seen as a pair of real options representing different levels of flexibility and commitment.

Foreign production involves a higher level of investment commitment and hence lower level of flexibility. Production investments are often customized to meet local demands and the complexity of managing vast multinational networks can limit flexibility (Rangan, 1998). Also, costs associated with shutdowns, start-ups and labour contracting imply that benefits must be substantial to justify exercising the decision to switch production from one subsidiary to another (Kogut & Kulatilaka, 1994). On the other hand, foreign market penetration (measured in terms of subsidiary sales) involves a lower level of resource commitment and hence a higher level of flexibility.

However, **while diversification and operating flexibility can provide significant benefits during times of crises, the final impact on the firm performance depends on how these benefits performed during the GFC crisis and how they compare with the costs of maintaining the real options and the net impact of other dimensions (i.e. human and scale) which could, among other things, place constraints and limitations on exercising the options and extracting the benefits (S.-H. Lee & Makhija, 2009)**.

Table 3 below summarizes the derivation of the moderation impact and the sections that follow explain the impact in greater detail.

Table 3: Derivation of Moderation Impact of the Global Financial Crisis

Note:

- The table below provides an assessment of the impact of the GFC on Foreign Market Penetration (FMP) and Foreign Production (FP) along with an explanatory commentary.
- Differential impact for Foreign Market Penetration and Foreign Production has been highlighted with the text "- Differentiator between FMP and FP"

	Pre-crisis	**Crisis**	**Post Crisis**	**Moderating effect of crisis**
1. Diversity Dimension				
Foreign Market Penetration (FMP)	**Neutral**	**Highly Negative**	**Moderately Negative**	**Highly Negative driven possibly by cost of diversity emanating from nationalism.**
Foreign Production (FP)	**Neutral**	**Negative**	**Neutral**	**Negative driven possibly by cost of diversity emanating from nationalism.**
Risk Diversification	• Internationalization typically reduces overall systemic risk by diversifying operations across uncorrelated markets (Hughes et al., 1975; A. M. Rugman, 1976b);	• High synchronicity of the GFC across the world continued to limit the benefits of diversification seen in the pre-crisis era (Bems et al., 2013; Imbs, 2010a; Pyun &	• Trade, vertical production linkages and financial integration have continued to drive the convergence of global business cycles post the GFC	• Due to the high comovement of global business cycles before, during and after the crisis, diversification did not lead to a moderating impact of the crisis on

	however, the explanatory power of diversification has been reduced over the last 20 years due to the increased co-movement of business cycles across the world (Imbs, 2004, 2006)	An, 2016); Hence the diversification argument would not have helped drive a positive impact of internationalization on firm performance during the crisis.	(di Giovanni & Levchenko, 2010; Kose et al., 2012); Hence, like the pre-crisis and crisis periods, diversification would not have helped improve the impact of internationalization on firm performance post crisis.	the relationship between internationalization and firm performance.
Operational Flexibility	• Operational flexibility is a tool that is used to navigate periods of uncertainty (Kogut, 1986) and hence played a limited role in improving the relationship between internationalization and firm performance during the pre-crisis ("Great Moderation") period (Leeson et al., 2013)	• Given the high level of synchronicity (point made above), the level of operational flexibility available during the GFC would have been limited. • Additionally, research suggests that multiple real world challenges impact the value of operational flexibility in practice versus in theory (Reuer & Leiblein, 2000) eg.	• Similar to the pre-crisis period the relative calm post the GFC would have reduced the value for operational flexibility (Kogut, 1986) and hence this factor would not have impacted the relationship between internationalization and firm performance post crisis.	• Given the limited role of operational flexibility during the pre and post crisis years and the high synchronicity of the crisis, operational flexibility would not have contributed in any significant way to the moderating impact of the crisis on the relationship between internationalization and firm performance.

		○ Challenges in perceiving real options due to organizational size and complexity (Kogut, 1986) ○ Lack the managerial experience, organizational structures and incentives (Kogut, 1986) ○ Organizational inertia, managerial bandwidth and pursuit of subgoals are potential (Rangan, 1998) ○ Various psychological biases (Horn et al., 2006) Combining the arguments above, operational flexibility would not have		

		contributed to improving the relationship between internationalization and firm performance during the crisis.		
Cost of Diversity	• During the pre-crisis years (i.e. until the arrival of the GFC), internationalization was seen as largely a positive force and hence the cost of diversity did not exert a negative impact on the relationship between internationalization and firm performance. (The Economist, 2019)	• Increased protectionist measures from host country governments especially in relation to foreign businesses (Evenett, 2019; Meyer, 2017; United Nations Conference on Trade and Development, 2016) would have a negative impact on the relationship between internationalization and firm performance. • Protectionist policies were typically more discriminatory towards commercial	The following factors continue to cause a moderately negative impact of internationalization on firm performance during the post crisis period: • Increased level of nationalism and anti-globalisation sentiment post GFC (Ian Bremmer, 2014) • Crisis era protectionist policies have reduced but not altogether disappeared eg. the share of restrictive policy changes increased from 2% in 2001 to a peak of	• Cost of diversity (eg. protectionist policies and anti-globalization sentiment) is an attributing reason for a negative moderating impact of crisis on the relationship between internationalization and firm performance.

		trade than towards FDI and this would have worsened the impact of internationalization on firm performance in the case of FMP – Differentiator between FMP and FP • Research results support the fact that crises with an international dimension (eg. GFC) have a greater adverse impact on multinationals than local/ domestic crises (Varum et al., 2014)	28% during the GFC in 2011 and declined to 14%by 2015 (Evenett, 2019; United Nations Conference on Trade and Development, 2016) • High cost of cross border arbitrage and increase in complexity of risk (Krapl, 2015; Olibe et al., 2008)	
Relative impact between FMP and FP for Diversity Dimension: Policy evidence suggests that despite protectionist trade policies being introduced during the GFC, FDI entry and ownership rules continued to see relaxations (Evenett, 2019). Hence, foreign investment commitment was welcome even through the crisis and was not discriminated against. This implies that FP (which is operationalized based on foreign investment and asset ownership) was impacted less that FMP (which is a sales driven measure.) One could therefore argue that the negative moderation impact of the crisis on account of the diversity (/ liability of foreignness) argument				

was less in the case of FP than in the case of FMP on account of the higher level of commitment.				
2. Human Dimension				
Foreign Market Penetration (FMP)	**Neutral**	**Negative**	**Neutral**	**Negative driven by organizational complexity**
Foreign Production (FP)	**Neutral**	**Moderately Negative**	**Neutral**	**Moderately Negative driven by organizational flexibility and partially attenuated by the benefits of strong subsidiary linkages**
Organizational complexity	• During times of stability (pre-crisis period) management of subsidiaries is not unduly complex and hence does not exert a negative effect on the relationship between internationalization and firm performance.	• The relationship between internationalization and firm performance was negatively impacted by various human dimension limitations in exercising operational flexibility – described in detail under Diversity (Operational Flexibility) dimension above	• As stability returned in the post crisis period, the complexity in management once again reduced. Hence, this factor no longer exerted a negative effect on the relationship between internationalization and firm performance.	• Organization complexity contributed to exert a negative moderation effect on the relationship between internationalization and firm performance during the crisis.

Organizational Structure	• During regular (non-crisis) years, subsidiary structure is optimized based on operational requirements. Hence, the extent of linkage and investment does not play any significant role in moderating the relationship between internationalization and firm performance.	• Subsidiaries configured with strong financial linkages and/ or strong vertical production linkages demonstrate greater resilience particularly during the crisis due to better access to capital and to markets (Alfaro & Chen, 2012; Houston et al., 2017) and this exerts a positive effect on the relationship between internationalization and performance - <u>Differentiator between FMP and FP</u>	• During the post crisis period, as normalcy returned to the business cycle, subsidiary structures once fell into alignment with the operational purposes for which they were created. Hence, they no longer exerted a negative impact on the relationship between internationalization and firm performance.	• Organizational structure (strong financial and vertical linkages seen under FP) exerts a positive impact on the relationship between internationalization and firm performance during the crisis.
Relative impact between FMP and FP for Human Dimension: Strong financial linkages (as well as vertical linkages) commonly seen in the case of FP attenuate the negative impact of complexity. Hence, one could argue that negative moderation impact of crisis under FP is lower than under FMP.				
3. Scale Dimension				
Foreign Market Penetration (FMP)	**Neutral**	**Highly Negative**	**Negative**	**Highly Negative**

Foreign Production (FP)	**Neutral**	**Highly Negative**	**Negative**	**Highly Negative**
Cost of managing international operations	• During normal (pre-crisis) years, business forecasts and plans are predictable and the costs of international operations can be budgeted for with a fair degree of certainty. Hence, they do not exert a negative impact on the relationship between internationalization and firm performance.	• Revenue uncertainty resulting in cost pressures during a crisis can tip marginally profitable international markets into losses (Bernard & Jensen, 2007; Luan et al., 2013; Rhodes & Stelter, n.d.) and thereby cause a negative impact of internationalization on firm performance.	• Post the crisis, as the business cycle stabilized, financial forecasts once again became more predictable and foreseeable and hence international costs were easier to plan for. Hence, they no longer exerted a negative impact on the relationship between internationalization and firm performance.	• Extreme cost pressures during a crisis contribute to a negative moderation of crisis on the relationship between internationalization and firm performance.
Relative impact between FMP and FP for Scale Dimension: The relative impact between FMP and FP does not differ for the scale dimension.				
Overall Net Impact across All Dimensions				
Foreign Market Penetration (FMP)	Neutral	Highly Negative	Neutral	Heightened protectionism, complexity and cost pressures contribute to a negative

				moderation impact of crisis.
Foreign Production (FP)	Neutral	Negative	Neutral	Protectionism, complexity and cost pressures contribute to a negative moderation impact of crisis and this negative impact is partly attenuated by the benefits of strong subsidiary linkages
Overall Relative effect between FMP vs FP	• High commitment (that results in reduced protectionism) and strong financial and vertical linkages (that result in improved credit and market access) in the case of FP versus FMP lead to a reduced negative moderation impact of crisis under FP. In other words, crisis has a greater negative moderation impact under FMP than under FP.			

5.1 Role of Diversification, Operating Flexibility and Diversity during the GFC (2008-09)

The Global Financial Crisis brought about a significant collapse of international trade. Between Q1 2008 and Q1 2009, the decline in world trade (15%) was over 4 times the decline in world GDP, and, importantly, this decline was highly synchronized across countries (Bems et al., 2013).

