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TWO ESSAYS ON
THE DEGREE OF GLOBALIZATION OF A FIRM: MEASUREMENT,
ANTECEDENTS, AND CONSEQUENCES
by
Victor B. Marshall

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I want to express my deep appreciation and gratitude to all those who have helped mentor me throughout my doctoral studies. This has truly been a transformational experience.

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Dedication

I dedicate this dissertation to my wonderful wife, Jane, who has been by my side ever since we met in high school, first as my best friend and then later as my much better half. As is true with most of the good things in my life, I could not have accomplished this without her love, support, and encouragement, for which I am thankful every day.
Abstract

In this research I address the question: how global should a firm be? Answering this question requires addressing several related questions. First, what is a global firm, and how does one measure how global a firm is? Second, which firm capabilities are antecedents to firm globalization? And finally, what is the relationship between firm globalization and performance?

I begin by examining Rugman’s (2003, 2005) and Asmussen’s (2009) measures for the globalization of a firm and develop a new, simplified, enhanced measure, the Degree of Globalization (DOG). DOG is an easy to interpret continuous ratio variable that is mathematically and empirically equivalent to Asmussen’s overall measure. Compared to Rugman’s and Asmussen’s systems, however, DOG has the advantages that it is: more parsimonious; easy to calculate; can be applied to more firms; is not sensitive to the definition of the countries that comprise the Asia-Pacific, North American, and European triads; and clarifies the distinction between the degree of globalization and degree of internationalization constructs. I validated DOG and confirmed the results for this new measure versus the two existing globalization measurement systems using the same sample used to develop those approaches.

I next examined the differences in capabilities that distinguish highly global firms from less global firms and the relationship between firm globalization and firm performance. Based on the Resource-Based View (RBV), I hypothesized that firms with greater technological and/or marketing capabilities would tend to be more globalized. Combining my application of the RBV with the concept of strategic fit as profile deviation, I further hypothesized that firms would perform better with a higher degree of
fit between a firm’s actual and predicted DOG. I reasoned that firms that under-globalized relative to their capabilities would suffer an opportunity cost from the inefficient under-utilization of their capabilities. I similarly reasoned that firms that over-globalized relative to their capabilities would suffer diminished performance due to the ineffective over-utilization of their capabilities. My empirical analysis of 222 large firms from multiple industries across the globe supported my hypothesis that firms with greater technological capabilities tend to be more global.
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CHAPTER 1: SUMMARY OF RESEARCH

There have been changes in global environmental factors over the past few decades that have fundamentally changed how businesses operate (Peng, 2010). These changes include: advances in telecommunications, transportation, and other enabling technologies; the trend of lowering trade barriers across the globe; and the establishment of the World Trade Organization to regulate trade between and among nations. These factors have made it more feasible for firms to consider becoming more globalized. But no direction has been given to firms concerning two questions: first, given the resources and capabilities of a firm, how global should it be; and, second is there a predictable relationship between how global a firm is, how global should it be, and firm performance? This dissertation represents an initial attempt to address both questions.

In my first essay, I built upon prior research comparing regional versus global firms (Asmussen, 2009; Rugman, 2003, 2005) to develop a new continuous ratio measure, the Degree of Globalization (DOG). I tested this new measure on the firms of the 2002 Global Fortune 500 and compared my results with this prior research. As demonstrated, DOG is mathematically and empirically equivalent to, but simpler than, Asmussen’s (2009) measure of the degree of overall globalization for a firm.

DOG exhibits a number of advantages over Asmussen’s (2009) and Rugman’s (2003, 2005) approaches: DOG can be applied to more firms (376 of the 500 firms for DOG, versus 366 for Rugman (2003, 2005) and 137 for Asmussen (2009)); DOG can be
applied to a firm from any country (not just those from the Asia-Pacific, North American, or European triads); DOG has enhanced validity, reliability, and stability (since it is not sensitive to the definition of which countries comprise the Asia-Pacific, North American, and European triads); and DOG explicitly links the relationship between the concepts of globalization and internationalization since DOG is expressed as a non-linear function of foreign sales to total sales (FSTS) which is the most frequently used measure for firm internationalization (Buckley, Dunning, & Pearce, 1984; Contractor, Kundu, & Hsu, 2003; Daniels & Bracker, 1989; Eckert, Dittfeld, Muche, & Rassler, 2010; Eppink & Van Rhijn, 1988, 1989; Errunza & Senbet, 1984; Geringer, Beamish, & daCosta, 1989; Geringer, Tallman, & Olsen, 2000; Gomes & Ramaswamy, 1999; Haar, 1989; Pantzalis, Park, & Sutton, 2008; Riahi-Belkaoui, 1996, 1998, 1999, 2002; Ruigrok, Amann, & Wagner, 2007; Ruigrok & Wagner, 2003; Sambharya, 1995; Siddharthan & Lall, 1982; Sullivan, 1994; Tallman & Li, 1996).

DOG gives scholars an easy way to measure firm globalization. Thus the development of DOG creates an opportunity to empirically examine globalization in a variety of contexts and with respect to a number of questions.

In my second essay, I attempt to explain the link between firms being at the appropriate level of globalization (given their technological and marketing capabilities) and their performance. My theoretical prism was the resource-based view (RBV) (Barney, 1991; Barney, Ketchen, & Wright, 2011; Barney, Wright, & Ketchen, 2001). I hypothesized that firms with higher levels of technological and/or marketing capabilities would be expected to have greater degrees of globalization. I also hypothesized that a firm whose actual degree of globalization matches its predicted degree of globalization
typically would have better performance than a firm whose actual degree of globalization is significantly different from its predicted degree of globalization.

I tested these RBV based hypotheses regarding the antecedents and consequences of firm globalization on a sample of 222 large firms from multiple industries from across the globe utilizing data from the S&P Capital IQ database (S&P Capital IQ). Following Brouthers, Werner, & Wilkinson (1996) the sample data was averaged for the 2007 to 2010 time frame to minimize the effect of single-year variations thus providing more valid and reliable measures.

Utilizing hierarchical multiple regression, I found support for my hypothesis that a firm’s technological capabilities were positively related to firm globalization but I did not find support for my hypothesis that a firm’s marketing capabilities were positively related to firm globalization. My sample included a mix of B2B and B2C firms, so my inability to support my marketing capabilities hypothesis may stem in part from my utilization of advertising intensity as a proxy to measure a firm’s marketing capabilities (Delios & Beamish, 1999, 2001; Fang, Wade, Delios, & Beamish, 2007; Kirca et al., 2011; Lu & Beamish, 2004) due to the differences in the use of advertising between B2B and B2C firms (Glynn, 2012).

Utilizing difference score analysis (Edwards, 2001) to evaluate fit as profile deviation (Venkatraman, 1989), I did not find support for my hypothesis that the degree of fit between a firm’s actual DOG and predicted DOG (based on the firm’s technological and marketing capabilities) was positively related to firm performance. My results in testing this hypothesis were consistent for my two measures of firm performance: Return on Assets, an historical accounting-based measure (Geringer, et al., 2000; Gomes &
Ramaswamy, 1999; Qian, Li, Li, & Qian, 2008; Ruigrok, et al., 2007); and Tobin’s Q, a prospective market-based measure (Eckert, et al., 2010; Hult et al., 2008; Qian, et al., 2008; Rugman & Oh, 2010). My findings were consistent, however, with recent research into the positive relationship between firm internationalization and firm performance (Kirca, et al., 2011) in that I found a positive significant relationship between actual DOG and firm performance.
CHAPTER 2 - ESSAY #1: MEASURING THE DEGREE OF GLOBALIZATION OF A FIRM: AN ENHANCED SIMPLIFICATION

There has been an active debate regarding regional versus global geographic diversification in international business (IB) strategy research that begs the question of how to measure the degree of globalization of a firm (Peng & Pleggenkuhle-Miles, 2009; Seno-Alday, 2010). The origins of this debate can be traced to Levitt’s (1983) assertion that a global firm is quite different than a multinational enterprise (MNE) and his stressing the advantages a global firm possesses compared to an MNE. In response to the notion of the global corporation, Rugman, in a series of articles, argues that MNEs pursue strategies of regionalization, not globalization (Collinson & Rugman, 2008; Rugman, 2003, 2005, 2009, 2010a, 2010b; Rugman & Brain, 2004; Rugman, Li, & Oh, 2009; Rugman & Oh, 2010; Rugman & Verbeke, 2003, 2004, 2005, 2008a, 2008b; Simon & Rugman, 2008). Rugman suggests that the concept of the globalization of a firm is largely a myth and has written of the demise of the concept of globalization (Rugman, 2003, p. 409).

One outcome of this geographic diversification debate is that it leads researchers and managers alike to ask the question: “Exactly how do we determine how global a firm is?” Prior scholarship has noted that the ability to answer this type of question is a fundamental issue for IB research; while multiple approaches have been recommended and used, most have been criticized and thus far there is not an agreed upon method and
measure (Aggarwal, Berrill, Hutson, & Kearney, 2010). One impediment to clearly answering the question of how to measure the degree of globalization for a firm is the lack of clarity generated by the interchangeable use in IB research of the terms degree of globalization, degree of internationalization, degree of multinationality, international diversification, geographic diversification, and international expansion. Prior IB scholarship has noted that these terms have often been used in a completely interchangeable fashion (Kirca, et al., 2011).

Recently, scholars in IB research defined the term degree of globalization and distinguished it from the term degree of internationalization (Asmussen, 2009). The degree of globalization refers to the extent to which a firm has achieved an equivalent economic presence across the globe (relative to the size of the underlying economy for each area) whereas the term degree of internationalization refers to the extent to which a firm has achieved a presence beyond the borders of the firm’s domestic home country (Asmussen, 2009). Firm globalization is therefore a precisely defined, specific form of firm internationalization. Thus a firm with a high degree of internationalization may or may not have a high degree of globalization whereas a firm that has a high degree of globalization will always have a high degree of internationalization. In this paper I distinguish between these concepts by using the terms degree of globalization and degree of internationalization based on these definitions.

So how have the degree of globalization and the degree of internationalization been measured? There have been a myriad of measures used to capture the degree of internationalization of firms. One family of measures examines the foreign versus domestic percent composition of indicators such as a firm’s sales, assets, number of
employees, number of subsidiaries, or profits (Buckley, et al., 1984; Contractor, et al., 2003; Daniels & Bracker, 1989; Eppink & Van Rhijn, 1988, 1989; Errunza & Senbet, 1984; Geringer, et al., 1989; Geringer, et al., 2000; Gomes & Ramaswamy, 1999; Grant, 1987; Grant, Jammine, & Thomas, 1986; Haar, 1989; Jung, 1991; Pantzalis, et al., 2008; Riahi-Belkaoui, 1996, 1998, 1999, 2002; Ruigrok, et al., 2007; Ruigrok & Wagner, 2003; Sambharya, 1995; Siddharthan & Lall, 1982; Sijbrands & Eppink, 1994; Sullivan, 1994; Tallman & Li, 1996). Another family of measures examines the international diversification for a firm measured as either the entropy or heterogeneity of indicators such as a firm’s sales, number of countries, or number of subsidiaries (Buhner, 1987; Errunza & Senbet, 1984; Miller & Pras, 1980; Qian, 1996, 1997; Qian, et al., 2008; Sambharya, 1995; Zahra, Ireland, & Hitt, 2000). Yet another family of measures simply examines the international amounts and/or counts for a firm of indicators such as sales, the number of subsidiaries, the number of countries, or the number of regions (Errunza & Senbet, 1984; Gomes & Ramaswamy, 1999; Lu & Beamish, 2004; Morck & Yeung, 1991; Pantzalis, et al., 2008; Sambharya, 1995; Tallman & Li, 1996; Zahra, et al., 2000). The most frequently used measurement by far, however, is the ratio of Foreign Sales to Total Sales (FSTS) (Buckley, et al., 1984; Contractor, et al., 2003; Daniels & Bracker, 1989; Eckert, et al., 2010; Eppink & Van Rhijn, 1988, 1989; Errunza & Senbet, 1984; Geringer, et al., 1989; Geringer, et al., 2000; Gomes & Ramaswamy, 1999; Haar, 1989; Pantzalis, et al., 2008; Riahi-Belkaoui, 1996, 1998, 1999, 2002; Ruigrok, et al., 2007; Ruigrok & Wagner, 2003; Sambharya, 1995; Siddharthan & Lall, 1982; Sullivan, 1994; Tallman & Li, 1996). Therefore I use the ratio of Foreign Sales to Total Sales (FSTS) to measure the degree of internationalization of a firm.
There have been two primary measurement systems used to measure the degree of globalization of a firm. Rugman (2003, 2005) developed his pioneering descriptive Regionalization-Globalization Taxonomy (RGT) that categorizes firms based on their distribution of sales across the three triad regions (the Asia-Pacific triad, the European triad, and the North American triad). He categorizes firms as being either: home region oriented firms; bi-regional firms; host oriented firms; or global firms. Rugman defines a global firm as being a firm that has less than 50% of its revenues from its home triad while having at least 20% of its revenues from each of the two remaining triads.

Asmussen (2009) built upon Rugman’s research and his own definition of a global firm to develop his measurement system. Asmussen’s definition of the degree of globalization is the extent to which a firm has achieved an equivalent economic presence across the globe relative to the size of the underlying economy for each area. Asmussen’s Measurement System (AMS) is unique in that both Rugman and the degree of internationalization measures ignore the size of a firm’s home country’s economy. Asmussen uses Gross Domestic Product (GDP) as a proxy for the size of the economy for each geographic area. Thus his approach differs from prior methodologies in that it normalizes a firm’s sales for each geographic area by converting sales to a penetration measure; it does so by dividing sales for each area by the size of the economy for that same area (Asmussen, 2009). Asmussen’s method recognizes that the size of a firm’s home country economy can vary greatly based on that firm’s home country whereas preceding methods do not account for this difference and therefore implicitly make the assumption that each country is equal. For example, FSTS, the most commonly used measure in IB research for the degree of internationalization, indicates that two
companies are equally internationalized if both companies have a value of 0.20 for FSTS. FSTS is interpreted in this fashion even if one company is from the United States and the other is from Lithuania. As I develop in this research, these two companies will have quite different levels of foreign penetration when compared to their home country penetration.

While both the Rugman and Asmussen groundbreaking measurement systems have provided new insights, they tend to suffer from some shortcomings. First, Rugman’s and Asmussen’s approaches are not exhaustive. Both can only be applied to firms with home countries from the Asia-Pacific, European, and North American triads. Additionally, Rugman’s measurement system has a gap in its classification approach such that some firms cannot be categorized (firms that have less than 50% of their revenue in their home triad and have less than 20% of their revenue in each of the other two triads).

A second shortcoming affects the validity, reliability, and stability over time of the Rugman and Asmussen measurement systems. Both approaches are based on the concept of the Asia-Pacific, European, and North American triads. This is problematic because it begs the question of which specific countries comprise each triad? Do these specific countries vary over time and do firms report their geographic segment data in a fashion consistent with these definitions? For example, does the European triad include the members of the European Union, or the UN definition of Europe (which includes Russia) (United Nations Statistics Division, 2012a), or some other definition? Similarly, does North America include Mexico since it is a member of the North American Free Trade Agreement (NAFTA) or does North America exclude Mexico consistent with the UN definition of North America (United Nations Statistics Division, 2012a), or some
other definition? Further, unless the list of countries by region is provided in a company’s footnote to their financial reports, it is difficult to know the exact countries included in the geographic segment data reported in a firm’s financial reports. This makes comparison across firms and across different researchers’ findings very difficult.

Additionally, Rugman’s measurement system implicitly makes the assumption that each triad is economically equal which, as I test in this research, is not a valid assumption.

Finally, both the Rugman and the Asmussen measurement systems are limited in terms of the number of companies to which each can be applied due to the specific firm geographic segment detail that is required for each approach. The Rugman approach requires that a firm report revenues for each of the triad regions if that firm has less than 50 percent of its revenues in its home triad. In contrast, the Asmussen approach requires that a firm report revenues for its home country and its home triad (either the Asia-Pacific triad, the European triad, or the North American triad depending upon the firm’s home country location). Based on these requirements, Rugman was able to classify only 365 firms of the 2002 Fortune Global 500 while Asmussen was able to measure only 140 of the same 500 firms (Asmussen, 2009; Rugman, 2003, 2005). In summary, both the Rugman and Asmussen measurements systems are: non-exhaustive (since each can only be applied to triad based firms); have validity, reliability, and stability issues (based on their reliance on triad data); and are limited in the number of firms to which each can be applied (based on each method’s data requirements).

In this research I attempt to overcome these difficulties by developing and testing a new measure, the Degree of Globalization (DOG). I will empirically examine DOG using those firms included in the 2002 Global Fortune 500 (selected on the basis of those
firms’ 2001 financial results). I choose this sample because it is the same data set used by Asmussen and Rugman (Asmussen, 2009; Rugman, 2003, 2005), allowing for direct comparisons among the three measurement approach studies. I base DOG on the same definition of the characteristics of a globalized firm as Asmussen. However, DOG represents an improvement over AMS and RGT in several ways. First, DOG is easy to interpret as it measures a firm’s characteristics along a continuum anchored by two well-defined anchor points. The first anchor point for DOG is a domestic firm that has no foreign sales; a domestic firm has a value of 0 for DOG. The second anchor point for DOG is Asmussen’s (2009) definition of a global firm as a firm that has achieved an equivalent economic presence across the globe (relative to the size of the underlying economy for each area); a global firm has a value of 1 for DOG. In contrast to DOG, Asmussen’s measurement system requires interpreting four different continuous ratio variables and Rugman’s Regionalization-Globalization Taxonomy categorizes firms into four different descriptive categories.

Second, DOG is an exhaustive measurement system whereas Asmussen’s Measurement System and Rugman’s Regionalization-Globalization Taxonomy are not. DOG can be calculated for firms from any country whereas the Asmussen and Rugman approaches cannot be applied to a firm that is from a country that is external to the triad regions (Asmussen, 2009; Rugman, 2003, 2005). Further, there is a gap in the definitions of Rugman’s categories. For example, any firm that has less than 50 percent of its revenues from its home triad and that has less than 20 percent of its revenues in each of the other two triads fails to meet the criteria for any of the RGT categories (Rugman, 2003, 2005).
Third, basing DOG on the data for the firm’s home country revenues (instead of the revenues by triad as required for RGT and AMS) improves the validity, reliability, and stability over time for this measure. DOG is based on the well defined and commonly understood definition of the area represented by a firm’s home country. In contrast and as already noted, there is ambiguity regarding the specific countries to be included in the Asia-Pacific triad, the European triad, and the North American triad. In addition to the ambiguity of the specific countries included in the specific triads, the specific list of countries associated with a triad can potentially change over time (such as when new countries are added to the European Union or when there are new trade agreements between countries). Therefore, basing DOG on domestic versus foreign revenues for a firm enhances its validity, reliability, and stability over time relative to Asmussen’s and Rugman’s measurement approaches since DOG is not sensitive to the definition of which countries are included in each of the triads.

Fourth, DOG is easy to calculate. DOG can be calculated from two ratios: (1) the ratio of Foreign Sales to Total Sales (FSTS) for a firm; and (2) the ratio of the size of the firm’s Domestic Economy to the size of the Global Economy (DEGE). Thus DOG is not dependent upon a firm’s reporting of triad-level geographic segment financial data as required by the Asmussen and Rugman measurement systems (Asmussen, 2009; Rugman, 2003, 2005). Therefore I expect that DOG can be calculated for more firms than either the Rugman or Asmussen methods since many firms do not report triad-level geographic segment financial data.

Fifth, the DOG equation underscores the difference in perspectives of measures of the degree of globalization of a firm versus the degree of internationalization of a firm.
Since FSTS is the most frequently used measure of the degree of internationalization of a firm, the DOG equation highlights the non-linear relationship between DOG and FSTS and the importance of normalizing for the size of the firm’s home country versus the global economy.

Finally I demonstrate that even though DOG is easier to calculate than Asmussen’s method and does not require triad-level geographic segment data, DOG is nonetheless mathematically and empirically equivalent to Asmussen’s measure for the overall globalization of a firm. Thus DOG provides an effective answer to the question of how to validly and reliably measure the degree of globalization for a firm, and does so for a larger number of firms within the context of the assumptions used to develop DOG.

Reviewing the Existing Degree of Globalization Measurement Systems

Currently there are two degree of globalization measurement systems for firms: the Rugman (RGT) and Asmussen (AMS) measurement systems (Asmussen, 2009; Collinson & Rugman, 2008; Rugman, 2003, 2005; Rugman & Brain, 2004; Rugman & Oh, 2008; Rugman & Verbeke, 2004; Simon & Rugman, 2008). Herein I introduce the Degree of Globalization (DOG) as a third measure of the degree of globalization. DOG represents an extension and enhancement of Asmussen’s measurement system just as his system similarly represented an extension and enhancement of Rugman’s measurement system. Prior to doing so, I first review the Rugman and Asmussen measurement systems.

Since each system measures the degree of globalization for a firm, the Rugman, Asmussen, and DOG measurement systems each share a fundamental characteristic and
foundation. Each measurement system divides the globe into four or fewer global zones and then compares the characteristics of those global zones.¹ The description of each measurement system herein begins by defining and illustrating the global zones used as the basis for that measurement system. By comparing the overall characteristics for each global zone as a whole, however, each measurement system thus ignores any country-to-country variations that may exist within any global zone.

The Rugman Descriptive Regionalization-Globalization Taxonomy (RGT)

Rugman was the first to attempt to empirically categorize the degree of globalization for a large sample of MNEs (Collinson & Rugman, 2008; Rugman, 2003, 2005; Rugman & Brain, 2004; Rugman & Oh, 2008; Rugman & Verbeke, 2004; Simon & Rugman, 2008). He did this by classifying multinational enterprises based on each firm’s distribution of sales across the three dominant triad regions (these regions are hereafter referred to collectively as the triads or singularly as a specific triad). These triads are the North American Triad, European Triad, and Asia-Pacific Triad. Thus Rugman’s approach is dependent upon the definition of the specific countries to be included within each triad. As illustrated in Figure 1, this approach excludes from consideration all sales for firms in countries external to these triads. This approach also does not consider the distribution of sales by country within these triads. Finally to evaluate a firm via Rugman’s measurement system requires that the firm report its

¹ The term “zone” in this research refers to one of the specifically defined global zones used for the Rugman, Asmussen, or DOG measurement systems. In contrast, the term
geographic segment sales data in sufficient detail to determine that firm’s sales for each of the triads (if the percent of revenue in the home triad is less than 50%).

Figure 1: The Global Zones for a Firm for the Rugman Regionalization-Globalization Taxonomy (RGT)

<table>
<thead>
<tr>
<th>Asia-Pacific Triad (AP)</th>
<th>North American Triad (NA)</th>
<th>European Triad (EU)</th>
<th>The Rest-of-the-World Non-Triad Countries (N/A*)</th>
</tr>
</thead>
</table>

*Note: Firm activities external to the three triads are not considered.

Rugman’s descriptive Regionalization-Globalization Taxonomy (RGT) includes four categories: home region oriented firms, bi-regional firms, host region oriented firms, and global firms. His criteria for assigning any given MNE to a specific category is: home region oriented firms have at least 50% of their sales in their home triad; bi-regional firms have at least 20% of their sales in two of the triads, but have less than 50% of sales in any one triad; host oriented firms have more than 50% of their sales in a triad.
other than their home triad; and global firms have 20% or more of their sales in each of
the three triad regions but have less than 50% of their sales in any one triad (Rugman,
2005, p. 10). Rugman developed these criteria as he reviewed the distribution of sales
across the triads for those 365 firms of the 2002 Fortune Global 500 that reported their
geographic segment sales data in sufficient detail. Thus these criteria appear to be
descriptive and arbitrary in nature based on the characteristics of this sample.
Additionally, any firm that has less than 50% of its revenues in its home triad and has less
than 20% of its revenues in each of the other two triads cannot be categorized.

Asmussen’s Measurement System (AMS)

Asmussen (2009) built on Rugman’s taxonomy improving it on several fronts.
First, he created a theoretical justification for determining the degree of globalization
based on his definition of a global firm. This definition is that a global firm is a firm that
achieves an equivalent economic presence across the globe. His measure for a firm’s
degree of economic presence within an area is a penetration measurement defined as the
ratio of the firm’s sales within an area divided by the size of the economy for that area.
Thus Asmussen based his measure of globalization on a competitive global economic
view. From this perspective a global firm achieves the same ratio of sales to the size of
the economy for each zone in the world. In summarizing the primary contribution for his
research Asmussen stated that, “unlike extant measures, the index is objectively scaled,
and controls for home country orientation and market size differences” (Asmussen, 2009,
p. 1192).
Second, Asmussen revised an inherent assumption in Rugman’s taxonomy. Rugman implicitly assumed that the potential for sales was equal for each of the triads (Rugman, 2003, 2005). However economic data show this not to be the case. For example, the distribution of Global Gross Domestic Product (GDP) for the sample period of 2001 used in both Rugman’s and Asmussen’s research (Asmussen, 2009; Rugman, 2003, 2005) was: 34% for the North American Triad, 28% for the European Triad, 21% for the Asia-Pacific Triad, and 16% for all countries external to the triads. Rather than treating each triad equivalently, the Asmussen Measurement System normalizes sales in each zone of interest by dividing the sales in each zone by the size of the economy for that zone.

Third, Asmussen expanded the measurement model to consider economies beyond the triad regions. Asmussen considers the sales in, and the sizes of the economies for, all countries within the global economic system in contrast to Rugman’s approach that excludes from consideration all countries external to the three triads. As noted above, the economies of the countries external to the three triads represented 16% of the global economy (based on GDP) in 2001. The AMS is therefore more inclusive and exhaustive than Rugman’s approach since excluding these countries, and a firm’s sales to these countries, from consideration would be simply arbitrary.

Fourth, the AMS results in a continuous ratio variable for its degree of overall globalization measure in comparison to the four descriptive categories of Rugman’s measurement system. Subsequent research notes that Asmussen’s continuous ratio variable is much more useful for empirical research (Osegowitsch & Sammartino, 2008). As noted by Hair, Black, Babin, & Anderson (2010, p. 7), “Ratio scales represent the
highest form of measurement precision because they possess the advantages of all lower scales plus an absolute zero point. All mathematical operations are permissible with ratio-scale measurements.” Having a ratio scale dependent variable allows analytical techniques such as multiple regression or conjoint analysis whereas having a nonmetric dependent variable (such as Rugman’s categories) limits analytical techniques to multiple discriminant analysis or linear probability models (Hair, et al., 2010, p. 12). Thus ratio scale variables have greater precision and allow for the use of more robust analytical methodologies.

Asmussen began the development of his measurement system by dividing the world into three global zones for each firm as illustrated in Figure 2: (1) the firm’s home country; (2) the neighboring countries within the firm’s home triad; and (3) the rest-of-the-world (comprised of all countries external to the firm’s home triad). This is an extension of Rugman’s concept of using a firm’s home triad as a key geographic zone of reference for a firm. As illustrated in Figure 2, Asmussen’s measurement system considers each global zone in total; it does not consider the country-by-country variations within each zone. Thus to evaluate a firm via Asmussen’s measurement system requires that the firm report its geographic segment sales data in sufficient detail to determine its domestic sales and home triad sales. Due to these requirements, Asmussen was only able to apply his measurement system to 140 of the 2002 Fortune Global 500; far fewer than the 365 firms that Rugman was able to categorize from the same sample.
Figure 2: The Global Zones for a Firm for the Asmussen Measurement System (AMS)

Asmussen’s Measurement System (AMS) is based on calculating the relative penetration for a firm in each of the geographic zones of Figure 2. The relative penetration for a firm for a zone is the penetration of that zone divided by the penetration of the firm in its home market. The penetration for each zone is defined as the sales for a geographic zone divided by the size of the economy (measured by GDP) for that geographic zone.