Table 2 below reflects the percentage change in total exports for the United States across its various trading partners in 2008 and 2009. As can be seen, although there were differences in the intensity of decline across regions, almost all regions saw significant decline.:

Table 2: United States Exports by region (2008 and 2009)

United States Exports	**Annual change (%)**		**Total change (%)**
	2008	**2009**	**2008 & 2009**
World	**7**	**-17**	**-11**
North America	3	-17	-15
South and Central America	23	-18	0
Brazil	33	-19	7
Europe	8	-18	-11
European Union (27)	8	-18	-12
CIS	30	-45	-29
Russian Federation	25	-48	-35
Africa	18	-9	7
Middle East	21	-17	0
Asia	4	-14	-11
China	6	-2	4
Japan	1	-20	-19
Six East Asian traders	-1	-17	-18

Source: WTO, International Trade Statistics 2010 - Merchandise trade by product

The synchronized nature of this crisis suggests that diversification may not have played a significant role in moderating the relationship between diversification and performance during the GFC.

Following from the idea that diversification across markets was not significant (on account of the coordinated nature of the crisis), the value of operational flexibility would also have been limited role during the GFC.

Additionally, research also shows a number of constraints and limitations of exercising operational flexibility during a crisis. While outlining the strategic opportunities presented by operating flexibility, (Kogut, 1986) recognizes that due to size and complexity, firms may fail to perceive real options or may lack the managerial experience, organizational structures and incentives to exercise them in times of need. Rangan (1998) points out to factors like organizational inertia, limited managerial bandwidth and pursuit of subgoals as potential obstacles to exercising options.

Horn et al (2006) identify four psychological biases in exercising exit options i.e. confirmation bias, the sunk-cost fallacy bias, escalation of commitment, and anchoring and adjustment. The spur to bail out of a market or a business segment is often the arrival of a new senior executive or the arrival of a very deep crisis. Exit decisions are usually made at the trough of a business cycle (which is often the worst time to sell) rather than as a well calculated exercise of an option.

In an empirical study of US manufacturing firms between 1985-89, Reuer and Leiblein (2000) highlight the gap between the benefits of flexibility in theory and in practice. Greater multinationalism does not help firms to reduce downside risk and not all investments undertaken in uncertain contexts provide significant options. Most importantly, firms do not necessarily manage real options optimally.

While risk diversification and operational flexibility may not have exerted a moderating influence on the relationship between internationalization and firm performance, protectionist and nationalistic policies introduced during the crisis did create a negative impact on MNC companies. The greater thrust of these measures was on export-oriented firms rather than on firms that brought in FDI investment. Crisis era protectionist measures did to some extent get repealed (although not totally disbanded) post the GFC (Evenett, 2019; Meyer, 2017; United Nations Conference on Trade and Development, 2016). This factor exerted a negative moderating impact (- more in the case of FMP than FP -) on the relationship between internationalization and firm performance.

5.2 Role of Counterbalancing arguments (i.e. Human dimension, Scale Dimension and costs of maintaining diversity) during the GFC

As described above, several human dimension factors impact and limit the practical value of operational flexibility during the crisis. At the same time and on the other side of the argument, human dimension factors such as organizational structure, exert a positive influence on the relationship between internationalization and firm performance. Subsidiaries that represent significant foreign ownership or FDI benefit from improved access to credit, particularly to foreign lenders, during economic downturns (Houston et al., 2017). Similarly, strong vertical production linkages between the subsidiary and parent can help create an internal market and thereby support subsidiary performance during crises (Alfaro & Chen, 2012). These factors (i.e. financial linkages and vertical production linkages) are typically seen in FP based diversification and can help create a positive impact on the relationship between internationalization and firm performance.

Finally, the scale of operations can add unique challenges especially during times of crisis. During non-crisis periods, planning and budgeting for foreign operations is, to a great extent, predictable and foreseeable. However, revenue uncertainty during crisis periods can result in extreme cost pressures making marginal businesses unviable (Bernard & Jensen, 2007; Luan et al., 2013; Rhodes & Stelter, n.d.) This can result in a negative impact on the relationship between internationalization and firm performance.

Combining the arguments in 4.1 and 4.2, one can conclude that the risk diversification and operational flexibility arguments may not have helped improve performance during the GFC while the human, scale and diversity (/ liability of foreignness) dimensions may have exerted a negative impact during the crisis. This implies that, on the balance, the GFC may have negatively moderated the relationship between internationalization and performance.

Hence, one can hypothesize as follows:

Hypothesis 1: The Global Financial Crisis (2008-09) negatively moderated the relationship between foreign market penetration-based internationalization and firm performance.

Hypothesis 2: The Global Financial Crisis (2008-09) negatively moderated the relationship between foreign production -based internationalization and firm performance.

5.3 Foreign Market Penetration and Foreign Production during the GFC

As described above, Foreign Market Penetration and Foreign Production are real options representing different combinations of flexibility and commitment. Foreign Market Penetration represents a higher level of

flexibility but a lower level of commitment while Foreign Production represents the reverse.

The higher commitment embedded in FP resulted in a more favourable treatment under the policy measures implemented during the GFC. By May 2011, almost 1,610 trade protection measures were announced since November 2008. However, less than 7% were related to FDI (Görg & Krieger-Boden, 2011). Hence, protectionist policies created a less negative impact on the relationship between FP based internationalization and performance than between FMP based internationalization and performance.

Secondly, there is evidence to suggest that the stronger financial linkages and foreign asset ownership helped in better access to foreign lenders (Houston et al., 2017). Asset ownership and commitment helps foreign firms become increasingly embedded in local information networks, improves the level of trust and erodes the liability of foreignness (Zaheer & Mosakowski, 1997; Zhou & Guillen, 2016). Additionally, the resource based view suggests that the firm can derive competitive tangible and intangible ownership advantages originating in their home countries (Dunning, 1981). In situations where subsidiaries share strong vertical production linkages and have strong financial linkages with the parents, there is evidence of greater resilience particularly during the crisis (Alfaro & Chen, 2012).

Hence, on the balance, the negative moderation impact of the GFC would have been lesser in the case of foreign production than in the case of foreign market penetration. This leads us to hypothesis 3:

Hypothesis 3: The moderation impact of the Global Financial Crisis (2008-09) was stronger in the case of foreign market penetration-based internationalization than in the case of foreign production - based internationalization.

6. Expected Theoretical Contributions

This study aims to offer the following theoretical contributions.

a. As a baseline hypothesis, this study seeks to **revalidate received knowledge** on the relationship between geographical diversification and firm performance by **analysing a broader and more current data set and by incorporating methodological improvements** (e.g., employing a firm fixed effects design, which, to the best of my understanding, has not been employed in this area of research by any other major study. The only study where I found fixed effects being used is Garrido-Prada et al. (2019) which studies a sample of less than 100 Spanish firms.) Similarly, this paper incorporates more detailed methodologies for investigating the quadratic relationship as well as moderator analyses. Also, it examines internationalisation in terms of two

dimensions i.e., foreign market penetration and foreign production.

b. Next, it **identifies and examines the effect of crisis as a moderator** to the relationship between foreign market penetration based- and foreign production based-internationalisation and firm performance in the current business context, which is yet to be examined by past research. Specifically, the GFC created conditions that enabled investigation into specific risk-mitigating benefits of internationalization. Although the GFC is over a decade old and archival data has been available for a while, there has been very limited focus on this event-driven risk, barring a few Finance papers. By drawing upon the insights from these Finance studies, this paper seeks to advance internationalisation theory in the field of Strategy.

7. Methodology

The empirical approach for this research involves regressing of the dependent variable (firm performance) on geographic diversification (both dimensions i.e., foreign market penetration and foreign production) using crisis as an interaction term along with various control variables. The following sections provide more details on the methodology.

7.1. Sample

The sample for this research includes US manufacturing companies that are listed on major American stock exchanges as well as those delisted during the study period i.e., 1/1/2000 and 12/31/2019. The companies are included only for the period that they are active. In line with existing internationalization research, an export ratio criterion of 10% is used for the year under study (Qian et al., 2010).

The data was sourced from the Worldscope annual fundamentals and segment databases.

7.2. Variables

7.2.1 Dependent Variable(s)

The dependent variable for the study is firm performance. The two common approaches to measuring performance are accounting measures or operating measures (such as Return on Assets, Return on Equity, Net Income etc) and market measures (such as Tobin's Q, market returns etc.) Operating measures represent past and present performance, while market measures represent future-oriented expectations from a shareholder perspective (Gentry & Shen, 2020). Given that this research focuses on the firm performance and not on investor returns, it relies on accounting measures.

The accounting measure used to operationalize firm performance is EBIT based Return on Assets (Hitt et al., 1997b; Lu & Beamish, 2004; Qian et al., 2010). **Three common measures of accounting performance used in diversification research are Return on Sales (ROS), Return on Assets (ROA) and Return on Equity (ROE). ROE is sensitive to the capital structure of a firm while ROS is closely linked to one of the control variables proposed (firm size.) Hence, ROA has been selected as the dependent variable (Hitt et al., 1997b). In any case, ROA, ROS and ROE show a high degree of convergent validity (Gentry & Shen, 2020).** Also, by using EBIT as the numerator, the impact of capital structure and tax strategies can be excluded (Garrido-Prada et al., 2019). Log transformation of EBIT_ROA has been used to correct for skewness.

7.2.2 Independent Variable(s)

The independent variables are: Geographic Diversification (linear and quadratic) computed based on foreign market penetration and foreign production.

Geographic segment diversification (GSD) has been operationalized in strategy and international business literature in diverse ways. Some of the common measures used are: Foreign Sales/ Total Sales, Foreign Assets/ Total Assets, degree of Internationalization Scale which is a composite of 5 dimensions (Sullivan, 1994b), modified Herfindahl index (measured as one less the sum of squares of the proportion of sales in each geographic segment) and the entropy measure.

This research uses the entropy-based measure for foreign market penetration and foreign production.

Internationalisation based on foreign market penetration is computed as an entropy measure of sales i.e.

$$GSD = \sum P_i \times \ln(1/P_i) \quad , \text{for } i=1 \text{ to } n$$

n is the number of regions in which a firm has sales and P_i is the ratio of the firm sales in the i^{th} region to total sales for that year.

Internationalisation based on foreign production is computed as an entropy measure of sales i.e.

$$GSD\_Asset = \sum A_i \times \ln(1/A_i) \quad , \text{for } i=1 \text{ to } n$$

n is the number of regions in which a firm has sales and A_i is the ratio of the firm assets in the i^{th} region to total assets for that year.

The entropy measure incorporates, both, the scope of regions involved as well as share of sales and assets in each region. Studies have indicated high convergent, discriminant and criterion-related validity for the entropy measure (Hoskisson et al., 1993) as well as high explanatory power (Chatterjee & Blocher, 1992). Also, it is a common measure in recent studies and is far more sensitive than the modified Herfindahl measure (Jacquemin & Berry, 1979). Hence, I have selected the entropy measure for my study. Log transformation has been used to correct for skewness.