AMS is comprised of four separate components. The first component is the Degree of Intra-Regionalization for a firm. This component measures the firm’s degree of expansion into the neighboring countries within the firm’s home triad and is the relative

*Note: Rest-of-the-world outside home triad consists of the two host triads regions and those countries not included in the three triads.
penetration for a firm within these neighboring countries. Thus a firm without any sales in these neighboring countries would have a Degree of Intra-Regionalization of zero. Conversely, a firm that has achieved the same degree of penetration in these neighboring countries as in its home market would have a Degree of Intra-Regionalization of one. This component is a continuous ratio variable.

The second component of AMS is the Degree of Inter-Regionalization for a firm. This component measures the firm’s degree of expansion into the rest-of-the-world external to the firm’s home triad and is the relative penetration for a firm within the rest-of-the-world. Thus a firm without any sales in these countries would have a Degree of Inter-Regionalization of zero. Conversely, a firm that has achieved the same degree of penetration in the rest-of-the-world as in its home market would have a Degree of Inter-Regionalization of one. This component is also a continuous ratio variable.

The third component of AMS is the Global Orientation of a firm. The Global Orientation of a firm measures the degree of balance between a firm’s Degree of Intra-Regionalization and Inter-Regionalization. A firm that only expanded into its neighboring countries within its home triad but had not expanded into the rest-of-the-world would have a Global Orientation of negative one. Conversely, a firm that had expanded into the rest-of-the-world external to its home triad but had not expanded into its neighboring countries within its home triad would have a Global Orientation of positive one. If, however, a firm had a Degree of Intra-Regionalization that was equal to its Degree of Inter-Regionalization, that firm would have a Global Orientation of zero. This would indicate that the firm has expanded in a balanced fashion into both foreign
zones. Global Orientation is also a continuous ratio variable, but this component is unique in that it is the only component of AMS that can assume negative values.

Finally, the fourth component of AMS is the Degree of Overall Globalization\(^2\) for a firm. The Degree of Overall Globalization for a firm is the weighted average of the Degree of Intra-Regionalization and the Degree of Inter-Regionalization. The weighting factors for these two components in determining the weighted average are: (1) the sum of the size of the economies for the neighboring countries within the firm’s home triad; and (2) the sum of the size of the economies for the countries in the rest-of-the-world external to the firm’s home triad, respectively. Thus a domestic firm would have a Degree of Overall Globalization of zero. Conversely, a firm that met Asmussen’s definition of a global firm (as a firm that has achieved an equivalent economic presence across the globe) would have a Degree of Overall Globalization of one. This component is also a continuous ratio variable.

A Proposed Measurement System

Developing the DOG Measurement

My proposed measurement system, DOG, builds upon and improves AMS, and is based upon Asmussen’s definition of a globalized firm (Asmussen, 2009). First, just as

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\(^2\) Asmussen (2009) referred to this component as the Degree of Internationalization, but I am instead referring to it as the Degree of Overall Globalization in my research since this is what this component represents. I also use the term Degree of Overall Globalization to avoid the confusion noted in the introduction to this research caused by the interchangeable use of the terms degree of internationalization and degree of globalization. I also wanted to avoid confusion over the terms used for Asmussen’s Degree of Overall Globalization and the new measurement Degree of Globalization (DOG) developed herein.
with Asmussen’s Degree of Overall Globalization, DOG is easy to interpret and measures a firm’s position along a continuum with two well-defined anchor points: the lower anchor point is a domestic firm (with DOG equal to zero) and the upper anchor point is a global firm (with DOG equal to one). Second, DOG is an exhaustive measurement approach that can be applied to a firm from any country, regardless of whether that country is from a triad region. Third, DOG has improved validity, reliability, and stability over time since it is not sensitive to the definition of which countries are included within the triads. Fourth, DOG is an easy to calculate continuous ratio variable that requires less data per firm for its calculation; thus DOG can probably be calculated for more firms. Fifth, one of the equations for DOG highlights the difference in the degree of internationalization and degree of globalization perspectives since DOG is expressed as a non-linear function of FSTS (the most commonly used measure for the degree of internationalization). Finally, DOG is demonstrated to be mathematically equivalent to Asmussen’s measure for the Degree of Overall Globalization (Asmussen, 2009) while being easier to calculate and requiring less data per firm, which allows the calculation of DOG for more firms.

DOG is determined by first dividing the world into two global zones as illustrated in Figure 3: (1) the firm’s home country; and (2) the rest-of-the-world external to the firm’s home country. This is a simplification and consolidation of Asmussen’s dividing the world into three zones (as illustrated in Figure 2). As illustrated in Figure 3, DOG
considers each global zone in total; it does not consider the country-by-country variations within each zone.³

Figure 3: The Global Zones for a Firm for the Degree of Globalization (DOG) Measure

DOG represents the ratio of a firm’s penetration for the rest-of-the-world divided by the firm’s penetration within its home country using Asmussen’s (2009) definition of penetration. DOG can be calculated from: (1) the ratio of the firm’s Foreign Sales to Total Sales (FSTS); and (2) the ratio of the size of the firm’s Domestic Economy to the size of the Global Economy (DEGE).

³ It should be noted that DOG uses the same geographic zones as the most commonly used measure for the degree of internationalization, the ratio of Foreign Sales to Total Sales (FSTS). However, DOG is different than FSTS because DOG is a non-linear function of FSTS that also considers the size of the firm’s home country economy in relation to the size of the global economy.
As illustrated in Figure 3, evaluating DOG for a firm only requires that a firm report its geographic segment sales data in sufficient detail to determine that firm’s home market domestic sales. Therefore it should be possible to evaluate more firms with DOG than AMS or RGT since having triad data is not required. With the emergence of the European Union, however, a number of European firms no longer identify their domestic sales in the geographic segment reporting of revenues (Rugman, 2003, 2005; S&P Capital IQ). Instead these firms report their home market sales as either being a sub-region of Europe (such as the Nordic countries) or for Europe as a whole in their geographic segment reporting of revenues. These firms are now implying through their geographic segment reporting that their home country is now only a portion of their home market. Therefore the region reported as the firm’s home market can be used as the basis for determining the home market penetration and the rest-of-the-world penetration. Thus DOG may be calculated for any firm that reports their home market revenues even if that firm does not report its domestic revenues per se. This recognition further expands the domain of firms that can be evaluated by the DOG methodology.

Deriving the DOG Measurement Equations

The following equations represent the derivation of DOG and are based on the geographic zones of Figure 3. Equations 1a and 1b define the sales of the firm and the sizes of the economies for these respective geographic zones of the world.

\[ S_G = S_H + S_R \]  \hspace{1cm} (1a)

\[ E_G = E_H + E_R \]  \hspace{1cm} (1b)
Where:

- $S_G$ = the total global sales for the firm.
- $S_H$ = the sales of the firm in the firm’s home country.
- $S_R$ = the sales of the firm in the rest-of-the-world external to the firm’s home country.
- $E_G$ = the size of the global economy.
- $E_H$ = the size of the economy of the firm’s home country.
- $E_R$ = the cumulative size of the economies for all the countries external to the firm’s home country.

Equations 2a and 2b define the penetration for each zone. These equations follow Asmussen’s (2009) definition for penetration.

\[
P_H = \frac{S_H}{E_H} \quad (2a)
\]
\[
P_R = \frac{S_R}{E_R} \quad (2b)
\]

Where:

- $P_H$ = the penetration within the firm’s home country.
- $P_R$ = the penetration for the rest-of-the-world external to the firm’s home country.
Equations 3a and 3b detail the calculation of DOG. Equation 3a defines DOG as the ratio of the penetration for the rest-of-the-world (external to the firm’s home country) divided by the penetration within the firm’s home country. Equation 3b is obtained by substituting Equations 2a and 2b into Equation 3a.

\[
DOG_{V1} = \frac{P_R}{P_H} \quad (3a)
\]

\[
DOG_{V1} = \frac{S_R}{E_R} \cdot \frac{E_R}{E_H} = \frac{S_R}{S_H} \quad (3b)
\]

Where:

- \( DOG_{V1} \) = the first form of the equation for the new measure for the Degree of Globalization (DOG) for a firm.

Based on Equations 3a and 3b, a firm with no sales external to its home country would have a value of zero for DOG and a firm with the penetration within its home country that is equal to the penetration in the rest-of-the-world (external to the firm’s home country) would have a value of one for DOG. Thus a value of zero for DOG indicates a domestic firm; a value of one indicates a global firm; and a value between zero and one indicates the proportional Degree of Globalization.

While Equation 3b does allow the calculation of DOG for a firm, it requires that the values for the firm’s sales and the size of the respective economies be converted to a common currency. In addition, Equation 3b does not clarify the relationship between
DOG and the degree of internationalization. The following equations derive a new, equivalent equation for DOG that addresses these shortcomings.

Equations 4a and 4b define the ratio of Foreign Sales to Total Sales (FSTS) and the ratio of the size of the Domestic Economy to the Global Economy (DEGE) in terms of the global zones defined in Figure 3.

\[
FSTS = \frac{s_R}{s_G} \quad (4a)
\]

\[
DEGE = \frac{E_H}{E_G} \quad (4b)
\]

Where:

- FSTS = the ratio of Foreign Sales to Total Sales.
- DEGE = the ratio of the size of the Domestic Economy to the Global Economy.

Equations 5a through 5d are obtained by substituting Equations 4a and 4b into Equations 1a and 1b, and then rearranging terms. These equations relate to the global zones of Figure 3.

\[
S_H = S_G (1 - FSTS) \quad (5a)
\]

\[
S_R = S_G FSTS \quad (5b)
\]

\[
E_H = E_G DEGE \quad (5c)
\]

\[
E_R = E_G (1 - DEGE) \quad (5d)
\]
Equation 6 provides the alternate and recommended equation for DOG.

Equation 6 is obtained by substituting Equations 5a through 5d into Equation 3b, eliminating the variables $S_G$ and $E_G$ from the numerator and denominator, and rearranging terms.

$$
\frac{DOG_{V2}}{S_H^E_R} = \frac{S_H^{FSTS} - E_G^{DEGE}}{S_H^{(1-FSTS)} - E_G^{(1-DEGE)}} = \frac{(FSTS)(DEGE)}{(1-FSTS)(1-DEGE)}
$$

(6)

Where:

- $DOG_{V2}$ = the second and recommended form of the equation for calculating the new measure for the Degree of Globalization (DOG) for a firm.

Equation 6 demonstrates that DOG is a nonlinear function of the ratio of Foreign Sales to Total Sales (FSTS) for a firm (the most commonly used degree of internationalization measure). DOG is also a nonlinear function of the ratio of the size of the Domestic Economy to the Global Economy (DEGE). Thus DOG is greater for firms with a higher percentage of foreign sales and is greater for firms with home countries that represent a larger percentage of the global economy.

In terms of the ease of calculation, the ratios used in Equation 6 (FSTS and DEGE) can be calculated using the reported currencies for a firm’s sales and for the size of economies without having to convert to a common currency. Therefore Equation 6 is the recommended equation for calculating DOG for a firm.
Establishing DOG’s Mathematical Equivalence to Asmussen’s Degree of Overall Globalization

The following equations first recap the derivation of the Asmussen Measurement System (AMS) and then demonstrate the mathematical equivalence of the Degree of Overall Globalization component of AMS with DOG. AMS is based on the geographic zones of Figure 2. Equations 7a and 7b define the sales of the firm and the sizes of the economies for the respective global zones for this firm:

\[ S_G = S_H + S_N + S_O \quad (7a) \]
\[ E_G = E_H + E_N + E_O \quad (7b) \]

Where:

- \( S_G \) = the total global sales for the firm.
- \( S_H \) = the sales of the firm in the firm’s home country.
- \( S_N \) = the sales of the firm from the neighboring countries within the firm’s home triad (excluding the sales in the firm’s home country).
- \( S_O \) = the sales for the firm from the rest-of-the-world external to the firm’s home triad.
- \( E_G \) = the size of the global economy.
- \( E_H \) = the size of the economy for the firm’s home country.
- \( E_N \) = the cumulative size of the economies for the neighboring countries within the firm’s home triad (excluding the size of the economy for the firm’s home country).
- \( E_O \) = the cumulative size of the economies for the rest-of-the-world external to the firm’s home triad.
The Asmussen Measurement System then determines the firm’s penetration calculated as the firm’s sales divided by the size of the underlying economy for each of these geographic zones. This is consistent with his definition of penetration for a global firm. Equations 8a through 8c define this penetration for each respective region.

\[
P_H = \frac{s_H}{E_H} \quad (8a)
\]

\[
P_N = \frac{s_N}{E_N} \quad (8b)
\]

\[
P_O = \frac{s_O}{E_O} \quad (8c)
\]

Where:

- \( P_H \) = the penetration within the firm’s home country.
- \( P_N \) = the penetration for the neighboring countries in the firm’s home triad.
- \( P_O \) = the penetration for the rest-of-the-world external to the firm’s home triad.

Equation 9a defines Asmussen’s measure for the Degree of Intra-Regionalization and Equation 9b defines Asmussen’s measure for the Degree of Inter-Regionalization. Each is a ratio of the penetration within each respective zone divided by the penetration within the firm’s home country.

\[
AMS_N = \frac{P_N}{P_H} \quad (9a)
\]

\[
AMS_O = \frac{P_O}{P_H} \quad (9b)
\]
Where:

- $AMS_N$ = the Asmussen Measurement System measure for the Degree of Intra-Regionalization for the neighboring countries within the firm’s home triad.