In line with prevailing research and given the limitations of data, the entropy measure is computed based on the following five regions: (1) Americas (2) Europe (3) Asia and Pacific (4) Africa (5) Others (Hitt et al., 1997b; Wiersema & Bowen, 2008). Any observations that had a > 5% discrepancy between the total sales by region and total sales were excluded from the analysis.

In order to capture the causative relationship, GSD and GSD_Asset is computed as a one-year lag and is used in its linear and quadratic forms. The practice of using a lagged value of internationalisation is common in existing diversification literature. It also finds support in theories and concepts such as organizational learning and liability of foreignness (Vahlne & Johanson, 1977) and internationalization experience (Abdi & Aulakh, 2018).

7.2.3 Moderator

The research hypothesis seeks to investigate the moderation impact of an economic crisis on the relationship between geographic segment diversification (GSD) and performance. Since the study period covered the years 2000-19, the Global Financial Crisis (GFC) was available for use as a natural experiment. As per the National Bureau of Economic Research (NBER), the contraction linked to the Global Financial Crisis started in Dec 2007 and ended in Jun 2009[1]. Since this study is based on annual data, the years 2008 and 2009 are classified as recession years. Crisis has been coded as a categorical variable with the following values:

Crisis = 1 (pre-crisis period, 2000-07)

Crisis = 2 (crisis period, 2008-09)

Crisis = 3 (post crisis period, 2010-19)

[1] https://www.nber.org/research/data/us-business-cycle-expansions-and-contractions

An alternative approach for operationalizing crisis could have been to look at the moderation effect of a change in the organizational task environment. Dess & Beard (1984) suggest that an industrial classification system can help operationalize the organizational task environment. They suggest three dimensions for the organizational task environment i.e., munificence, dynamism, and complexity.

The organizational task environment as defined by Dess & Beard (1984) is industry-specific. Also, as a construct, change in the organizational task environment is different from an economic crisis (which is a deep, exogenous, economy wide event.) Hence, it would not be suitable for testing the hypothesis. Notwithstanding this fact, there are elements from the organizational task environment which have been used as Control Variables in my study. For instance, the 6 economic indicators which I have used as control variables are related to the “munificence” dimension. Similarly, the control variable of product diversification is related to the “complexity” dimension. Finally, the GFC variable used is itself most closely related to the dynamism (stability-instability) dimension.

7.2.4 Control Variable(s)

Firm size: Firm size is operationalized as the natural log of sales.

Leverage: Leverage is computed as the log of long-term debt to total assets.

Company age: Company Age is computed as the difference between the year of study and the foundation year.

Intangible Assets: Intangible Assets offer economies of scope and thereby motivate geographic expansion as well as drive profitability (Delios & Beamish, 2001; Morck & Yeung, 1991). Log transformation has been used to correct for skewness.

Related Product Diversification (PSRD): Related product diversification has a significant impact on profitability (Doukas & Lang, 2003; Keats, 1990; Palich et al., 2000) and hence has been used as a control variable. PSRD has been computed as an entropy measure based 2-digit SIC codes.

The segment level SIC data are sourced from the Worldscope segment database which reports segments based on the SEC segment reporting rule[2] and conforms with the requirements of the Financial Accounting Standards Board's ("FASB") Statement of Financial Accounting Standards ("SFAS") No. 131. As per these guidelines, a company must report information about an operating segment separately if its reported revenue, including both sales to external customers and intersegment

[2] https://www.sec.gov/rules/proposed/33-7549.htm

sales and transfers, is 10 percent or more of the combined revenue of all reported operating segments.

World Economic Indicators: Six world economic indicators are used to control for the effect economic conditions. These are regional GDP growth, regional GDP per capita, regional inflation, regional export growth, regional consumption, and regional domestic capital formation (Qian et al., 2010). The data are sourced from the World Bank Open Data site[3]. The country level indicators are used to compute weighted averages at a regional level. For each firm year, the value for the indicator is the weighted average value based on its sales in each region.

7.3. Modelling Procedure

The analysis method used is fixed effects regression between performance (operationalized as Ln_EBIT_ROA) and geographic diversification (Ln_GSD or Ln_GSD_Asset) with an interaction term used for the crisis moderator. Fixed effects regression ensures that any firm-level time-invariant unobserved heterogeneity is controlled for and the various control variables exclude the impact of confounding variables. Further, any effect of autocorrelation and heteroskedasticity is controlled for by clustering Standard Errors.

The following 5 models are used in the analysis:

[3] https://data.worldbank.org/indicator/

S.No	Model	Description
1	Control Variables Only	-
2	$\alpha_1 Ln\_GSD_{it} + \alpha_2 Ln\_GSD\_Asset_{it}$	Foreign Market Penetration and Foreign Production (linear)
3	$\alpha_1 Ln\_GSD_{it} + \alpha_2 Ln\_GSD_{it}^2 + \alpha_3 Ln\_GSD\_Asset_{it} + \alpha_4 Ln\_GSD\_Asset_{it}^2$	Foreign Market Penetration and Foreign Production (quadratic)
4	$\alpha_1 Ln\_GSD_{it} + \alpha_2 Ln\_GSD_{it}$*Crisis + $\alpha_3 Ln\_GSD\_Asset_{it} + \alpha_4 Ln\_GSD\_Asset_{it}$*Crisis	Foreign Market Penetration and Foreign Production (linear) with interaction with Crisis
5	$\alpha_1 Ln\_GSD_{it} + \alpha_2 Ln\_GSD_{it}^2 + \alpha_3 Ln\_GSD_{it}$*Crisis + $\alpha_4 Ln\_GSD_{it}^2$*Crisis + $\alpha_5 Ln\_GSD\_Asset_{it} + \alpha_6 Ln\_GSD\_Asset_{it}^2 + \alpha_7 Ln\_GSD\_Asset_{it}$*Crisis+ $\alpha_8 Ln\_GSD\_Asset_{it}^2$*Crisis	Foreign Market Penetration and Foreign Production (quadratic) with interaction with Crisis

Since the dependent and independent variables have been log transformed, their relationship can be measured based on elasticity rather than slope. Elasticity represents the total impact of Geographic Diversification on Performance, after accounting for all the main and interaction effects embedded in the model. In other words, it is the rate of change of Performance in response to a unit change in Geographic Segment Diversification. Elasticity is better aligned to economic theory and easier to interpret from a managerial perspective.

To illustrate the difference between elasticity and slope, let us denote the dependent variable as variable y and the independent variable as variable x:

- Elasticity represents the % change in the DV in response to % change in the IV i.e., dlogy/ dlogx. (Refer Appendix 9 for derivation.)
- Slope represents the change in the DV in response to change in the IV i.e., dy/dx.

8. Analysis

Appendix 2 summarizes the fixed effects regression output for the 5 models used to investigate the relationship between internationalisation and performance (refer section 6.3 for model descriptions.)

Model 1 includes control variables only so that their effect can be removed before the substantive independent variables are investigated.

Model 2 includes the linear relationship between Ln_GSD and Ln_GSD_Asset and Ln_EBIT_ROA. Ln_GSD is significant and has a negative coefficient (i.e. -0.514.) However, Ln_GSD_Asset is not a significant under this model.

Model 3 includes the relationship between the linear and quadratic terms for Ln_GSD and Ln_GSD_Asset and firm performance. Neither of the quadratic terms (i.e. Ln_GSD and Ln_GSD_Asset) are significant. The linear term for Ln_GSD continues to be significant with a coefficient of -0.656.

Model 4 includes the interaction effect of crisis with the linear terms of Ln_GSD and Ln_GSD Asset. Crisis=2 is used as the reference value. The interaction effect for the pre-crisis period and Ln_GSD is significant at a 10% confidence level and the interaction effect for the post-crisis period and Ln_GSD is significant at a 5% confidence level. On the other

hand, the interaction effect for the pre-crisis period and Ln_GSD_Asset is significant at a 10% confidence level, however, the interaction effect for the post-crisis period and Ln_GSD_Asset is not significant.

Model 5 includes the interaction effect of crisis with the linear and quadratic terms of Ln_GSD and Ln_GSD Asset. None of the interaction effects are significant under this model.

Appendix 3 compares models 2 and 3 using the likelihood ratio test. As can be seen, the inclusion of the quadratic terms for Ln_GSD and Ln_GSD_Asset (Model 3) does not substantially improve model fit for model 2. Accordingly, model 3 is discarded.

Appendix 4 compares models 4 and 5 using the likelihood ratio test. Once again, the inclusion of the quadratic terms for Ln_GSD and Ln_GSD_Asset with crisis interaction (Model 5) does not substantially improve model fit for model 4. Hence, model 5 is discarded.

Finally, Appendix 5 compares models 2 and 4. The results of the likelihood ratio test indicate that the inclusion of the crisis interaction for Ln_GSD and Ln_GSD_Asset (Model 4) improves the model fit for model 2 at a 10% confidence level. Accordingly, model 2 is discarded and model 4 is used for further analysis.

Prior to using model 4 for further analysis, we revalidate the model for some basic checks. As can be seen in appendix 7, we confirm the appropriateness of using the fixed effects model via the Hausman test. In appendix 8, we examine the residuals via the Kernel density plot and the Qnorm and Pnorm plots to ensure goodness of fit.

Appendix 11 summarizes the regression results using the pre-crisis period (i.e. crisis = 1) as the reference period and the crisis period (i.e. crisis = 2) as the reference period. In the case of the former, the moderating effect of the onset of the crisis is -0.4912059 (with p value = 0.052). In case of the latter, the moderating effect of the close of the crisis is 0.3948923 (with p value = 0.041.) This implies that there is a significant improvement in the impact of foreign market penetration based diversification on performance after the crisis (and the deterioration pre-crisis to crisis is significant at 10%, p-value 5.2% .) **Hence, hypothesis 1 is partially supported**. The impact of the crisis indeed negatively impacted the relationship between foreign market penetration based diversification and performance.

Appendix 12 provides a similar analysis for foreign production based internationalization and performance. The two tables presented summarize the regression results using the pre-crisis period (i.e. crisis = 1) as the reference period and the crisis period (i.e. crisis = 2) as the reference period. In the case of the former, the moderating effect of the onset of the crisis is 0.3740774 (with p value = 0.078). In case of the

latter, the moderating effect of the close of the crisis is -2617078 (with p value = 0.168.) These results are not significant. **Hence, hypothesis 2 is not supported**. The impact of the crisis did not moderate the relationship between foreign production based diversification and performance.