- $AMS_O$ = the Asmussen Measurement System measure for the Degree of Inter-Regionalization for the rest-of-the-world external to the firm’s home triad.

Based on Equation 9a, a firm without any sales in the neighboring countries within the firm’s home triad has a Degree of Intra-Regionalization of zero and a firm that has a penetration for the neighboring countries within the firm’s home triad that is equal to the penetration for the firm’s home country has a Degree of Intra-Regionalization of one. Similarly, based on Equation 9b, a firm without any sales in the rest-of-the-world external to the firm’s home triad has a Degree of Inter-Regionalization of zero, and a firm that has a penetration for the rest-of-the-world external to the firm’s home triad that is equal to the penetration for the firm’s home country has a Degree of Inter-Regionalization of one.

Equation 10 defines Asmussen’s measure for Global Orientation. This is a measure of the degree of balance between a firm’s Degree of Intra-Regionalization and a firm’s Degree of Inter-Regionalization.

$$AMS_Z = \frac{AMS_O - AMS_N}{AMS_O + AMS_N} \quad (10)$$
Where:

- $AMS_Z$ = the Asmussen Measurement System measure for Global Orientation that measures the degree of balance between a firm’s intra-regional and inter-regional expansion.

Based on Equation 10, a firm that has sales outside its home country only in the neighboring countries within the firm’s home triad will have a value of negative one for Global Orientation. Similarly, a firm that has sales outside its home country only in the rest-of-the-world external to the firm’s home triad will have a value of positive one for Global Orientation. Conversely, a firm that has a Degree of Intra-Regionalization equal to its Degree of Inter-Regionalization will have a value of zero for Global Orientation, indicating a balanced expansion into both regions. This equation becomes meaningless, however, for a firm that does not have any foreign sales since in such a situation the denominator assumes a value of zero.

Equation 11 defines Asmussen’s Degree of Overall Globalization. Equation 11 is the orthogonally weighted average of the Degree of Intra-Regionalization and the Degree of Inter-Regionalization where the weighting factors are the sizes of the respective economies.

$$AMS_I = \frac{AMS_RE_N + AMS_OE_O}{E_N + E_O} \quad (11)$$
Where:

- $AMS_I$ = the Asmussen Measurement System measure for Degree of Overall Globalization.

Based on Equation 11, a value of zero for $AMS_I$ indicates a domestic firm without sales external to its home country and a value of one represents a global firm where the penetration is the same for the firm’s home country, the rest of the countries in the firm’s home triad, and the rest-of-the-world external to the firm’s home triad. Thus Asmussen’s Degree of Overall Globalization is consistent with his definition for a global firm upon which it was based.

The following equations demonstrate the mathematical equivalence of Asmussen’s Degree of Overall Globalization with DOG. Equation 12 is obtained by substituting Equations 9a and 9b into Equation 11.

$$AMS_I = \frac{AMS_N E_N + AMS_O E_O}{E_N + E_O} = \frac{(\frac{P_N}{P_H}) E_N + (\frac{P_O}{P_H}) E_O}{E_N + E_O} \quad (12)$$

Equation 13 is obtained by substituting Equations 8a through 8c into Equation 12. Equation 13 is then simplified by eliminating $E_N$ and $E_O$ from the numerator and then collecting with respect to the ratio of $E_H$ divided by $S_H$.

$$AMS_I = \frac{(\frac{S_N}{E_H}) E_{2H} + (\frac{S_O}{E_H}) E_{3H}}{E_N + E_O} = \frac{E_H S_H (S_N + S_O)}{E_N + E_O} \quad (13)$$
Equations 14a and 14b are obtained by subtracting Equation 7a and 7b from Equation 1a and 1b and rearranging terms. These equations can now be substituted into Equation 13.

\[ S_N + S_O = S_R \quad (14a) \]
\[ E_N + E_O = E_R \quad (14b) \]

Equation 15 is obtained by substituting Equation 14a and 14b into Equation 13. Equation 15 is thus a mathematical restatement of Asmussen’s measure of the Degree of Internationalization.

\[ AMS_I = \left( \frac{E_H}{S_H} \right) \frac{S_R}{E_R} = \left( \frac{S_R}{E_R} \right) \left( \frac{E_H}{S_H} \right) = \frac{S_RE_H}{S_H E_R} \quad (15) \]

Equation 16 is obtained by subtracting Equation 15 (for AMS\(_I\)) from Equation 3b (for DOG). Equation 16, when simplified, is equal to zero. Thus DOG and AMS\(_I\) are demonstrated to be mathematically equivalent since their difference is zero. But DOG is better because: (1) DOG is an exhaustive measurement approach that can be applied to firms from any country (versus AMS that can only be applied to firms from triad countries); (2) DOG has improved validity, reliability, and stability over time since DOG is not sensitive to the definition of which countries are included in each triad (versus the overall Asmussen Measurement System which is based on the triads, even though AMS\(_I\) as a component is not sensitive to this definition); (3) DOG is easy to calculate and can be calculated for more firms since it only requires knowing the proportion of revenues from a firm’s home market (versus AMS which also requires knowing the home triad revenue proportion); and (4) DOG highlights the difference in the degree of globalization
perspective versus the degree of internationalization perspective (since DOG is shown to be a non-linear function of FSTS, the most commonly used measure for the degree of internationalization, and is also dependent upon the size of the home market’s economy).

\[
DOG - AMS_I = \frac{s_{RE_H}}{s_{HER}} - \frac{s_{RE_H}}{s_{HER}} = 0 \quad (16)
\]

Empirically Comparing The Firm Globalization Measurement Systems

The sample for testing my new measure DOG consists of the firms that comprise the 2002 Global Fortune 500. This is the same sample that Asmussen and Rugman used (Asmussen, 2009; Rugman, 2003, 2005), and thus allows direct comparisons of the three measurement systems. Since my objective is to compare the usefulness of my proposed measure, DOG, with the two existing measurement systems, I used the dataset taken from the appendix to Rugman’s book, The Regional Multinationals - MNE’s and “Global” Strategic Management, (Rugman, 2005, pp. 242-254). This appendix provides the company names, home regions, revenue (in $US Billion), the percent of foreign revenues, the percent of intra-regional revenues (for the firm’s home country and other countries within the firm’s home triad), the percent of revenues from the Asia-Pacific Triad, the percent of revenues from the European Triad, the percent of revenues from the North American Triad, and the Rugman taxonomy category for each firm. Rugman obtained this information from the geographic segment data reported in each company’s financial reports for the year 2001.

Prior to conducting my analysis, I reviewed the data published in this appendix for internal consistency for each firm. Of the 500 firms, there were twelve firms where
either (1) the sum of the reported percentage of revenues for the Asia-Pacific, European, and North American triad regions exceeded 100% of the firm’s total revenues, or (2) where the reported percent domestic revenues (calculated as 100 less the percent of foreign revenues) exceeded the reported percent of revenues for the firm’s home triad. Both of these conditions represent logical inconsistencies and suggest that there are some errors in the published data. I corrected these inconsistencies by referring to the 2001 geographic segment data for these firms from the S&P Capital IQ database (S&P Capital IQ).4

Additional data sources beyond the company specific financial data were also required for this research. As did Asmussen, I used the Gross Domestic Product (GDP) as the proxy for the size of each country’s and geographic zone’s economy (Asmussen, 2009; United Nations Statistics Division, 2012b). Further, since both the Rugman and Asmussen measurement systems are sensitive to the definition of which countries comprise the Asia-Pacific, European, and North American triads, I also used Asmussen’s (2009) list of countries for each triad region.5 Using Asmussen’s list eliminated the differences that would have been introduced by using a different list of countries for each of the triad regions.

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4 Several of these inconsistencies in the appendix data appeared to be simple typo’s that occurred in the publication process.
5 Asmussen emailed me this list of countries by triad region from his work papers for his research (Asmussen, 2009).
Replicating Rugman’s Regionalization-Globalization Taxonomy (RGT)

I began by replicating Rugman’s Regionalization-Globalization Taxonomy (RGT). I classified each firm of the Global Fortune 500 according to Rugman’s classification rules (Rugman, 2003, 2005). These classification rules are: home region oriented firms are those firms that have at least 50% of their sales in their home triad; bi-regional firms are those firms that have at least 20% of their sales in each of two triads, but have less than 50% of sales in their home triad; host oriented firms are those firms that have more than 50% of their sales in a triad other than their home triad; and global firms are those firms that have 20% or more of their sales in each of the triads and less than 50% of their sales in their home triad (Rugman, 2005, p. 10).

As indicated in Table 1, Rugman summarized by taxonomy category the number of firms of the 2002 Global Fortune 500 (Rugman, 2003, p. 413; 2005, p. 12) and provided a detailed appendix with data for each firm (Rugman, 2005, pp. 242-254). The summary tables (Rugman, 2003, p. 413; 2005, p. 12) indicate that Rugman was able to classify 365 of the 500 firms. These classified firms included 9 global firms, 11 host region firms, 25 bi-regional firms, and 320 home region oriented firms. The detailed firm level data included in the appendix, however, classified 366 of the 500 firms (or one additional firm). The tally by category from the appendix data matched the summary tables except for the category of global firms; the summary tables indicated 9 global firms whereas the appendix table identified 10 global firms.

As indicated in Table 1, my replication produced identical results to those published in Rugman’s appendix. Thus my adjustments for the twelve firms with inconsistent data from Rugman’s (2005) appendix did not affect the tally of firms for Rugman’s categories. As also indicated in Table 1, those firms that could not be
classified included: firms that did not report any geographic segment data; and firms that reported some geographic segment data, but that data was not sufficient to allow a definitive application of the Rugman classification rules.

Table 1: Replication of Rugman’s Regionalization-Globalization (RGT) Taxonomy

<table>
<thead>
<tr>
<th>Number of Firms by Category</th>
<th>Rugman Summary Tables</th>
<th>Rugman Appendix Data</th>
<th>Dissertation Replication</th>
</tr>
</thead>
<tbody>
<tr>
<td>D - Home Region Oriented Firms</td>
<td>320</td>
<td>320</td>
<td>320</td>
</tr>
<tr>
<td>B – Bi-regional Firms</td>
<td>25</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>G – Global Firms</td>
<td>9</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>S - Host Region Oriented Firms</td>
<td>11</td>
<td>11</td>
<td>11</td>
</tr>
<tr>
<td>Sub-Total for Classifiable Firms</td>
<td>365</td>
<td>366</td>
<td>366</td>
</tr>
<tr>
<td>I - Insufficient Information</td>
<td>15</td>
<td>14</td>
<td>14(^6)</td>
</tr>
<tr>
<td>N - Not Available</td>
<td>120</td>
<td>120</td>
<td>120</td>
</tr>
<tr>
<td>Sub-Total for Non-Classifiable Firms</td>
<td>135</td>
<td>134</td>
<td>134</td>
</tr>
<tr>
<td>Total Number of Firms</td>
<td>500</td>
<td>500</td>
<td>500</td>
</tr>
</tbody>
</table>

Replicating Asmussen’s Measurement System (AMS)

I also replicated Asmussen’s Measurement System (Asmussen, 2009). I used Asmussen’s equations to generate a scatterplot similar to the scatterplot in Asmussen’s (2009) article.

As indicated in Table 2, I was able to apply the Asmussen Measurement System to approximately the same number of firms as Asmussen (2009). Asmussen (2009) was able to apply his measurement system to 140 firms whereas I was able to apply his

\(^6\) This includes three firms that reported revenue data for each of the triad regions but could not be classified by Rugman’s classification rules. These firms fell into a “gap” between Rugman’s categories since these firms had less than 50% of their revenues in their home triad and less than 20% of their revenues in each of the other two triads.
measurement system to 137 firms (or three less firms). I attribute this slight difference in the number of measurable firms to my adjustments to the data for the twelve firms that had internally inconsistent data in Rugman’s (2005) appendix.

Table 2: Replication of Asmussen’s Measurement System (AMS)

<table>
<thead>
<tr>
<th></th>
<th>Asmussen Research</th>
<th>Dissertation Replication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Firms</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Measureable</td>
<td>140</td>
<td>137</td>
</tr>
<tr>
<td>Number of Firms Non-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Measureable</td>
<td>360</td>
<td>363</td>
</tr>
<tr>
<td>Total Number of Firms</td>
<td>500</td>
<td>500</td>
</tr>
</tbody>
</table>

Figure 4 provides the scatterplot of the firm data for Asmussen’s Degree of Overall Globalization (AMS₁ as calculated by Equation 11) versus the Global Orientation (AMS₂ as calculated by Equation 10). The Degree of Overall Globalization is the weighted average of the Degree of Intra-Regionalization and the Degree of Inter-Regionalization. The Degree of Intra-Regionalization is the relative degree of penetration in the neighboring countries within the firm’s home triad compared to the penetration in the firm’s home country. Similarly, the Degree of Inter-Regionalization is the relative degree of penetration for all countries external to the firm’s home triad compared to the penetration in the firm’s home country. The Global Orientation, in contrast, represents the degree of balance between the degree of a firm’s expansion into the neighboring countries within the firm’s home triad versus the firm’s degree of expansion into those countries outside its home triad. A firm that has expanded exclusively within its home triad has a global orientation value of a negative one while a firm that has expanded exclusively outside its home triad has a global orientation value of
plus one. Figure 4 closely resembles the pattern of the similar scatterplot from Asmussen’s (2009, p. 1201) article. I attribute the slight variation in the location of a few data points to my adjustment of data for the twelve firms that had internally inconsistent data in Rugman’s (2005) appendix. Hence I was also able to successfully replicate Asmussen’s (2009) research.