In order to test hypothesis 3, we conduct two likelihood ratio tests as reflected in Appendix 13. Likelihood Ratio Test #1 tests model 4 against a reduced form model including Ln_GSD_Asset#crisis only (i.e. excluding Ln_GSD#crisis.) The likelihood ratio test confirms that including Ln_GSD#crisis as a predictor variable significantly improves the model fit. Likelihood Ratio Test #2 tests model 4 against a reduced form model including Ln_GSD#crisis only (i.e. excluding Ln_GSD_Asset#crisis.) This test confirms that including Ln_GSD_Asset#crisis does not impact or improve the model fit. Hence, one can conclude that the effect of Ln_GSD#crisis is greater than that of Ln_GSD_Asset#crisis. The AIC test (Appendix 14) confirms that Foreign Market Penetration interaction with Crisis (AIC 1460.403) is a better model than Foreign Production interaction with Crisis (AIC 1482.931.)

This implies hypothesis 3 is supported.

9. Robustness Checks

Additional tests were conducted to verify the robustness of the results.

a. **Alternative Operationalization Variables for Performance**: Model 4 was replicated with alternative accounting measures to operationalize firm performance i.e. Ln_EBIT_ROS and Ln_EBIT_ROE. The results (Appendix 15) are largely consistent with the research findings.

b. **Endogeneity tests**: Firms choose strategies based on their own attributes as well as based on industry and market conditions. To that extent, strategy choices, including those related to geographic diversification, may be endogenous and involve self-selection. Hence, any model that regresses performance on geographical diversification is vulnerable to endogeneity concerns (Abdi & Aulakh, 2018; Campa & Kedia, 2002; Chang et al., 2016a; Kuppuswamy & Villalonga, 2016; Shaver, 1998b). Hence, this study uses 2SLS as a robustness check. 2SLS involves the use of an instrumental variable which is exogenous to the structural equation but is correlated to the endogenous regressor. Prior experience with internationalization has a strong impact on a firm's internationalization decisions, although it does not impact the current year performance. Accordingly, internationalization experience, defined as the average level of Ln_GSD for lagged year 2 and 3, is identified as an instrumental variable for a 2SLS robustness check (Appendix 16.) As can be seen, the 2SLS coefficient for the linear Ln_GSD term is negative and significant. Hence, the results are largely consistent with the study finding for a monotonic declining relationship.

10. Discussion

Prior research on the relationship between internationalization and firm performance has produced a wide range of results. The S-curve, which comprises 3 distinct stages, represents the most comprehensive set of possibilities. Initially, as firms expand overseas, they face the high fixed costs and the liability of foreignness and hence profitability declines. As learning builds, profitability begins to increase. However, as firms internationalize beyond an optimum level, the cost and complexity of managing foreign operations begins to dominate the relationship and profitability declines with multinationalism (Verbeke & Brugman, 2009).

However, as Contractor (2012) points out, all studies may not show the full range of possibilities because the characteristics of the different samples could be different. If a sample includes a large number of newly internationalizing firms or firms that are over-internationalized, the relationship between internationalization and firm performance may reflect as negative. On the other hand, if the sample reflects firms that are beginning to reap the rewards of internationalization, the relationship may reflect as positive. Likewise, different time samples (reflecting specific economic conditions) may also affect the relationship.

Based on the sample in this study, one can conclude that for US manufacturing firms over the period 2000-19, internationalization along

the foreign market penetration dimension has had an adverse impact on firm performance. **In other words, US manufacturing firms that were geographically focused performed better during the study period.** Some part of this may be on account of the **increasing level of synchronization of trade cycles across the world**, which is unprecedented even relative to the 1973 oil shock (Imbs, 2010b). A second explanation of this phenomenon may lie in the **"globalization penalty"** which reflects the strategic challenges of managing the increasing diversity of markets, customers and channels, overexposure to **international risk**, the **high coordination costs of international operations** and emerging trends such as **sustainability and customization** (Dewhurst et al., 2012; Reuer & Tong, 2005; Serdarasan, 2013).

The sample also shows that internationalization along the foreign production dimension does not have a significant impact on firm performance. As discussed earlier, foreign production based internationalization is operationalized on the basis of the share of foreign assets. Hence, this finding may be a reflection of **economic and structural factors that are affecting FDI and asset ownership and driving asset-light modes of foreign production.**

- The World Investment Report (2018) reported a decrease in the global average return on foreign investment from 8.1% in 2012 to 6.7% in 2018 driven by rising labour costs and declining commodity prices.

This decline, which was recorded across all regions, was likely to be the most significant contributor to an overall decline in FDI.

- Secondly, policy uncertainty has also been reducing business confidence and impacting FDI negatively. The global economic policy uncertainty index has been on a rising trend for the past two decades. Protectionist ideas and a mistrust towards international trade and globalization have been gaining strength in political discourse. Trade uncertainty seems to have become the new normal and this does not bode well for FDI (Baker et al., 2019).
- While the growth of FDI has been on a cooling trend, royalties and licencing fees have been growing briskly. The annual growth of royalties and licensing fees for the 5 years ending 2017 was 5% compared with 1% for the trade in goods and FDI. Similarly, while the sales in foreign affiliates have been growing (+6% in 2017), assets and employees have been increasing at a slower rate (United Nations Conference on Trade and Development, 2018).

The declining trend in FDI, strengthening trend in royalties and licencing fees and outpacing of foreign affiliate sales compared with assets point to the growing preference for asset light modes of internationalization.

The GFC (2008-09) had a negative moderating impact on the relationship between foreign market segmentation based internationalization and firm performance. This can be explained by the

increased cost of diversity (particularly reflected in high levels of protectionism), the high levels of complexity in managing international businesses and the cost pressures created by the crisis. **This result suggests that the hitherto observed risk mitigating role of diversification may not be as relevant as observed in previous studies**.

Finally, the **moderation impact of the GFC on foreign market penetration has been greater than on foreign production**. While in negative impacts mentioned above (i.e. cost of diversity, high complexity and cost pressures) existed in the case of Foreign Production as well, the positive impact of strong subsidiary linkages (in particular the strong financial linkages as well as the internal market created in the case of vertical production diversification) acts as an attenuating force.

11. Conclusion

This study provides five broad conclusions:

- The dimensions of f**oreign market penetration and foreign production internationalization represent fundamentally different strategies** and have very different influences on firm performance.

- The relationship between inter-regional foreign market penetration based diversification and performance for US industrial companies over the past two decades shows a **monotonically declining trend reflecting reduced benefits of risk diversification**.
- This study suggests that while a key driver for internationalization may be the pursuit of higher returns, internationalization strategies entail a higher level of risk. Hence, internationalization may align better with the **high risk high return hypothesis**.
- This negative moderation of the GFC underscores the fact that **major economic disturbances can have a global impact and hence such risk cannot be diversified away**. This result if somewhat at odds with conclusions of certain studies in Finance which suggests that diversified companies were considered to represent a lower level of risk. This appears to be on account of the fact that Finance studies typically rely on market measures of performance as opposed to accounting measures of performance. Hence, the results in those studies are greatly impacted by investor expectations.
- Finally, foreign production based internationalization does not have a significant impact on firm performance. This clearly reflects the **reduced impact of asset ownership on internationalization strategies**.

12. Limitations and Future Direction

This study supports the thesis that an increase in geographical diversification across regions has a negative marginal effect on performance. The study focuses exclusively on inter-regional diversification and the results should be interpreted as such. It is possible that the impact of intra-regional diversification could be very different and even contradictory.

Secondly, as described above, the impact of diversification in this study has been computed using a one year time lag. However, like many strategic decisions, geographic diversification may take much longer to play out and may even have different consequences in the short- / medium- and long-run. In fact, a study of the top 200 of the Fortune "500" companies concluded that it takes an average of 10 to 12 years before the ROI of ventures equals that of mature businesses (Biggadike, 1979). To that extent, the time lag used in this study can be seen as a limitation.

Finally, this study draws upon archival data and hence is a quantitative study of the relationship between internationalization and firm performance. It does not incorporate some of the rich qualitative feedback on what firms and managers may actually have experienced.

In terms of future directions, researchers may want to put a greater focus on intra-regional diversification since it has been a relatively neglected

area in research. Another angle that may merit exploring is a longer time lag and impact of diversification through the cycle i.e. if diversification level was not changed, what would be the net performance of a company through the economic cycle. Finally, like any other area of strategy research, qualitative case studies on when diversification works and when it does not, would carry powerful managerial value.

13. References

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14. Appendices

Appendix 1: Geographic Diversification and Performance Relationship

S.No	Study	GSD-Performance Relationship	GSD Operationalization	Performance Operationalization	Sample Firms	Sample Period
1	Brewer, 1981	Nil/ Minimal Impact	Dummy variable based on significance of foreign operations	Risk adjusted return (from an investor perspective)	U.S.-based MNCs and 137 US National Companies for the period January 1963 to December 1975	January 1963 to December 1975
2	Grant et al., 1988	Linear Increasing	1. Product diversity (index based on the proportion of sales in an activity and the # of stock exchange industries in activity) 2. Multinational diversity (index calculated as 1- UK production / total sales) - simultaneous and with 4-year lag	1. Performance based on ROA (Operating profit before interest and tax divided by fixed assets, net current assets and short term loans) 2. Performance based on Sales growth (Average annual sales 1982-84 divided by average annual sales 1972-74)	304 large British manufacturing firms	1972-84
3	Sambharya (1995)	Nil/ Minimal Impact (although there is significant impact when interacting with product diversification)	FSTS, FATA, number of non-US subsidiaries, entropy measure	ROA, ROS, ROE	53 US MNCs	1985-87
4	Tallman & Li, 1996	Nil/ Minimal Impact	1. FSTS (multi-nationality) 2. No. of foreign countries (country scope)	ROS	192 US manufacturing companies	1987
5	Riahi-Belkaoui, 1996	Linear Increasing	Dummy variable calculated based onn FSTS	ROA	31 French MNEs	1988
6	Hitt et al., 1997	Inverted U	Sales based entropy measure	ROA	Manufacturing firms with over USD 100 million in sales	1988-90
7	Shaver, 1998	After including self-selection bias, greenfield entries no longer have an advantage over acquisitions	FDI entry model dummy (Acquisition versus Greenfield)	Foreign direct investment survival	Foreign direct investment in the United States manufacturing sector (213 FDI instances across 177 firms)	1987
8	Riahi-Belkaoui (1998)	S-shaped	FSTS	ROA	612 firm year observationns (where the firms were collected from Forbes list of "Most International" US companies)	1987-93

S.No	Study	GSD-Performance Relationship	GSD Operationalization	Performance Operationalization	Sample Firms	Sample Period
9	Gomes & Ramaswamy, 1999	Inverted U	Composite index (sales, assets, and countries of operation)	1. ROA 2. Operating Cost to Sales	95 firms from 4 manufacturing industries (Chemicals, drugs & pharma, computers & office equipment, Electrical & electronics)	1990-65
10	Geringer et al., 2000	Linear Declining	FSTS, Internal Ratio (sales by foreign subsidiaries to total sales)	ROA, ROS, sales growth	108 large Japanese manufacturing firms	1977-93
11	Lu & Beamish, 2001	U-shaped	1. Export Sales/ Total Sales 2. Number of foreign investments (linear/ squared) 3. Number of countries invested in (linear/ squared) 4. JV Intensity (Japanese-Japanese JVs, Japanese Local JVs)	ROA	All Japanese firms listed on the first and second sections of the Tokyo stock exchange in 1999, that had fewer than 500 employees	1986-97
12	Denis et al., 2002	Linear Declining	Dummy variable (based on sales reporting in foreign subsidiaries)	Excess Value (Log of the ratio firm market cap to imputed value)	7520 US firms (all firms with Compustat reported data except Utility & Financials)	1984-97
13	Riahi-Belkaoui & Alnajjar, 2002	Linear Declining	Composite of Foreign Sales/ Total Sales, Foreign Profits/ Total Profits and Foreign Assets/ Total Assets	Persistence of annual earnings	100 Most International US multinational firms from Forbes' annual survey	1990-99
14	Qian & Li, 2002	Inverted U	1. Geographic scope (High/ Medium/ Low) computed using entropy measure of subsidiaries 2. Geographic scale (High/ Medium/ Low) computed using FSTS ratios 3. Combinations of scale and scope above	ROA	125 large industrial U.S. firms	1983-1992
15	Capar & Kotabe, 2003	U-shaped	International Diversification (Foreign Sales/ Total Sales)	Performance (Return on sales or ROS)	81 major German service firms	1997-99
16	Ruigrok & Wagner, 2003	U-shaped	Foreign Sales/ Total Sales (FSTS)	1. Pre-tax ROA 2. Sum of material costs and employee costs to sales	84 large Germany manufacturing companies	1993-97
17	Contractor et al., 2003	S-shaped	Composite index (foreign sales, employees, and offices)	ROA, ROS	103 large service companies in 11 sectors across the world	1983-88

S.No	Study	GSD-Performance Relationship	GSD Operationalization	Performance Operationalization	Sample Firms	Sample Period
18	Lu & Beamish, 2004	S-shaped	Average of the ratios of foreign subsidiaries and foreign countries to their respective maximum values in the sample	1. ROA 2. Tobin's Q	1,489 Japanese firms	1986 –97
19	Thomas & Eden, 2004	S-shaped	Composite measure comprising foreign sales ratio, foreign assets ratio and number of foreign countries	1. ROA 2. ROE 3. Excess market Value (ratio of market value plus book value of debt minus assets to Sales) 4. Average Market Value (market value to total assets)	151 US Headquartered manufacturing companies included in S&P500	1990-94 (5 years)
20	Qian et al., 2008	Inverted U	Susidiary-based entropy measure weighted by region	1. ROA 2. ROS	189 firms selected from the US Fortune 500 List and which have operations in 6 or ore countries.	1996 to 2000
21	Qian et al., 2010	Inverted U	Sales and subsidiary based entropy measures, each computed as at an intra-region, inter-region and total level	ROA	123 US based manufacturing MNEs drawn from the Fortune Global 500 list and having operations in > 6 countries and at least 10% foreign sales	1999 to 2005
22	Garrido-Prada, 2019	U-shaped	Sales based entropy measure	EBIT ROA (EBIT/ Assets)	91 Spanish listed countries	2006-11
23	Chang et al., 2016	Positive relationship after accounting for endogeneity	Geographic diversification dummy (1= firm has a foreign subsidiary)	Excess Value	All firms with data reported on the Compustat Industry Segment database from 2005 to 2011	2005-2011
24	Abdi & Aulakh, 2018	S-shaped	FSTS (1 year lag)	Return on Assets	2,620 US manufacturing firms	1976–2008
25	Yip, Rugman, and Kudina, 2006	U-shaped	% of International Revenues (from Foreign Subsidiaries and Exports)	Net Profits on Assets	1884 public British companies listed in Osiris	2001 to 2003
26	Elango and Sethi, 2007	Inverted U (for large economies with modest trade)	Foreign sales to total sales	1. Gross Profit Margin 2. Operating Profit Margin	1721 technology firms from 16 countries	1995 to 2000

S.No	Study	GSD-Performance Relationship	GSD Operationalization	Performance Operationalization	Sample Firms	Sample Period
27	Click and Harrison, 2000	Negative Linear	1. Foreign sales to total sales 2. a dummy variable for non-zero foreign sales and 3. foreign country count	Tobin's q	42529 firm-year observations for U.S. nonfinancial corporations	1984 to 1997

Appendix 2: Summary Results Models 1-5

	(1) Ln_EBIT_ROA	(2) Ln_EBIT_ROA	(3) Ln_EBIT_ROA	(4) Ln_EBIT_ROA	(5) Ln_EBIT_ROA
L.Ln_GSD		-0.514**	-0.656**	-0.929**	-0.775+
L.Ln_GSD_Asset		-0.0604	-0.0945	0.257	0.357
cL.Ln_GSD#cL.Ln_GSD			-0.06		0.0902
cL.Ln_GSD_Asset#cL.Ln_GSD_Asset			-0.0112		0.117
1.crisis				-0.112	-0.168
2.crisis				0	0
3.crisis				-0.290+	-0.355+
1.crisis#cL.Ln_GSD				0.491+	0.165
2.crisis#cL.Ln_GSD				0	0
3.crisis#cL.Ln_GSD				0.395*	0.19
1.crisis#cL.Ln_GSD_Asset				-0.374+	-0.498
2.crisis#cL.Ln_GSD_Asset				0	0
3.crisis#cL.Ln_GSD_Asset				-0.262	-0.499
1.crisis#cL.Ln_GSD#cL.Ln_GSD					-0.171
2.crisis#cL.Ln_GSD#cL.Ln_GSD					0
3.crisis#cL.Ln_GSD#cL.Ln_GSD					-0.11
1.crisis#cL.Ln_GSD_Asset#cL.Ln_GSD_Asset					-0.121
2.crisis#cL.Ln_GSD_Asset#cL.Ln_GSD_Asset					0
3.crisis#cL.Ln_GSD_Asset#cL.Ln_GSD_Asset					-0.176
_cons	-8.322**	-12.65**	-13.01**	-13.66**	-13.94**
N	1232	926	926	926	926
R^2	0.089	0.141	0.143	0.151	0.155

+ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$

Note: For space constraints, only Independent Variables and Moderator are shown in the table above.

Appendix 3: Likelihood ratio test (Model 2 and 3)

Model 3 (Quadratic terms for Ln_GSD and Ln_GSD_Asset)

```
. xtreg Ln_EBIT_ROA Ln_Revenue Ln_LTD_to_Sales Ln_Intangible_Assets  CoAge wGDPpc wCPI wDCF wExpgr w
> GDPgr wCons Ln_PS_RD c.l1.Ln_GSD##c.l1.Ln_GSD c.l1.Ln_GSD_Asset##c.l1.Ln_GSD_Asset if  CoAge>=0 &
> NATION=="UNITED STATES" & NATIONCODE==840 & FSTS>=10 & FSTS <=100 & GENERALINDUSTRYCLASSIFICATION
> ==1 & Year_<2020 & Year_<YearInactive & Discr_GS_Rev!=1, fe
```

Model 2 (Linear terms for Ln_GSD and Ln_GSD_Asset)

```
. xtreg Ln_EBIT_ROA Ln_Revenue Ln_LTD_to_Sales Ln_Intangible_Assets  CoAge wGDPpc wCPI wDCF wExpgr w
> GDPgr wCons Ln_PS_RD c.l1.Ln_GSD c.l1.Ln_GSD_Asset if  e(sample), fe
```

Likelihood Ratio Test: Model 2 and 3

```
. lrtest Small Big

Likelihood-ratio test                                 LR chi2(2)  =      1.55
(Assumption: Small nested in Big)                     Prob > chi2 =    0.4607
```

The likelihood ratio test indicates that the inclusion of quadratic terms for Ln_GSD and Ln_GSD_Asset (model 3) does not substantially improve model fit over model 2.

Appendix 4: Likelihood ratio test (Model 4 and 5)

Model 5 (Quadratic terms for Ln_GSD and Ln_GSD_Asset with crisis interaction)

```
. xtreg Ln_EBIT_ROA Ln_Revenue Ln_LTD_to_Sales Ln_Intangible_Assets  CoAge wGDPpc wCPI wDCF wExpgr w
> GDPgr wCons Ln_PS_RD c.l1.Ln_GSD##c.l1.Ln_GSD##ib2.crisis c.l1.Ln_GSD_Asset##c.l1.Ln_GSD_Asset##ib
> 2.crisis if  CoAge>=0 & NATION=="UNITED STATES" & NATIONCODE==840 & FSTS>=10 & FSTS <=100 & GENERA
> LINDUSTRYCLASSIFICATION ==1 & Year_<2020 & Year_<YearInactive & Discr_GS_Rev!=1, fe
```

Model 4 (Linear terms for Ln_GSD and Ln_GSD_Asset with crisis interaction)

```
. xtreg Ln_EBIT_ROA Ln_Revenue Ln_LTD_to_Sales Ln_Intangible_Assets  CoAge wGDPpc wCPI wDCF wExpgr w
> GDPgr wCons Ln_PS_RD c.l1.Ln_GSD##ib2.crisis c.l1.Ln_GSD_Asset##ib2.crisis if e(sample), fe
```

Likelihood Ratio Test: Model 4 and 5

```
. lrtest Small Big

Likelihood-ratio test                                 LR chi2(6)  =      4.44
(Assumption: Small nested in Big)                     Prob > chi2 =    0.6175
```

The likelihood ratio test indicates that the inclusion of quadratic terms for Ln_GSD and Ln_GSD_Asset with crisis interaction (model 5) does not substantially improve model fit over model 4.