Figure 4: Replication of Asmussen’s Scatterplot of Degree of Overall Globalization versus Global Orientation
The Empirical Results for DOG

In this study I developed a new measure for firms, DOG, and I developed two alternate equations for calculating this measure. I developed Equation 3 (for DOG$_{V1}$) that calculates this measure based on the sales and size of the economy for both the home market and the rest of the world. I also developed Equation 6 (for DOG$_{V2}$) that alternatively calculates this measure based on the ratio of a firm’s foreign sales to total sales (FSTS) and the ratio of the size of the firm’s domestic economy to the global economy (DEGE). The purpose of both equations is to calculate the ratio of the firm’s penetration in the foreign markets compared to the firm’s penetration in its home market where penetration is measured as the percentage of sales to the size of the economy (as an indicator of the relative potential market). Hence a domestic firm would have a DOG of zero and a global firm would have a DOG of one. As indicated in Table 3, I was able to calculate DOG for 376 of the 500 firms, or 75% of the sample, by using Equation 3 (for DOG$_{V1}$) and by using Equation 6 (for DOG$_{V2}$). I could not calculate DOG for the 124 firms of this sample that did not report their geographic segment data. Thus I could not determine for these firms the home market sales required to calculate DOG via the first equation nor could I determine the FSTS ratio required to calculate DOG via the second equation.

Table 3: The Number of Firms Classifiable by DOG

<table>
<thead>
<tr>
<th>2002 Fortune Global 500</th>
<th>Number of Firms</th>
<th>% of Firms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Sample</td>
<td>500</td>
<td>100%</td>
</tr>
<tr>
<td>Classifiable by DOG$_{V1}$</td>
<td>376</td>
<td>75%</td>
</tr>
<tr>
<td>Classifiable by DOG$_{V2}$</td>
<td>376</td>
<td>75%</td>
</tr>
</tbody>
</table>
In Figure 5, I create a scatterplot of the firm data where the horizontal axis is DOG$_{V1}$ (as calculated by Equation 3) and the vertical axis is DOG$_{V2}$ (as calculated by Equation 6). The plot points indicate the 376 firms for which these two variables could be calculated. As indicated by the trend-line equation, the $R^2$ is one and $Y=X$. Hence, as predicted algebraically, the two equations produce identical results.

Figure 5: Equivalence of the DOG$_{V1}$ and DOG$_{V2}$ Equations
Empirically Comparing the Three Measurement Systems

Since my ultimate objective in this analysis is to compare the results for these three alternative measurement systems, I compared the number of firms classifiable by each system in Table 4. I was able to classify 376 firms, or 75% of the sample, using my new equations for DOG. Alternatively, I was able to classify 366 firms, or 73% of the sample, using the Rugman Regionalization-Globalization Taxonomy (RGT). Finally, I was able to classify only 137 firms, or 27% of the sample, using the equations for the Asmussen Measurement System (AMS). Hence more firms are classifiable by my proposed DOG measure than either Rugman’s (2003, 2005) or Asmussen’s (2009) measurement systems.

Table 4: Comparison of Number of Firms Classifiable by Measurement Systems

<table>
<thead>
<tr>
<th></th>
<th>2002 Fortune Global 500</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number of Firms</td>
<td>% of Firms</td>
<td></td>
</tr>
<tr>
<td>Total Sample</td>
<td>500</td>
<td>100%</td>
<td></td>
</tr>
<tr>
<td>Classifiable by DOG</td>
<td>376</td>
<td>75%</td>
<td></td>
</tr>
<tr>
<td>Classifiable by RGT</td>
<td>366</td>
<td>73%</td>
<td></td>
</tr>
<tr>
<td>Classifiable by AMS</td>
<td>137</td>
<td>27%</td>
<td></td>
</tr>
</tbody>
</table>
I next compare the distribution of firms by their degree of globalization as indicated by Rugman’s (2003, 2005) taxonomy and DOG. I provide in Figure 6 the number of firms for each of Rugman’s categories for the 2002 Fortune Global 500 in the order of increasing globalization. This figure shows that most firms are home region oriented firms (which includes domestic firms and firms that are primarily focused on their home triad markets). In contrast, this figure also shows that there are very few global firms, and slightly more host region oriented firms and bi-regional firms.

Figure 6: Number of Firms by Rugman’s Categories

<table>
<thead>
<tr>
<th>Rugman's RGT Taxonomy</th>
<th># of Firms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Home Region Orientation</td>
<td>320</td>
</tr>
<tr>
<td>Bi-regional</td>
<td>25</td>
</tr>
<tr>
<td>Host Region Orientation</td>
<td>11</td>
</tr>
<tr>
<td>Global</td>
<td>10</td>
</tr>
</tbody>
</table>
I provide in Figure 7 a histogram of the distribution of firms by DOG for the 2002 Fortune Global 500. Unlike Rugman’s descriptive approach that classifies firms into one of four categories, DOG is a continuous ratio variable based on Asmussen’s (2009) theory-driven definition of a global firm. I provide a histogram grouped into four bins of increasing globalization so that I can compare this distribution of DOG in Figure 7 to Rugman’s distribution in Figure 6.

Figure 7: Histogram of Number of Firms by DOG

As indicated, both Figures 6 (for Rugman’s RGT) and Figure 7 (for DOG) exhibit an exponential distribution pattern where the vast majority of firms have a very low degree of globalization and the remaining firms exhibit an ever-decreasing number of
firms for higher degrees of globalization. Hence DOG and Rugman’s (2003, 2005) measurement system exhibit similar distributions for the number of firms with respect to increasing degrees of globalization.

Finally, and most significantly, I empirically test the equivalence of my proposed DOG measure with Asmussen’s Degree of Overall Globalization to confirm my earlier algebraic derivations that illustrated the equivalence of these two variables. Figure 8 provides a scatterplot of the firm data with my proposed DOG measure on the vertical axis and Asmussen’s Degree of Overall Globalization on the horizontal axis. The plot points represent the 137 firms for which both measures could be calculated. As indicated by the trend-line equation, the $R^2$ is 1 and the regression equation is $Y=X$. Thus, as predicted algebraically, these two measures are empirically equivalent.
Figure 8: Comparing DOG and Asmussen’s Degree of Overall Globalization

The graph shows a strong positive correlation between DOG and Asmussen’s Degree of Overall Globalization, with the equation $y = 1x + 4\times10^{-9}$ and $R^2 = 1$. The data points closely follow a straight line, indicating a high level of agreement between the two measures.
Conclusion: Contributions, Implications, and Limitations

A global firm is defined as a firm that has achieved an equivalent economic presence and penetration across the globe (Asmussen, 2009). Rugman (2003, 2005) pioneered a descriptive taxonomy that categorized firms as either home region oriented firms, bi-regional firms, host region oriented firms, or global firms based upon a firm’s distribution of revenues across the Asia-Pacific, European, and North American triads. Asmussen (2009) extended Rugman’s research and developed a multi-dimensional measurement system that was also based on a foundation of the triad regions. One of those dimensions was a firm’s Degree of Overall Globalization. I built on Rugman's (2003, 2005) and Asmussen’s (2009) research to develop a new measure, DOG, that is mathematically equivalent to, but simpler than, Asmussen’s (2009) Degree of Overall Globalization measure. In contrast to Asmussen’s (2009) and Rugman’s (2003, 2005) approaches, DOG: can be applied to more firms; can be applied to firms from any country (other than just firm’s from triad countries); has improved validity, reliability, and stability over time (since it is not sensitive to the definitions of which countries comprise the Asia-Pacific, North American, and European triads); and clarifies the distinction between the concepts of firm globalization and firm internationalization (since DOG is a non-linear function of FSTS, the most commonly used measure of firm internationalization). These benefits can be attributed to: (1) DOG’s being based on the foundation of Asmussen’s (2009) definition of a global firm; (2) DOG’s parsimonious simplicity; and (3) DOG being based on a firm’s revenues by region for regions that are more frequently reported by firms.
Using the same sample as Rugman (2003, 2005) and Asmussen (2009) (the 2002 *Fortune Global 500*), I found DOG could be applied to 376 firms (or 75% of the sample) whereas Rugman’s approach could be applied to 366 firms (or 73% of the sample) and Asmussen’s approach could be applied to only 137 firms (or 27% of the sample). The differences in the percentages have to do with two factors: how many regions are required, and whether firms are likely to report revenue for these regions. My measure requires the revenue data for fewer regions, so DOG is more parsimonious. This is important as my measure DOG and the Asmussen (2009) Degree of Overall Globalization measure were demonstrated to be both mathematically and empirically identical.

Contributions

This paper makes six contributions to research. First, this study develops a new measure, DOG, that captures in a continuous ratio variable the concept of the degree of globalization of a firm. This is an improvement on the Rugman (2003, 2005) approach that does not provide a continuous ratio variable but rather classifies a firm as being in one of four ordinal taxonomical categories. Second, DOG is based on Asmussen’s (2009) definition of a global firm but is both mathematically simpler than and equivalent to Asmussen’s Degree of Overall Globalization. This is a more parsimonious approach that produces an identical result. Third, since the data required to calculate DOG is reported more frequently by firms than the data required for the Rugman (2003, 2005) and Asmussen (2009) approaches, DOG can be calculated for more firms than either the Rugman or Asmussen approaches.
Fourth, one of the two equations for DOG clearly illustrates the difference in the concepts of globalization versus internationalization since DOG is demonstrated to be a nonlinear function of foreign sales to total sales (FSTS) which is the most frequently used measure for the degree of internationalization. Furthermore, this equation illustrates that DOG is also a nonlinear function of the ratio of the size of the domestic economy (for a firm’s home market) to the global economy (DEGE). Thus as FSTS increases and/or DEGE increases, then DOG increases.

Fifth, DOG can be calculated for a firm from any country whereas the Rugman and Asmussen approaches can only be applied to firms from one of the defined triad regions. Finally, DOG is not sensitive to the definition of which countries comprise the Asia-Pacific, North American, and European triads in contrast to the Rugman (2003, 2005) and Asmussen (2009) approaches that are.

Limitations

This study does have several limitations. The sample for this research is the 2002 Global Fortune 500. While this does allow direct comparisons with the Rugman (2003, 2005) and Asmussen (2009) approaches to allow validation of DOG as a measure of firm globalization, this sample includes only large firms based on data that is now a decade old. Thus the first limitation is that the inferences from this sample cannot be generalized to represent smaller firms. Second, the inferences from this sample also cannot be generalized to represent the current characteristics of large firms.

Third, the ability to apply the DOG measure to any firm is dependent upon that firm reporting sufficient geographic segment detail to allow the calculation of DOG.
This limitation is common to all measures of the degree of internationalization and the
degree of globalization, though as indicated in the results of this study DOG can be
calculated for more firms than either the Rugman (2003, 2005) or Asmussen (2009)
approaches.

Fourth, the calculation of DOG ignores the variations in penetration from country
to country in the firm’s foreign markets. As is the case for the Rugman (2003, 2005) and
Asmussen (2009) approaches, DOG divides the globe into a finite number of zones and
then ignores any variations from country-to-country within those zones. Thus, a firm
could have a DOG of one (indicating it is a global firm) even if that firm failed to satisfy
the definitional requirements of a global firm. For example, if a firm had a penetration in
half of its foreign markets that was twice the penetration of that within that firm’s home
market and that firm had a penetration of zero in the other half of its foreign markets, it
would have a DOG of one even though it had no penetration whatsoever for a significant
portion of the global economy.

Finally, it might also be argued that DOG has a limitation since it is a single-item
construct (rather than a multi-item construct). However, it has been noted that (Hair, et
al., 2010, p. 679):

The exception to using multiple items to represent a construct comes when
concepts can be adequately represented with a single item. Some concepts are
very simple and lack the nuance and complexity that accompanies the majority of
psychological constructs. In other words, if there is little argument over the
meaning of a term and that term is distinct and very easily understood, a single
item can be sufficient. In marketing, some behavioral outcomes, such as sales,
can be captured with a single item. Some behaviors are directly observable (purchase/no purchase, fail/succeed, etc.).

Just as is the case for the examples quoted above, DOG is an outcome measure (versus a process or input measure). Since DOG is based on Asmussen’s (2009) definition of a global firm (the concept that I am attempting to measure) as a firm that has achieved an equivalent economic presence and penetration across the globe, where penetration is defined as the ratio of sales within an area to the size of the market for that area (measured by the proxy of GDP), DOG therefore fulfills the requirements for this exception.\textsuperscript{7}

Future Research and Managerial Implications

This research opens multiple avenues for future research. DOG is a new continuous ratio variable that captures the concept of the degree of globalization for a firm on a broader scale than has been heretofore available. While international business research has extensively researched the antecedents to and consequences of the degree of \textsuperscript{7}As indicated earlier in this research, the degree of internationalization and the degree of globalization represent two related, but distinct, concepts. A review of 38 articles that either proposed a new measure for the degree of internationalization / globalization of a firm or examined the relationship between the degree of internationalization / globalization of a firm and firm performance revealed that these studies had used 20 different measures. Of these 38 articles, 22 (or 58\%) used single-item constructs; 7 (or 18\%) used two-item constructs; 4 (or 11\%) used three-item constructs; 3 (or 8\%) used four-item constructs; and 2 (or 5\%) used five-item constructs. Thus my proposal for DOG as a single-item construct is consistent with the majority of these articles that measured the degree of internationalization / globalization as a single-item construct. Further, Rugman (2003, 2005) and Asmussen (2009), the two extant measurement systems that specifically measured the degree of globalization of a firm (that I built upon in developing DOG), are single-item constructs. Thus developing DOG as a single-item construct is consistent with the precedent of existing research in this field.
internationalization of a firm, the degree of globalization represents a distinguishably different concept. Thus research concerning the antecedents to and consequences of DOG represents both a blank slate and a fertile field for future research. Theories and hypotheses that have been applicable to research regarding the degree of internationalization of a firm may or may not be applicable to the degree of globalization of a firm. Conversely, theories and hypotheses that were not applicable to research regarding the degree of internationalization of a firm may now be found to be applicable to the degree of globalization of the firm. Thus this research opens a broad, new field for future research that also offers the potential for significant managerial implications.