Appendix 5: Likelihood ratio test (Model 2 and 4)

Model 4 (Linear terms for Ln_GSD and Ln_GSD_Asset with crisis interaction)

```
. xtreg Ln_EBIT_ROA Ln_Revenue Ln_LTD_to_Sales Ln_Intangible_Assets  CoAge wGDPpc wCPI wDCF wExpgr w
> GDPgr wCons Ln_PS_RD c.l1.Ln_GSD##ib2.crisis c.l1.Ln_GSD_Asset##ib2.crisis if  CoAge>=0 & NATION==
> "UNITED STATES" & NATIONCODE==840 & FSTS>=10 & FSTS <=100 & GENERALINDUSTRYCLASSIFICATION ==1 & Ye
> ar_<2020 & Year_<YearInactive & Discr_GS_Rev!=1, fe
```

Model 2 (Linear terms for Ln_GSD and Ln_GSD_Asset - without crisis interaction)

```
. xtreg Ln_EBIT_ROA Ln_Revenue Ln_LTD_to_Sales Ln_Intangible_Assets  CoAge wGDPpc wCPI wDCF wExpgr w
> GDPgr wCons Ln_PS_RD c.l1.Ln_GSD c.l1.Ln_GSD_Asset if  CoAge>=0 & NATION=="UNITED STATES" & NATION
> CODE==840 & FSTS>=10 & FSTS<=100 &GENERALINDUSTRYCLASSIFICATION ==1 & Year_<2020 & Year_<YearInact
> ive & Discr_GS_Rev!=1, fe
```

Likelihood Ratio Test: Model 2 and 4

```
. lrtest Small Big

Likelihood-ratio test                                 LR chi2(6)  =     10.84
(Assumption: Small nested in Big)                     Prob > chi2 =    0.0936
```

The likelihood ratio test indicates that inclusion of crisis interaction for Ln_GSD and Ln_GSD_Asset (linear) improves model fit at a 10% significance level.

Appendix 6: Descriptive Statistics (Model 4)

Descriptive Statistics: Full Data Sample

Variable	Mean	Std. Dev.	Min	Max	Observations		
Ln_EBIT_ROA overall	-2.565862	0.9407584	-10.6507	2.200027	N	=	19411
between		0.9096409	-10.6507	1.758917	n	=	2898
within		0.6752245	-9.521616	1.209076	T-bar	=	6.69807
Ln_GSD overall	-0.4308703	0.5575351	-6.908268	0.4206757	N	=	24386
between		0.5985787	-4.839976	0.3307814	n	=	3329
within		0.2761872	-6.363318	2.416675	T-bar	=	7.32532
Ln_GSD_Asset overall	-0.7642533	0.8050827	-6.908268	0.3891892	N	=	18245
between		0.8349041	-6.908268	0.2930507	n	=	2521
within		0.4233093	-4.853259	2.248328	T-bar	=	7.23721

Descriptive Statistics: Data used in Model 4

Variable	Mean	Std. Dev.	Min	Max	Observations		
Ln_EBIT_ROA overall	-2.549585	0.8478011	-8.271927	0.830394	N	=	926
between		0.8750385	-8.167494	-1.186342	n	=	188
within		0.5675357	-7.821875	-0.5328493	T-bar	=	4.92553
l1.Ln_GSD overall	-0.3804718	0.5200617	-4.839976	0.2830217	N	=	926
between		0.5884443	-4.243323	0.2536557	n	=	188
within		0.2072882	-2.512685	0.5969417	T-bar	=	4.92553
l1.Ln_GSD_Asset overall	-0.5899866	0.6149543	-4.238641	0.2994433	N	=	926
between		0.5913714	-2.986929	0.2308709	n	=	188
within		0.2928375	-4.038761	1.040412	T-bar	=	4.92553

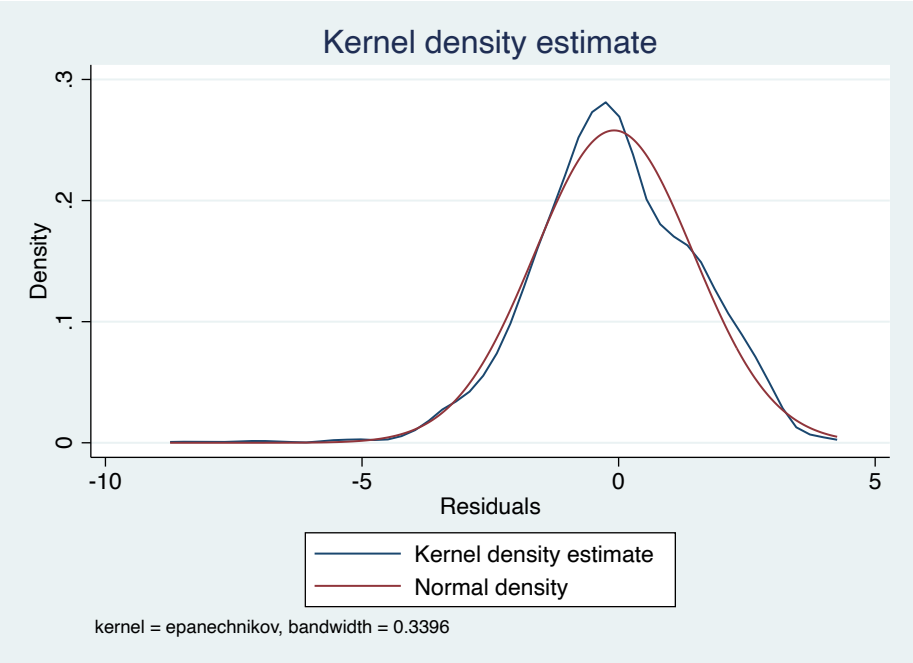
Appendix 7: Hausman Test (Model 4)

```
. hausman FE RE

Note: the rank of the differenced variance matrix (16) does not equal the number of coefficients
        being tested (19); be sure this is what you expect, or there may be problems computing
        the test.  Examine the output of your estimators for anything unexpected and possibly
        consider scaling your variables so that the coefficients are on a similar scale.

                ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |       FE           RE         Difference          S.E.
-------------+------------------------------------------------------------
  Ln_Revenue |    .6243873     .1490704         .475317        .1151845
Ln_LTD_to_~s |   -.1546554     -.117617       -.0370384          .02128
Ln_Intang~ts |   -.1735988    -.0488204       -.1247784         .032196
       CoAge |   -.0044462     .0022469       -.0066931         .016654
      wGDPpc |    .0000289     .0000209        7.94e-06        .0000145
        wCPI |   -.0294588    -.0147366       -.0147223        .0113897
        wDCF |    1.56e-13     1.09e-13        4.70e-14        6.96e-14
      wExpgr |    .0149712     .0115934        .0033778        .0038297
      wGDPgr |    .0069134     .0347677       -.0278543        .0117652
       wCons |   -2.86e-14    -2.02e-14       -8.39e-15        2.54e-14
    Ln_PS_RD |   -.0479189    -.0087393       -.0391796        .0399563
      Ln_GSD |
         L1. |   -.9290241    -.6321164       -.2969077        .0660353
      crisis |
          1  |   -.1118418     -.237196        .1253542        .0425933
          3  |   -.2901212    -.3641346        .0740134        .0663706
     crisis# |
   cL.Ln_GSD |
          1  |    .4912059     .4034517        .0877542         .051212
          3  |    .3948923     .3433508        .0515415        .0390493
Ln_GSD_Asset |
         L1. |    .2565351     .2143903        .0421447        .0450936
      crisis# |
        cL.  |
Ln_GSD_Asset |
          1  |   -.3740774    -.3208193        -.053258        .0233105
          3  |   -.2617078    -.2405117       -.0211961        .0116577
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                 chi2(16) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =      141.57
               Prob>chi2 =      0.0000
               (V_b-V_B is not positive definite)
```

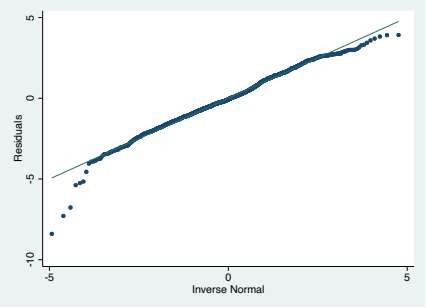
The Hausman test suggests the use of FE model is appropriate.

Appendix 8: Kernel Density, Qnorm, Pnorm Plots (Model 4)

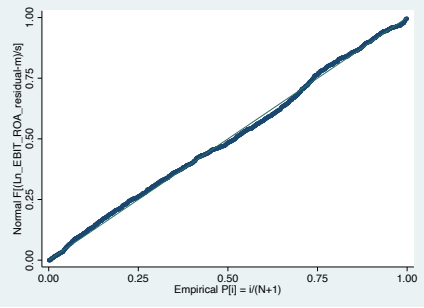
Kernel Density Plot (Model 4)



Qnorm Plot (Model 4)



Pnorm Plot (Model 4)



The analysis of residuals suggests a normal distribution and hence indicates goodness of fit of model 4.

Appendix 9: Marginal Effects of Foreign Market Penetration and Foreign Production (Model 4)

Marginal Effects of Foreign Market Penetration (Ln_GSD) - Model 4

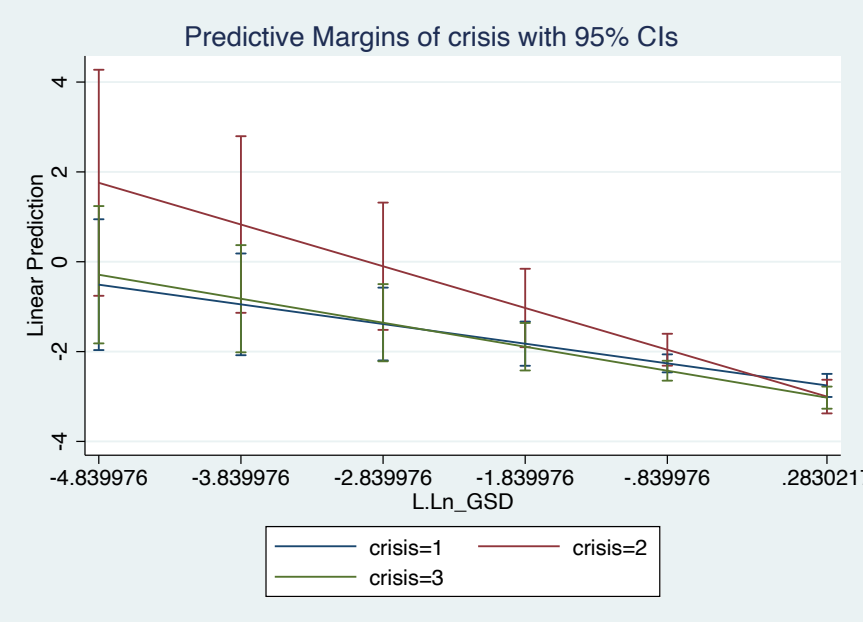
```
. margins crisis, dydx(cL.Ln_GSD)

Average marginal effects                        Number of obs     =        926
Model VCE    : Robust

Expression   : Linear prediction, predict()
dy/dx w.r.t. : L.Ln_GSD

------------------------------------------------------------------------------
             |            Delta-method
             |      dy/dx   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
L.Ln_GSD     |
      crisis |
          1  |  -.4378182   .1661241    -2.64   0.008    -.7634155   -.1122209
          2  |  -.9290241   .2818849    -3.30   0.001    -1.481508   -.3765399
          3  |  -.5341318   .1719874    -3.11   0.002    -.8712209   -.1970426
------------------------------------------------------------------------------
```