With respect to managerial implications, this research enables firms to be able to calculate and compare DOG for their own firm and for their primary competitors. Thus firms can assess how global they are in relation to their competitors and begin to examine the implications of their relative degrees of globalization. This could then lead firms to review and re-evaluate their current strategy with regard to globalization.

Conclusion

Firm globalization and firm internationalization represent two distinct concepts. Firm globalization refers to the extent to which a firm has achieved an equivalent economic presence and penetration across the globe (Asmussen, 2009) whereas firm internationalization refers to the extent to which a firm has established an economic presence external to its home country (Aggarwal, et al., 2010; Kirca, et al., 2011). I developed DOG as an enhanced, simplified measure of the degree of globalization of a firm by building upon the prior research that had developed methods to measure the
globalization of a firm (Asmussen, 2009; Rugman, 2003, 2005). I compared DOG to these two existing firm globalization measurement systems using the same data set that had been used in testing these two alternate firm globalization measurement systems (the 2002 Fortune Global 500). DOG is a continuous, ratio variable that has been shown to be mathematically and empirically equivalent to Asmussen’s (2009) Degree of Overall Globalization measure of a firm’s degree of overall globalization. DOG also exhibited a similar distribution of firms by globalization as did Rugman for the same sample (2003, 2005). However, compared to the Rugman (2003, 2005) and Asmussen (2009) measurement systems, DOG has the advantages that: DOG can be calculated for more firms; DOG can be applied to firms from any country (versus only those from the Asia-Pacific, North American, and European triads); DOG has enhanced validity, reliability, and stability (since it is not sensitive to the definition of which countries comprise the Asia-Pacific, North American, and European triads); and DOG clarifies the relationship between the concepts of firm globalization and firm internationalization (since DOG is a non-linear function of FSTS, the most frequently used measure for firm internationalization). These advantages can be attributed to: (1) DOG’s foundation being Asmussen’s (2009) definition of a global firm; (2) DOG’s parsimonious simplicity; and (3) DOG being calculated based on the distribution of revenue by region for regions more frequently reported by firms in the geographic segment data. Hence, the development of DOG opens a new field of research into the antecedents, consequences, and other characteristics of the globalization of firms.
CHAPTER 3 - ESSAY #2: FIRM CAPABILITIES, GLOBALIZATION, AND PERFORMANCE

There have been changes in environmental factors over the past several decades that have fundamentally changed how businesses operate. These include: changes in enabling technologies (such as telecommunications, transportation, and the internet); the trend of lowering trade barriers across the globe (such as the establishment of the European Union and numerous free trade zones); and the establishment of the World Trade Organization to regulate international trade (Peng, 2010). These changes have enabled new ways of doing business that heretofore had been almost unimaginable. These changes are driving businesses to reassess fundamental assumptions and decisions. Now that becoming more globalized has become a more feasible option for an increasing number of firms, both large and small (Knight & Cavusgil, 2004; Peng, 2001), the time has come to answer the question: “Given a firm’s resources and capabilities, how global should it be?”

As an extension of prior research (Hout, Porter, & Rudden, 1982), Levitt (1983, p. 92) suggests that a “global corporation” achieves superior performance. Empirical research that has examined the relationship between internationalization and firm performance, however, appears to have yielded mixed support for Levitt’s viewpoint. Some studies found a positive linear relationship (Buhner, 1987; Riahi-Belkaoui, 1996; Tallman & Li, 1996). In contrast, other studies found a negative linear relationship (Geringer, et al., 2000; Michel & Shaked, 1986; Siddharthan & Lall, 1982). Further, a
third group of studies failed to find a significant linear relationship (Brewer, 1981; Buckley, et al., 1984). To address these contradictory findings, subsequent research has hypothesized and tested models of firm performance as either inverted U-shaped relationships or S-shaped relationships with respect to firm internationalization; both of these types of relationships suggest that firm performance peaks at some level of internationalization (Contractor, et al., 2003; Daniels & Bracker, 1989; Geringer, et al., 1989; Gomes & Ramaswamy, 1999; Lu & Beamish, 2004; Qian, 1997; Ruigrok, et al., 2007; Ruigrok & Wagner, 2003). Still other studies have hypothesized and tested potential moderators to the relationship between a firm’s level of internationalization and a firm’s performance (Hitt, Tihanyi, Miller, & Connelly, 2006; Kirca, et al., 2011; Yan, Haiyang, Hitt, & Geng, 2007).

One possible reason for these contradictory findings is the different measures used to capture the concept of the degree of internationalization / multinationality of a firm (Sullivan, 1994). A number of researchers have used the ratio of foreign sales to total sales (Buckley, et al., 1984; Contractor, et al., 2003; Daniels & Bracker, 1989; Eppink & Van Rhijn, 1988, 1989; Errunza & Senbet, 1984; Geringer, et al., 1989; Geringer, et al., 2000; Gomes & Ramaswamy, 1999; Haar, 1989; Pantzalis, et al., 2008; Riahi-Belkaoui, 1996, 1998, 1999, 2002; Ruigrok, et al., 2007; Ruigrok & Wagner, 2003; Sambharya, 1995; Siddharthan & Lall, 1982; Sullivan, 1994; Tallman & Li, 1996). Other researchers have used the ratio of foreign assets to total assets (Daniels & Bracker, 1989; Gomes & Ramaswamy, 1999; Riahi-Belkaoui, 1999, 2002; Sullivan, 1994). Still other studies have used measures of dispersion or diversification, such as the heterogeneity of sales, the entropy of sales, or the entropy of the number of subsidiaries (Buhner, 1987;
Errunza & Senbet, 1984; Miller & Pras, 1980; Qian, 1996, 1997; Sambharya, 1995; Zahra, et al., 2000). Yet other studies have used measures of a firm’s multicultural experience (Ronen & Shenkar, 1985; Sullivan, 1994).

Another potential explanation for these mixed results is the interchangeable use of various terms that represent different perspectives. Kirca et al (2011) noted the interchangeable use of the terms: degree of internationalization, international diversification, multinationality, geographic diversification, and international expansion. I refer to all of these terms collectively as “the degree of internationalization” of a firm. Levitt’s (1983) research, however, specifically addresses the concept of a global firm and explains why a global firm has superior performance. Hence these prior studies that have examined the relationship between internationalization and performance have failed to examine the relationship between globalization and performance suggested by Levitt.

Rugman (2003, 2005) defines a global firm as a firm that has less than 50 percent of its revenues derived in its home triad and that has at least 20 percent of its revenues derived in each of the two remaining triads; the triads refer to the Asia-Pacific region, Europe, and North America. Asmussen (2009) and Marshall (2012) improve upon this definition and define a global firm as a firm that has achieved an equivalent economic presence across the globe (relative to the size of the underlying economy for each area). Thus a global firm is different from an international firm; a firm with a high level of globalization will always have a high level of internationalization whereas a firm with a high level of internationalization may or may not have a high level of globalization.

In this paper I reexamine Levitt’s (1983) notion of the relationship between firm globalization and performance. I use the Asmussen / Marshall definition of a global firm
to more clearly capture the concepts explained by Levitt and avoid the ambiguity associated with other measures of the level of firm internationalization. Based on the resource-based view (RBV) of the firm, I develop theory to explain the antecedents to a firm’s degree of globalization and the relationship between a firm’s degree of globalization and performance.

The RBV begins with the assumption of a heterogeneous distribution of resources across firms and then explains the relationship between a firm’s resources, capabilities, competitive advantage, and performance (Barney, 1991; Barney, et al., 2011; Barney, et al., 2001; Newbert, 2007, 2008; Wernerfelt, 1984). Due to the heterogeneous distribution of resources and capabilities across firms, different firms have different bundles of capabilities. RBV research has shown that firms with different bundles of capabilities have either greater or lesser abilities to internationalize (Barney, et al., 2001; K. Brouthers, L. Brouthers, & S. Werner, 2008; Brouthers, Nakos, Hadjimarcou, & Brouthers, 2009; Peng, 2001).

More specifically, international business research has identified a firm’s technological capabilities (which enable a firm’s ability to sell products of superior functionality, quality, and cost characteristics) and a firm’s marketing capabilities (which enhance a firm’s market-sensing and customer-linking abilities to effectively enter new host markets) as the two critical capabilities related to the internationalization of firms (Delios & Beamish, 1999, 2001; Fang, et al., 2007; Kirca, et al., 2011; Kotabe, Srinivasan, & Aulakh, 2002; Lu & Beamish, 2004; Morck & Yeung, 1991). Thus I theorize and test the notion that firms with greater technological and/or marketing capabilities will have greater degrees of globalization.
The RBV also helps explain the relationship between the antecedents for firm globalization and performance. At the heart of the RBV is the notion that a firm’s effective utilization of its valuable, rare, imperfectly imitable, and non-substitutable resources and capabilities leads to enhanced performance (Barney, 1991; Barney, et al., 2011; Barney, et al., 2001; Newbert, 2007, 2008). A firm’s globalization to a level less than its capabilities can support represents an under-utilization of capabilities and thus represents an opportunity cost. A firm’s attempt to globalize to a level beyond the level that its capabilities can support represents an over-utilization of its capabilities and thus results in reduced effectiveness from having exceeded its capabilities. Thus I theorize and test the concept that a firm will perform optimally relative to its capabilities when a firm globalizes to a level commensurate with its capabilities.

I test these ideas on a random sample of firms taken from the S&P Capital IQ database (S&P Capital IQ). I perform a cross-sectional analysis and use data representing the average of the latest available four-year time period of 2007 to 2010.

I contribute to the literature in a number of ways. First, I return to Levitt’s original idea and examine the relationship between firm globalization and performance. Prior studies that have examined the relationship between internationalization and performance have failed to examine the relationship between globalization and performance suggested by Levitt. These studies have used a range of concepts and related measures for the degree of internationalization, multinationality, international diversification, international expansion, and/or geographic diversification for a firm that are not consistent with the concept and measurement of the degree of globalization of a firm. Second, I extend RBV theory to explain the antecedents to and consequences of a
firm’s globalization. My theoretical model for the relationship between firm globalization and performance is more parsimonious than the more complex models required to explain the relationship between firm internationalization and performance. Different firms have different bundles of capabilities, and different bundles of capabilities have been shown to either be more effective or less effective in a firm’s internationalization efforts. Firms with the bundles of capabilities that enable a firm to be more effective in its internationalization efforts will tend to be more global. Further, firms that more effectively utilize their capabilities and globalize to a level that is commensurate with their capabilities will perform optimally relative to their capabilities. Through this theory I answer the key question, “How global should each firm be?”

Theory and Hypotheses

Globalization versus Internationalization Perspectives

Prior research suggests that a global firm is superior to a traditional multinational enterprise (MNE) and suggests that MNEs should globalize to achieve superior performance (Hout, et al., 1982; Kobrin, 1991; Levitt, 1983). By globalizing, firms can: expand the size of their market, lower unit costs through economies of scale, and/or fund additional R&D which enhances their ability to develop further innovations. In contrast to prior research that adopts the perspective of firm internationalization, I adopt the perspective of firm globalization. The perspective of firm globalization is consistent with Levitt’s (1983) proposition.

Research has refined the definition of a global firm and developed methodologies to measure the degree of globalization of a firm. Rugman (2003, 2005) defined a global
firm as a firm that has less than 50 percent of its revenues in its home triad and that has at least 20 percent of its revenues in each of the remaining triads; the triad regions refer to the Asia-Pacific region, Europe, and North America. Rugman examined the firms of the 2002 *Fortune Global 500* as a sample representing the world’s largest corporations. He was able to categorize 365 of the 500 firms. Rugman found that most firms were focused on their home region triad and that only 9 firms of the sample could be considered global firms.

Asmussen (2009) and Marshall (2012) build on Rugman’s work and define a global firm as a firm that has achieved an equivalent economic presence across the globe relative to the size of the underlying economy for each area. Asmussen and Marshall both used the sample of the 2002 *Fortune Global 500* to facilitate comparison with Rugman’s research. Based on his measurement system, Asmussen was only able to measure 140 of the 500 firms. Asmussen’s scatterplots (Asmussen, 2009, p. 1201) indicated that only 3 of the 140 measureable firms achieved a degree of overall globalization of 0.40 or more where a value of one on this scale would represent a global firm. Using the same sample, Marshall (2012) was able to categorize 376 firms and found 12 of the 376 measureable firms with a DOG of 0.75 or greater.

In this paper I use the Asmussen / Marshall definition of globalization to develop and test hypotheses for the antecedents and consequences of a firm’s degree of globalization. The degree of globalization for a firm represents a very different perspective than the degree of internationalization of a firm. Prior research has examined the degree of internationalization of a firm but this does not represent Levitt’s concept.
Therefore I correct this shortcoming and develop theory based on the concept of globalization consistent with Levitt’s proposition.

The Resource-Based View and Globalization

I base this research on the resource-based view (RBV) of the firm (Barney, 1991; Barney, et al., 2011; Barney, et al., 2001; Wernerfelt, 1984). The RBV suggests: (1) that resources are largely immobile and distributed heterogeneously across firms; (2) that some firms possess resources that are valuable, rare, imperfectly imitable, and non-substitutable; (3) that these types of resources give rise to firm capabilities that can enable a firm to achieve a sustained competitive advantage; and (4) that this sustained competitive advantage can enable improved firm performance.