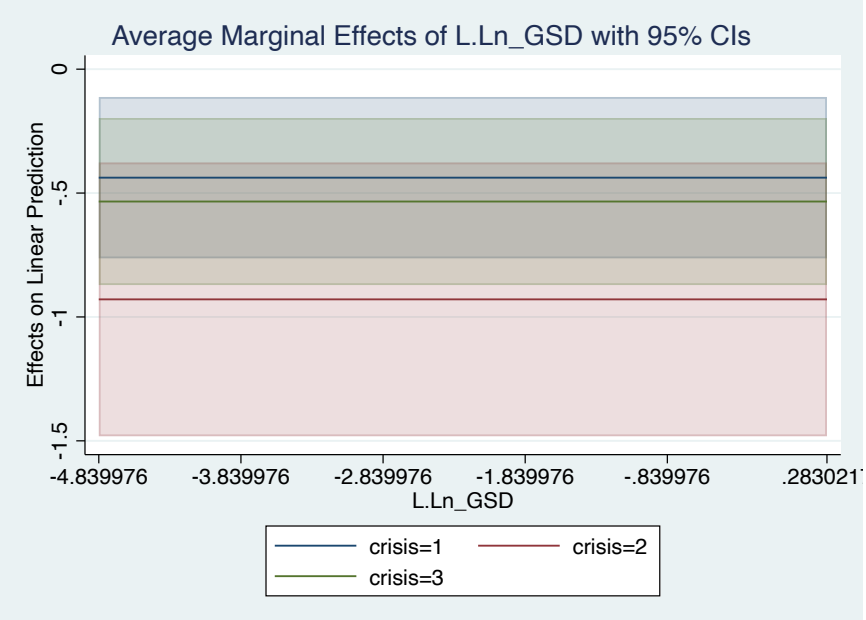
Marginal Effects of Foreign Production (Ln_GSD_Asset) - Model 4

```
. margins crisis, dydx(cL.Ln_GSD_Asset)

Average marginal effects                        Number of obs     =        926
Model VCE    : Robust

Expression   : Linear prediction, predict()
dy/dx w.r.t. : L.Ln_GSD_Asset

------------------------------------------------------------------------------
             |            Delta-method
             |      dy/dx   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
L.Ln_GSD_Asset |
      crisis |
          1  |  -.1175423    .094782    -1.24   0.215    -.3033116    .0682269
          2  |   .2565351   .2205139     1.16   0.245    -.1756643    .6887344
          3  |  -.0051727   .1225317    -0.04   0.966    -.2453304     .234985
------------------------------------------------------------------------------
```

The marginal effect of Ln_GSD is significant in the pre-crisis, crisis and post crisis periods, while the marginal effect of Ln_GSD_Asset is not significant in any of these periods.

Appendix 10: Predictive Margins and Marginal Effects Plots for Foreign Market Penetration (Model 4)





Note:

- The Predictive Margins plot provides the average Ln_EBIT_ROA at different levels of Ln_GSD, other things being equal.
- The Marginal Effects plot represents the first derivative of Ln_EBIT_ROA with respect to Ln_GSD

Appendix 11: Testing of Hypotheses: Hypothesis 1

Hypothesis 1: The Global Financial Crisis (2008-09) negatively moderated the relationship between foreign market penetration-based internationalization and firm performance.

```
. xtreg Ln_EBIT_ROA Ln_Revenue Ln_LTD_to_Sales Ln_Intangible_Assets  CoAge wGDPpc wCPI wDCF wExpgr w
> GDPgr wCons Ln_PS_RD c.l1.Ln_GSD##ib1.crisis c.l1.Ln_GSD_Asset##ib1.crisis if  CoAge>=0 & NATION==
> "UNITED STATES" & NATIONCODE==840 & FSTS>=10 & FSTS <=100 & GENERALINDUSTRYCLASSIFICATION ==1 & Ye
> ar_<2020 & Year_<YearInactive & Discr_GS_Rev!=1, fe cluster(n_WSID)
```

	Coefficient	Robust Std Err.	t	P>|t|	95% Conf.	Interval
L1.Ln_GSD	-0.4378182	0.1661241	-2.64	0.009	-0.7655364	-0.1101
2.crisis#cL.Ln_GSD	-0.4912059	0.2510322	-1.96	0.052	-0.9864249	0.0040131
3.crisis#cL.Ln_GSD	-0.0963136	0.1841886	-0.52	0.602	-0.4596683	0.2670411

```
. xtreg Ln_EBIT_ROA Ln_Revenue Ln_LTD_to_Sales Ln_Intangible_Assets  CoAge wGDPpc wCPI wDCF wExpgr w
> GDPgr wCons Ln_PS_RD c.l1.Ln_GSD##ib2.crisis c.l1.Ln_GSD_Asset##ib2.crisis if  CoAge>=0 & NATION==
> "UNITED STATES" & NATIONCODE==840 & FSTS>=10 & FSTS <=100 & GENERALINDUSTRYCLASSIFICATION ==1 & Ye
> ar_<2020 & Year_<YearInactive & Discr_GS_Rev!=1, fe cluster(n_WSID)
```

	Coefficient	Robust Std Err.	t	P>|t|	95% Conf.	Interval
L1.Ln_GSD	-0.9290241	0.2818849	-3.3	0.001	-1.485107	-0.372941
1.crisis#cL.Ln_GSD	0.4912059	0.2510322	1.96	0.052	-0.0040131	0.9864249
3.crisis#cL.Ln_GSD	0.3948923	0.191727	2.06	0.041	0.0166664	0.7731182

Given that there is a significant improvement in the impact of market segment-based diversification on performance after the crisis (and the deterioration pre-crisis to crisis is significant at 10%, p-value 5.2%), hypothesis 1 is partially supported.

Appendix 12: Testing of Hypotheses: Hypothesis 2

Hypothesis 2: The Global Financial Crisis (2008-09) negatively moderated the relationship between foreign production -based internationalization and firm performance

```
. xtreg Ln_EBIT_ROA Ln_Revenue Ln_LTD_to_Sales Ln_Intangible_Assets  CoAge wGDPpc wCPI wDCF wExpgr w
> GDPgr wCons Ln_PS_RD c.l1.Ln_GSD##ib1.crisis c.l1.Ln_GSD_Asset##ib1.crisis if  CoAge>=0 & NATION==
> "UNITED STATES" & NATIONCODE==840 & FSTS>=10 & FSTS <=100 & GENERALINDUSTRYCLASSIFICATION ==1 & Ye
> ar_<2020 & Year_<YearInactive & Discr_GS_Rev!=1, fe cluster(n_WSID)
```

	Coefficient	Robust Std Err.	t	P>|t|	95% Conf.	Interval
L1.Ln_GSD_Asset	-0.1175423	0.094782	-1.24	0.216	-0.3045216	0.069437
2.crisis#cL.Ln_GSD_Asset	0.3740774	0.2113403	1.77	0.078	-0.0428401	0.7909949
3.crisis#cL.Ln_GSD_Asset	0.1123696	0.1388451	0.81	0.419	-0.1615345	0.3862737

```
. xtreg Ln_EBIT_ROA Ln_Revenue Ln_LTD_to_Sales Ln_Intangible_Assets  CoAge wGDPpc wCPI wDCF wExpgr w
> GDPgr wCons Ln_PS_RD c.l1.Ln_GSD##ib2.crisis c.l1.Ln_GSD_Asset##ib2.crisis if  CoAge>=0 & NATION==
> "UNITED STATES" & NATIONCODE==840 & FSTS>=10 & FSTS <=100 & GENERALINDUSTRYCLASSIFICATION ==1 & Ye
> ar_<2020 & Year_<YearInactive & Discr_GS_Rev!=1, fe cluster(n_WSID)
```

	Coefficient	Robust Std Err.	t	P>|t|	95% Conf.	Interval
L1.Ln_GSD	0.2565351	0.2205139	1.16	0.246	-0.1784796	0.6915497
1.crisis#cL.Ln_GSD_Asset	-0.3740774	0.2113403	-1.77	0.078	-0.7909949	0.0428401
3.crisis#cL.Ln_GSD_Asset	-0.2617078	0.1888727	-1.39	0.168	-0.6343028	0.1108872

Given that the change in the impact of foreign production -based diversification on performance does not differ significantly in the pre-crisis, crisis and post crisis periods, hypotheses 2 is not supported.

Appendix 13: Testing of Hypotheses: Hypothesis 3

Model 4 (Ln_GSD and Ln_GSD_Asset with crisis interaction) – this is referred to as the “Full Model”

```
. xtreg Ln_EBIT_ROA Ln_Revenue Ln_LTD_to_Sales Ln_Intangible_Assets  CoAge wGDPpc wCPI wDCF wExpgr w
> GDPgr wCons Ln_PS_RD c.l1.Ln_GSD##ib2.crisis c.l1.Ln_GSD_Asset##ib2.crisis if  CoAge>=0 & NATION==
> "UNITED STATES" & NATIONCODE==840 & FSTS>=10 & FSTS <=100 & GENERALINDUSTRYCLASSIFICATION ==1 & Ye
> ar_<2020 & Year_<YearInactive & Discr_GS_Rev!=1, fe
```

Ln_GSD_Asset with crisis interaction - this is referred to as the “Ln_GSD_Asset Model” (i.e., model excludes Ln_GSD)

```
. xtreg Ln_EBIT_ROA Ln_Revenue Ln_LTD_to_Sales Ln_Intangible_Assets  CoAge wGDPpc wCPI wDCF wExpgr w
> GDPgr wCons Ln_PS_RD c.l1.Ln_GSD_Asset##ib2.crisis if  e(sample), fe
```

Ln_GSD with crisis interaction - this is referred to as the “Ln_GSD Model” (i.e., model excludes Ln_GSD_Asset)

```
. xtreg Ln_EBIT_ROA Ln_Revenue Ln_LTD_to_Sales Ln_Intangible_Assets  CoAge wGDPpc wCPI wDCF wExpgr w
> GDPgr wCons Ln_PS_RD c.l1.Ln_GSD##ib2.crisis if  e(sample), fe
```

… continued on next page

continued on previous page …

Hypothesis3: The moderation impact of the Global Financial Crisis (2008-09) was stronger in the case of foreign market penetration-based internationalization than in the case of foreign production -based internationalization.

Likelihood Ratio Test #1: Ln_GSD_Asset Model (i.e. Ln_GSD excluded) nested in Full Model

```
. lrtest Ln_GSD_Asset Full

Likelihood-ratio test                                 LR chi2(3)  =     26.89
(Assumption: Ln_GSD_Asset nested in Full)             Prob > chi2 =    0.0000
```

Likelihood Ratio Test #2: Ln_GSD Model (i.e. Ln_GSD_Asset excluded) nested in Full Model

```
. lrtest Ln_GSD Full

Likelihood-ratio test                                 LR chi2(3)  =      4.36
(Assumption: Ln_GSD nested in Full)                   Prob > chi2 =    0.2252
```

The likelihood Ratio Test 1 suggests that adding Ln_GSD as a predictor variable results in a statistically significant improvement in model fit, however, likelihood ratio test #2 suggests that adding Ln_GSD_Asset as a predictor variable does not result in a statistically significant improvement in model fit. Accordingly, hypothesis 3 is supported.

Appendix 14: Testing of Hypotheses (AIC): Hypothesis 3

1. AIC for Foreign Market Penetration interaction with Crisis (Ln_GSD#crisis)

```
. xtreg Ln_EBIT_ROA Ln_Revenue Ln_LTD_to_Sales Ln_Intangible_Assets  CoAge wGDPpc wCPI wDCF wExpg
> r wGDPgr wCons Ln_PS_RD c.l1.Ln_GSD##ib2.crisis c.l1.Ln_GSD_Asset##ib2.crisis if  CoAge>=0 & NA
> TION=="UNITED STATES" & NATIONCODE==840 & FSTS>=10 & FSTS <=100 & GENERALINDUSTRYCLASSIFICATION
>  ==1 & Year_<2020 & Year_<YearInactive & Discr_GS_Rev!=1, fe
```

```
. xtreg Ln_EBIT_ROA Ln_Revenue Ln_LTD_to_Sales Ln_Intangible_Assets  CoAge wGDPpc wCPI wDCF wExpg
> r wGDPgr wCons Ln_PS_RD c.l1.Ln_GSD##ib2.crisis  if e(sample), fe
```

```
. estat ic

Akaike's information criterion and Bayesian information criterion

------------------------------------------------------------------------------
       Model |          N   ll(null)  ll(model)      df        AIC        BIC
-------------+----------------------------------------------------------------
           . |        926  -788.9027  -715.2017      15   1460.403   1532.867
------------------------------------------------------------------------------
Note: BIC uses N = number of observations. See [R] BIC note.
```

2. AIC for Foreign Production interaction with Crisis (Ln_GSD_Asset#crisis)

```
. xtreg Ln_EBIT_ROA Ln_Revenue Ln_LTD_to_Sales Ln_Intangible_Assets  CoAge wGDPpc wCPI wDCF wExpg
> r wGDPgr wCons Ln_PS_RD c.l1.Ln_GSD##ib2.crisis c.l1.Ln_GSD_Asset##ib2.crisis if  CoAge>=0 & NA
> TION=="UNITED STATES" & NATIONCODE==840 & FSTS>=10 & FSTS <=100 & GENERALINDUSTRYCLASSIFICATION
>  ==1 & Year_<2020 & Year_<YearInactive & Discr_GS_Rev!=1, fe
```

```
. xtreg Ln_EBIT_ROA Ln_Revenue Ln_LTD_to_Sales Ln_Intangible_Assets  CoAge wGDPpc wCPI wDCF wExpg
> r wGDPgr wCons Ln_PS_RD c.l1.Ln_GSD_Asset##ib2.crisis  if e(sample), fe
```

```
. estat ic

Akaike's information criterion and Bayesian information criterion

------------------------------------------------------------------------------
       Model |          N   ll(null)  ll(model)      df        AIC        BIC
-------------+----------------------------------------------------------------
           . |        926  -788.9027  -726.4654      15   1482.931   1555.394
------------------------------------------------------------------------------
Note: BIC uses N = number of observations. See [R] BIC note.
```

Appendix 15: Robustness Check: Model 4 (using ROS and ROE as Independent Variables)

	(1) Ln_EBIT_ROA	(2) Ln_EBIT_ROS	(3) Ln_EBIT_ROE
L.Ln_GSD	-0.929**	-0.997**	-0.507
1.crisis	-0.112	-0.0631	-0.00951
2.crisis	0	0	0
3.crisis	-0.290+	-0.273+	-0.127
1.crisis#cL.Ln_GSD	0.491+	0.550*	0.199
2.crisis#cL.Ln_GSD	0	0	0
3.crisis#cL.Ln_GSD	0.395*	0.374*	-0.0869
L.Ln_GSD_Asset	0.257	0.277	0.103
1.crisis#cL.Ln_GSD_Asset	-0.374+	-0.408*	-0.214
2.crisis#cL.Ln_GSD_Asset	0	0	0
3.crisis#cL.Ln_GSD_Asset	-0.262	-0.259	0.0253
_cons	-13.66**	-12.26**	-3.466
N	926	926	700
R^2	0.151	0.114	0.094

Appendix 16: Robustness Check: Model 2 (Instrumental Variable Approach)

```
. xtivreg2 Ln_EBIT_ROA Ln_Revenue Ln_LTD_to_Sales Ln_Intangible_Assets  CoAge wGDPpc wCPI wDCF wExpg
> r wGDPgr wCons Ln_PS_RD l1.Ln_GSD_Asset (l1.Ln_GSD = Ln_Int_exp)  if  CoAge>=0 & NATION=="UNITED S
> TATES" & NATIONCODE==840 & FSTS>=10 & FSTS <=100 & GENERALINDUSTRYCLASSIFICATION ==1 & Year_<2020
> & Year_<YearInactive & Discr_GS_Rev!=1, fe
Warning - singleton groups detected.  27 observation(s) not used.

FIXED EFFECTS ESTIMATION
------------------------
Number of groups =       134                  Obs per group: min =         2
                                                             avg =       5.6
                                                             max =        17

IV (2SLS) estimation
--------------------

Estimates efficient for homoskedasticity only
Statistics consistent for homoskedasticity only

                                                    Number of obs =      748
                                                    F( 13,   601) =     5.87
                                                    Prob > F      =   0.0000
Total (centered) SS     =  208.2025914              Centered R2   =   0.0749
Total (uncentered) SS   =  208.2025914              Uncentered R2 =   0.0749
Residual SS             =  192.5983466              Root MSE      =    .5601

------------------------------------------------------------------------------
         Ln_EBIT_ROA |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
---------------------+--------------------------------------------------------
              Ln_GSD |
                L1. |  -1.378817   .5247761    -2.63   0.009    -2.407359   -.3502746
                    |
          Ln_Revenue |   .5210661   .1365774     3.82   0.000     .2533792    .7887529
     Ln_LTD_to_Sales |  -.1911393   .0380591    -5.02   0.000    -.2657338   -.1165448
Ln_Intangible_Assets |  -.1291467   .0488297    -2.64   0.008    -.2248512   -.0334422
               CoAge |  -.0303342    .013733    -2.21   0.027    -.0572503    -.003418
              wGDPpc |   .0000688   .0000298     2.31   0.021     .0000103    .0001273
                wCPI |  -.0299331   .0288935    -1.04   0.300    -.0865634    .0266972
                wDCF |   1.09e-14   1.62e-13     0.07   0.946    -3.06e-13    3.28e-13
              wExpgr |   .0041625   .0115575     0.36   0.719    -.0184899    .0268148
              wGDPgr |   .0021204   .0332984     0.06   0.949    -.0631432    .0673841
               wCons |   3.11e-14   6.11e-14     0.51   0.610    -8.86e-14    1.51e-13
            Ln_PS_RD |  -.0108582   .0855814    -0.13   0.899    -.1785947    .1568783
                     |
       Ln_GSD_Asset |
                L1. |   .3005654   .1928579     1.56   0.119    -.0774293      .67856
```

```
------------------------------------------------------------------------------
Underidentification test (Anderson canon. corr. LM statistic):          44.546
                                                Chi-sq(1) P-val =    0.0000
------------------------------------------------------------------------------
Weak identification test (Cragg-Donald Wald F statistic):               47.013
Stock-Yogo weak ID test critical values: 10% maximal IV size             16.38
                                         15% maximal IV size              8.96
                                         20% maximal IV size              6.66
                                         25% maximal IV size              5.53
Source: Stock-Yogo (2005).  Reproduced by permission.
------------------------------------------------------------------------------
Sargan statistic (overidentification test of all instruments):           0.000
                                                (equation exactly identified)
------------------------------------------------------------------------------
Instrumented:         L.Ln_GSD
Included instruments: Ln_Revenue Ln_LTD_to_Sales Ln_Intangible_Assets CoAge
                      wGDPpc wCPI wDCF wExpgr wGDPgr wCons Ln_PS_RD
                      L.Ln_GSD_Asset
Excluded instruments: Ln_Int_exp
------------------------------------------------------------------------------
```

Note:

- Instrumental Variable test was carried out on model 2 (rather than on model 4) since stata command xtivreg2 does not support interaction effect (#)
- Instrument used was internationalization experience i.e. average Ln-GSD for 2nd and 3rd lagged years

Appendix 17: Derivation of Elasticity as the Derivative of a Logarithmic Relationship

Let us assume:

Geographic Segment Diversification = G

Geographic Segment Diversification (Log transformed) = Ln_G

Performance = P

Performance (Log transformed) = Ln_P

Then,

Elasticity of Performance = % Change in Performance based on % Change in GSD

$= (\delta P/P)/(\delta G/G)$

$= (\delta P/\delta G)*(1/P)*(G/1)$

$= (dP/dG)*(dLn\_P/dP)*(dG/dLn\_G)$ – *using chain rule (calculus) and formula for the derivative of a log*

$= dLn\_P/dLn\_G$

Hence, elasticity of a dependent variable is the derivative of a log transformed dependent variable and log transformed independent variable.

Following is a summary of the interpretation of the values that elasticity can take

Range of Values	**Interpretation**

0< Elasticity<1	Rate of change of performance is less than rate of change of GSD and in the same direction
Elasticity > 1	Rate of change of performance is more than rate of change of GSD and in the same direction
-1<Elasticity<0	Rate of change of performance is less than rate of change of GSD and in the opposite direction
Elasticity < -1	Rate of change of performance is more than rate of change of GSD and in the opposite direction

Appendix 18: Interpreting the Natural Logarithm of Geographic Diversification (Ln_GSD)