The RBV has been used to study the international operations of both small and large firms for both start-up and mature operations (Peng, 2001). Peng notes that the RBV has been used to examine international entrepreneurship, market entries, strategic alliances, and the management of MNEs. Peng specifically notes that the RBV has been utilized in a stream of research addressing the degree of internationalization and that this research stream has been “inspired and frustrated by the large body of diversification research with mixed findings” (Peng, 2001, p. 810).

Prior RBV research has repeatedly proposed and confirmed that a firm’s technological and marketing capabilities are antecedents to a firm’s internationalization activities (Delios & Beamish, 1999, 2001; Fang, et al., 2007; Kirca, et al., 2011; Kotabe, et al., 2002; Morck & Yeung, 1991). Below I build on this previous RBV research and develop theory to explain how a firm’s technical and marketing capabilities determine
how global a firm should be. I also develop theory to explain that a firm’s performance will be optimized when it globalizes to this degree.

The Relationship of Firm Technological and Marketing Capabilities with Globalization

A firm’s capabilities have been described as the “complex bundles of skills and knowledge embedded in organizational processes” that bind together the resources of a firm (Krasnikov & Jayachandran, 2008, p. 1). Research has identified a firm’s technological and marketing capabilities as intangible assets that can be used and shared throughout an organization without depreciating the value of the asset or diminishing the ability to leverage these capabilities elsewhere in the organization (Delios & Beamish, 2001; Tseng, Tansuhaj, Hallagan, & McCullough, 2007).

Research has described a firm’s technological capability as the firm’s technological know-how (the firm’s skills and abilities to leverage technology for business purposes), quite often protected by patents, that results in superior products and superior production and distribution processes (Delios & Beamish, 2001; Kotabe, et al., 2002; Tseng, et al., 2007). Barney (1991) stresses that it is a firm’s knowledge of how to use a technology that potentially serves as the basis for a firm’s competitive advantage rather than just the firm’s possession of the technology itself. He stresses that while several firms might have the same technology, it is the firm with the “social relations, culture, traditions, etc. to fully exploit this technology” that has the competitive

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8 For example, if a firm uses a patent to enter one country, it does not diminish the firm’s ability to use the same patent to enter another country. There may be other resource constraints, however, that prevent a firm from attempting to enter two countries simultaneously such that the firm may choose to enter one country first and the second country later.
advantage (Barney, 1991, p. 110). Thus it is the knowledge of how to effectively utilize the technology rather than the technology itself that provides the advantage.

Research has described a firm’s marketing capability as the firm’s market-sensing and customer-linking capabilities that enable the firm to differentiate its products and services from competitors and build a strong brand (Delios & Beamish, 2001; Kotabe, et al., 2002; Tseng, et al., 2007). Day (1994) explains that market-sensing capabilities require systematic processes for collecting and interpreting information about a market and then applying that information in a firm’s approach to that market. Customer-linking capabilities require creating, developing, managing, and nurturing close buyer-seller relationships (Day, 1994); this includes establishing supply-chain partnerships (including distribution channels) to support that market. Thus these market-sensing and customer-linking capabilities provide an advantage by enabling a firm to develop market knowledge so that it can differentiate its products and establish successful relationships with customers and supply-chain partners (including distribution channels).

I theorize that these capabilities will determine the extent to which a firm will globalize. There are two mechanisms through which this works. First, one of the key underlying assumptions of the RBV is the heterogeneous distribution of resources and capabilities among firms. Thus different firms have different capabilities and different levels of capabilities. Since a firm’s technological capabilities directly affect the functionality, quality, and cost of a firm’s products and services, a firm with greater technological capabilities than a competitor has a high probability of being able to successfully compete against that competitor. Thus, the greater the level of technological capabilities for a firm, the greater will be the number of competitors against whom the
firm can successfully compete. The assumption of the heterogeneous distribution of resources and capabilities across firms also implies that the range of technological capabilities within each country’s market will vary based on the characteristics of the set of firms competing within that market. Thus a firm with a very high degree of technological capabilities will be able to successfully compete against more competitors across the globe and will be able to successfully enter more foreign markets provided that the firm’s products are valued by the customers in those foreign country markets and those countries have the prerequisite complementary resources (such as infrastructure, electricity, etc.) to enable the use of the firm’s products. Thus a firm with a high level of technical capabilities has the potential for a higher degree of globalization.

In contrast, a firm with a low degree of technological capabilities will only be able to successfully compete against a few firms. Given this low degree of technological capabilities, such a firm will only be able to successfully compete in countries where either (1) the customers in that country do not consider this firm’s technological capabilities in their buying decision; or (2) the customers in that country do consider a firm’s technological capabilities in their buying decision, but all of the competing firms in that country have similar or fewer technological capabilities than this firm. Hence a firm with a low degree of technological capabilities will not be able to operate in as many countries as a firm with a high degree of technological capabilities, so a firm with a low level of technological capabilities is expected to have a low degree of globalization.

Likewise, a firm’s marketing capabilities directly affect the ability of a firm to understand a new market in a new country; this is a prerequisite to conducting customer-linking activities in order to differentiate its products and establish a strong brand in that
market. A firm’s marketing capabilities do not only refer to the depth of the firm’s knowledge of its home market (though a firm with a high level of marketing capabilities is expected to have a great depth of knowledge about its home market). Rather, a firm’s marketing capabilities also relate to its ability to develop and act upon market knowledge for new markets, including those in new countries. If a firm does not have the capabilities to understand a market in a new country it will have a low probability of successfully entering any new market in a country that is different than its home country. If, on the other hand, the firm does have a high degree of capability to understand a new market in a new country, it will have a much greater likelihood of being able to establish relationships with the customers and supply chain partners (including distribution channels) within that new market in a new country regardless of whether that country is similar or dissimilar to its home country. Thus a firm with a low degree of marketing capabilities will only be able to successfully enter a few countries (if any) while a firm with a high degree of marketing capabilities will be able to successfully enter more countries. Hence I expect that firms with low degrees of marketing capabilities will have low degrees of globalization and firms with high degrees of marketing capabilities will have high degrees of globalization.

Additionally, the RBV assumptions concerning the imperfect imitability and mobility of resources and capabilities are particularly applicable to the knowledge base underlying a firm’s technological and marketing capabilities (Barney, 1991; Krasnikov & Jayachandran, 2008). Much of this knowledge base is tacit in nature and is thus difficult to codify. This characteristic makes it difficult for competitors to imitate these capabilities. Market knowledge requires time to develop through observation of and
experimentation with socially complex interactions and is distributed across multiple groups and individuals within a firm (Day, 1994; Krasnikov & Jayachandran, 2008). Barney (1991) stresses that much of the knowledge underlying technological capabilities is also tacit in nature. However, technological innovations are quite often patented to protect the firm’s intellectual property. As part of the patenting process, the inventor must disclose critical information about the technology that, while offering protection from competitors directly copying the patented innovation, still provides competitors some insight into some of the technological knowledge base of the firm holding the patent (Krasnikov & Jayachandran, 2008).

Thus, one key question with regard to globalization based on these capabilities is can firms effectively transfer knowledge that is tacit in nature across borders into new foreign markets? While research has demonstrated that one of the key attributes of a multinational firm is its superior effectiveness and efficiency in transferring knowledge across borders (Kogut & Zander, 1993), research has also highlighted the difficulties and cost inherent in attempting to transfer tacit knowledge (Hu, 1995). Tacit knowledge is typically acquired through experience and transferred through an apprenticeship / socialization process over a prolonged period of time (Hu, 1995). Studies have shown that one method for transferring tacit knowledge across borders is by means of transferring expatriate staff to the new market (Hu, 1995).

Given these general characteristics regarding the transfer of tacit knowledge, I specifically examine the transfer of tacit knowledge that forms the basis for marketing and technological capabilities. Lord and Ranft (2000) stress that local market knowledge is: first, difficult and costly to acquire (through direct observation of and experimentation
with the new foreign market); and second, difficult to share and transfer from one part of
the firm to another. Thus firms may have to dedicate expatriated staff to a new country
market in order to acquire the necessary local market knowledge. Regarding

technological capabilities, research has identified that firms quite often employ a different
approach regarding the underlying tacit knowledge; firms typically retain the
development of new innovations within their home country market and then only transfer
the results of the innovation process to foreign markets (Hu, 1995). Hence firms do have
methods for transferring their technological and marketing capabilities across borders and
applying these capabilities in new foreign markets. Therefore firms with more
technological and marketing capabilities can utilize these capabilities as a basis to
successfully enter more countries across the globe; this leads to a higher degree of
globalization. In contrast, firms with less technological and marketing capabilities can
only use their capabilities to successfully enter fewer countries across the globe; this
leads to a lower degree of globalization. Thus I hypothesize:

Hypothesis 1a: The extent of a firm’s technological capabilities is positively
related to its degree of globalization.

Hypothesis 1b: The extent of a firm’s marketing capabilities is positively related
to its degree of globalization.

Capabilities Utilization, Globalization, and Firm Performance

The nature of the hypothesized relationships between a firm’s technological and
marketing capabilities and a firm’s degree of globalization leads to the following
question: Is the RBV based model for the degree of globalization based on the preceding hypotheses simply predictive, or is it normative as well? In order to assess the normative nature of this relationship I use the notion of strategic fit as profile deviation (or congruence) as articulated by Venkatraman (1989) and Edwards (2001).

Venkatraman (1989) summarizes six different types of theoretical fit in strategy research, each of which has distinct theoretical meanings that require specific methods for empirical testing. One of these types of theoretical fit is the concept of fit as profile deviation. For fit as profile deviation, the dependent variable is typically related to the degree of fit (or congruence) between an entity’s actual profile and an idealized profile given the entity’s strategic context. The dependent variable achieves an extreme value (either a maximum or minimum) whenever the profiles are identical. Conversely, the dependent variable then deviates from its extreme value as the difference between the actual and idealized profile grows (whether positively or negatively). In this study, I will test whether a firm’s performance improves as the firm’s actual degree of globalization approaches its predicted degree of globalization (based upon the firm’s RBV capabilities) and deteriorates as the difference between the firm’s actual and predicted degree of globalization grows (either positively or negatively).

This perspective stems from the notion that an MNE’s performance is best when it matches its level of globalization to its RBV capabilities. The concept of fit as profile deviation (or congruence) suggests that firms have the potential to operate at, above, or

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9 The methodological requirements for empirically testing fit as profile deviation, as refined by Edwards (2001), are described in depth in the Methods section.
10 In this study, the firm’s idealized profile consists solely of the firm’s predicted degree of globalization (based on the firm’s technological and/or marketing capabilities).
below their capabilities. Firms globalizing below their capabilities are under-utilizing their resources and for this reason are inefficient (Rothaermel, Hitt, & Jobe, 2006).

Likewise, based on the RBV, if a firm possesses a capability that can lead to a competitive advantage and financial performance but the firm then fails to exercise such a capability, such inaction represents an opportunity cost. This inefficiency and opportunity cost reduce the firm’s performance. Firms globalizing beyond their capabilities are over-extending their resources and capabilities and for this reason are likely to be ineffective (Contractor, et al., 2003); this ineffectiveness reduces the firm’s performance. Based on this reasoning I hypothesize:

Hypothesis 2: The degree of fit between a firm’s actual and predicted degree of globalization (predicted by firm technological and marketing capabilities) is positively related to firm performance such that firm performance is greater when the difference between a firm’s actual and predicted degree of globalization is smaller and firm performance diminishes as the difference between a firm’s actual and predicted degree of globalization grows.

The Full Theoretical Model

Figure 1 illustrates the theoretical model derived from the preceding hypotheses. Model 1 illustrates that, based on the RBV, I expect a firm’s technological capability (H1a) and its marketing capability (H1b) to be positively related to its degree of globalization. Model 2 builds upon Model 1 and illustrates that, based on the RBV and the concept of strategic fit as profile deviation, I expect the degree of fit between the firm’s actual and predicted degree of globalization (indicated by Model 1) to be positively related to a firm’s performance (H2).
Methods

To test my hypotheses I utilized the S&P Capital IQ database (S&P Capital IQ) to build a dataset of information for large firms from across the globe. The S&P Capital IQ database is an extensive database used by investment bankers, asset managers, private equity firms, credit analysts, equity research analysts, government agencies, consultants, advisors, corporations, and academic researchers. The S&P Capital IQ database has extensive information on over one million public and private companies from across the globe.

Since prior research addressing regional versus global multinational enterprises has focused on large firms (Asmussen, 2009; Rugman, 2003, 2005), I also use a sample of large firms in my study. Firms from across the globe with average annual revenues of at least $1 Billion (USD) that also reported their advertising or R&D expenditures (which are used to calculate variables of interest) as well as reported chosen control variables for the period of interest were identified. This is a cross-sectional study, and each variable
represents the average value for the 2007 through 2010 time frame. This provided me with an initial population of 1,342 firms in the S&P Capital IQ database. I assigned a random number to each company and then selected a random sample of 651 firms for my research so that my ultimate random sample provided the recommended 20 observations per independent variable coefficient (Hair, et al., 2010).

From this sample of 651 firms I eliminated firms that were operating subsidiaries and firms that had been acquired or were reorganizing. I also eliminated firms that had not reported sufficient geographic segment data to calculate DOG; had not consistently reported either their advertising or R&D expenditures for the entire four-year period; or whose data represented outliers (where the data points for variables of interest were more than three standard deviations from the mean). As summarized in Table 1, this resulted in a final usable sample of 222 firms from across the globe from multiple industries.

As indicated in Table 1 below, the sample consisted of 151 manufacturing firms, 17 services firms, and 54 firms from other industries (such as agriculture, mining, etc.). Consistent with prior research (Guillen & Garcia-Canal, 2009; Johanson & Vahlne, 1977), the firms in my sample tend to be from North America (108) and Europe (43); in line with the notion that MNEs are beginning to emerge from other regions (Guillen & Garcia-Canal, 2009; Li, 2010), my sample also includes 59 firms from the Asian-Pacific region, 10 firms from Africa and the Middle East, and 2 firms from Latin America/Caribbean.
Table 1: Number of Firms in Sample by Headquarters Region and Industry

<table>
<thead>
<tr>
<th>HQ Region</th>
<th>Manufacturing</th>
<th>Services</th>
<th>All Other</th>
<th>Grand Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Africa / Middle East</td>
<td>6</td>
<td>1</td>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>Asia / Pacific</td>
<td>44</td>
<td>1</td>
<td>14</td>
<td>59</td>
</tr>
<tr>
<td>Europe</td>
<td>34</td>
<td>2</td>
<td>7</td>
<td>43</td>
</tr>
<tr>
<td>Latin America and Caribbean</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>United States and Canada</td>
<td>65</td>
<td>13</td>
<td>30</td>
<td>108</td>
</tr>
<tr>
<td><strong>Grand Total</strong></td>
<td><strong>151</strong></td>
<td><strong>17</strong></td>
<td><strong>54</strong></td>
<td><strong>222</strong></td>
</tr>
</tbody>
</table>

Calculating DOG for a firm requires information on the size of a firm’s home market economy as a percentage of the global economy (Marshall, 2012). I used the United Nations Statistics Division (United Nations Statistics Division, 2012b) as the source for all Gross Domestic Product (GDP) related data required for this analysis.

Model 1 – A Firm’s Technological and Marketing Capabilities as Antecedents to DOG

*Dependent Variable*

The dependent variable for Hypothesis 1 is the firm’s Degree of Globalization (DOG) (Marshall, 2012). DOG is a continuous ratio variable measure of the extent to which a firm has achieved an equivalent economic presence and penetration across the globe; this is in contrast to a degree of internationalization measurement that simply measures a firm’s degree of economic presence beyond its home country borders. DOG has a value of zero for a domestic firm; a value of one for a global firm; and a value

11 The HQ Regions are from the S&P Capital IQ Database based on company financial reports.
12 The industry classifications are based on the SIC Code Divisions.
between zero and one indicates the proportional degree of globalization for a firm. Equation 1 provides the method for calculating the Degree of Globalization (DOG) for a firm (Marshall, 2012):

\[
DOG = \frac{(FSTS)(DEGE)}{(1-FSTS)(1-DEGE)}
\]  

(1)

Where:

- FSTS = the ratio of Foreign Sales to Total Sales.
- DEGE = the ratio of the size of the Domestic Economy to the Global Economy.

**Independent Variables**

The independent variables for Model 1 are *R&D intensity* and *Advertising intensity*. As in prior international business research, I used a firm’s *R&D intensity* as a proxy for a firm’s technological capabilities (Delios & Beamish, 1999, 2001; Fang, et al., 2007; Kirca, et al., 2011; Lu & Beamish, 2004). I calculated *R&D intensity* as a firm’s R&D expenditures divided by a firm’s revenues. Similarly, I used a firm’s *advertising intensity* as a proxy for a firm’s marketing capabilities (Delios & Beamish, 1999, 2001; Fang, et al., 2007; Kirca, et al., 2011; Lu & Beamish, 2004). I calculated *advertising intensity* as a firm’s advertising expenditures divided by a firm’s revenues.

**Control Variables**

Several variables were chosen as controls because prior efforts have shown them to be related to internationalization (Anderson & Reeb, 2004; Brouthers, Nakos, et al., 2009; Geringer, et al., 2000; Guillen & Garcia-Canal, 2009; Johanson & Vahlne, 1977;
Jung, Beamish, & Goerzen, 2010; Kotabe, et al., 2002; Li, 2010; Ruigrok, et al., 2007; Verwaal & Donkers, 2002; Wan & Hoskisson, 2003; Wynarczyk & Watson, 2005). I reasoned that it was likely that these variables might also be related to globalization because firm globalization is achieved through a firm’s expanding internationally into numerous foreign markets, and therefore, included them as control variables.

First, firm size was measured by the firm’s revenues\(^\text{13}\) (Anderson & Reeb, 2004; Wynarczyk & Watson, 2005). Firm experience was measured by the age of the firm (Brouthers, Nakos, et al., 2009; Verwaal & Donkers, 2002). I also included controls for industry type that were measured with two dummy variables indicating whether a firm was a manufacturing firm, a service firm, or some other type of firm such as agricultural, mining, etc. (Geringer, et al., 2000; Jung, et al., 2010; Kotabe, et al., 2002; Ruigrok, et al., 2007; Wan & Hoskisson, 2003).

I also included a control variable to measure a firm’s home country level of economic development. Prior research has often used dummy variables to capture home country/regional effects (K. Brouthers, et al., 2008; Brouthers, Nakos, et al., 2009; Brouthers, O'Donnell, & Hadjimarcou, 2005; Jung, Beamish, & Goerzen, 2008). In such studies the MNEs used are overwhelmingly from developed economies in North America and Europe (Guillen & Garcia-Canal, 2009; Johanson & Vahlne, 1977). More recently it has been noted that MNEs increasingly originate from emerging economies (Guillen & Garcia-Canal, 2009; Li, 2010). In an effort to integrate all the various country/regional dummy variables into a single construct, I chose home country per capita GDP as a

\(^{13}\) Please note that the dependent variable DOG is not dependent upon the level of sales for a firm but rather upon the foreign versus domestic composition of those sales.
control variable reasoning that this continuous ratio variable captures the home country effect of varying degrees of economic development for the 28 home countries represented in my sample.

Model 2 – The Degree of Fit for Actual and Predicted Degree of Globalization as an Antecedent to Firm Performance

**Dependent Variable**

The dependent variable for Hypothesis 2 is firm performance. Both accounting-based and market-based measures were used to measure firm performance. My accounting-based measure of firm performance was Return on Assets (ROA) (Geringer, et al., 2000; Gomes & Ramaswamy, 1999; Qian, et al., 2008; Ruigrok, et al., 2007). ROA is a ratio of a firm’s income divided by its assets.

Tobin’s Q was used as my market-based measure of firm performance. Tobin’s Q has been used extensively for this purpose in international business research (Eckert, et al., 2010; Hult, et al., 2008; Qian, et al., 2008; Rugman & Oh, 2010). Tobin’s Q is a market-to-book ratio that considers a firm’s equity, preferred stock, and debt.

**Independent Variable**

The independent variable is the degree of fit of the actual DOG versus the predicted DOG for a firm. Prior research has examined the concept of fit in strategy research, categorized different conceptual types of strategic fit, and established the appropriate empirical methods to test hypotheses concerning these categories. In this study I measure fit as the congruence between actual and predicted DOG. Venkatraman (1989) suggests that fit as profile deviation is appropriate when evaluating whether the dependent variable is related to the co-alignment between an entity’s strategy and the
entity’s environment or characteristics. He explained that the typical method for testing this type of fit had been to apply a deviation score analysis (as illustrated in Equation 2 where $Fit_{Deviation}$ is first defined and then tested as a predictor of Performance). However research has identified several reliability and validity issues inherent with this approach (Johns, 1981; Venkatraman, 1989). Therefore, I searched for an alternative way of measuring fit.

$$Fit_{Deviation} = |DOG_{Actual} - DOG_{Predicted}|$$  \hspace{1cm} (2a)

$$Performance = \beta_0 + \beta_1 Fit_{Deviation}$$  \hspace{1cm} (2b)

$$Performance = \beta_0 + \beta_1 |DOG_{Actual} - DOG_{Predicted}|$$  \hspace{1cm} (2c)

Where:

- $Fit_{Deviation} = \text{Fit for Deviation Score Analysis.}$
- Performance = a measure of firm performance.
- $\beta_i = \text{regression equation coefficients (where i ranges from 0 to 1).}$
- $DOG_{Actual} = \text{a firm’s actual DOG.}$
- $DOG_{Predicted} = \text{a firm’s predicted DOG (from Model 1).}$

Subsequent research has developed a recommended alternate method that mitigates the numerous methodological problems associated with deviation score analysis (Equation 2). Edwards (2001) recommends an approach he refers to as difference score analysis that applies polynomial regression combined with comparing the three-dimensional response surface from the polynomial regression versus the anticipated
hypothesis-driven response surface as the preferred method for testing strategic fit as profile deviation (or congruence).

The polynomial regression approach of difference score analysis is based on first defining $Fit_{Difference}$ as the square of the difference between the two variables (as depicted in Equation 3a) and then testing whether $Fit_{Difference}$ is a predictor of the dependent variable, which in this case is Performance (as depicted in Equation 3b). Substituting Equation 3a into Equation 3b yields Equation 3c. Expanding Equation 3c then yields Equation 4.

$$Fit_{Difference} = (DOG_{Actual} - DOG_{Predicted})^2$$ \hspace{1cm} (3a)

$$Performance = \beta_0 + \beta_1 Fit_{Difference}$$ \hspace{1cm} (3b)

$$Performance = \beta_0 + \beta_1 (DOG_{Actual} - DOG_{Predicted})^2$$ \hspace{1cm} (3c)

$$Performance =$$

$$\beta_0 + \beta_1 DOG^2_{Actual} - 2\beta_1 DOG_{Actual} DOG_{Predicted} + \beta_1 DOG^2_{Predicted}$$ \hspace{1cm} (4)

Where:

- $Fit_{Difference}$ = Fit for Difference Score Analysis.
- Performance = a measure of firm performance.
- $\beta_i$ = hypothesized equation coefficients (where $i$ ranges from 0 to 1).

Thus Equation 4 is the expected form of the equation representing Hypothesis 2 based on the concept of strategic fit as profile deviation when utilizing difference score analysis. Additionally, Hypothesis 2 posits that performance will be maximized when the
actual DOG and predicted DOG for a firm are close in value and that performance will diminish as the difference between actual DOG and predicted DOG increases. For Equation 3c to exhibit these characteristics, $\beta_1$ must have a negative value such that performance will decline as the actual DOG and predicted DOG diverge.

I tested H2, the hypothesis that the degree of fit between actual and predicted DOG is positively related to firm performance, by examining whether a regression using the variables $\text{DOG}_{\text{Actual}}$, $\text{DOG}_{\text{Predicted}}$, $\text{DOG}_{\text{Actual}} \times \text{DOG}_{\text{Predicted}}$, $\text{DOG}_{\text{Actual}}^2$, and $\text{DOG}_{\text{Predicted}}^2$ resulted in the hypothesized form indicated by Equation 4 and also met the requirement that $\beta_1$ has a negative value. Equation 5 represents the predictive equation that results from the regression using these variables. The regression coefficient requirements necessary to support H2 are determined by equating the coefficients for Equation 4 (representing the hypothesis) and Equation 5 (representing the regression results) on a variable-by-variable basis as summarized in Table 2. As indicated in this table, for H2 to be supported then: (1) $C_1$ and $C_2$ should be approximately equal to zero; (2) $C_4$ and $C_5$ should be approximately equal to each other; (3) $C_3$ should be approximately equal to twice the negative value of $C_4$ (and $C_5$); and (4) $C_4$ and $C_5$ should be negative while $C_3$ should be positive.

$$\text{Performance} =$$
$$C_0 + C_1 \text{DOG}_{\text{Actual}} + C_2 \text{DOG}_{\text{Predicted}} + C_3 \text{DOG}_{\text{Actual}} \times \text{DOG}_{\text{Predicted}} + C_4 \text{DOG}_{\text{Actual}}^2 + C_5 \text{DOG}_{\text{Predicted}}^2$$

(5)
Where:

- Performance = a measure of firm performance.
- $C_i$ = regression equation coefficients (where $i$ ranges from 0 to 5).

Table 2: Coefficient Requirements to Support H2

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficients for:</th>
<th>Requirements to Support H2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Hypothesis</td>
<td>Regression</td>
</tr>
<tr>
<td></td>
<td>Equation (Eq. 4)</td>
<td>Equation (Eq. 5)</td>
</tr>
<tr>
<td>DOGActual</td>
<td>0</td>
<td>$C_1$</td>
</tr>
<tr>
<td>DOGPredicted</td>
<td>0</td>
<td>$C_2$</td>
</tr>
</tbody>
</table>
| $\text{DOG}_{\text{Actual}} \times \text{DOG}_{\text{Predicted}}$ | $-2\beta_1$      | $C_3$                       | $\beta_1 < 0$  
|                               |                   |                             | And $C_3 > 0$  
|                               |                   |                             | And $C_3 \approx -2C_4$  
|                               |                   |                             | And $C_3 \approx -2C_5$  |
| $\text{DOG}_{\text{Actual}}^2$ | $\beta_1$        | $C_4$                       | $\beta_1 < 0$  
|                               |                   |                             | And $C_4 < 0$  
|                               |                   |                             | And $C_4 \approx -0.5C_3$  
|                               |                   |                             | And $C_4 \approx C_5$  |
| $\text{DOG}_{\text{Predicted}}^2$ | $\beta_1$        | $C_5$                       | $\beta_1 < 0$  
|                               |                   |                             | And $C_5 < 0$  
|                               |                   |                             | And $C_5 \approx -0.5C_3$  
|                               |                   |                             | And $C_5 \approx C_4$  |

Note: The requirements regarding positive and negative values for coefficients are based on H2 that posits firm performance will be maximized if the actual DOG and predicted DOG for a firm are equal and will diminish as the actual DOG and predicted DOG for a firm diverge.
Control Variables

I included several control variables shown to be related to firm performance. Firm leverage was measured by the firm’s debt ratio that is calculated as total debt divided by the sum of total debt and total equity (Bouquet, Morrison, & Birkinshaw, 2009; Eckert, et al., 2010; Pangarkar & Wu, 2012; Qian, et al., 2008). Firm size was measured by firm revenues (Gomes & Ramaswamy, 1999; Lu & Beamish, 2001; Lu & Beamish, 2004). I also used industry dummy variables to indicate whether a firm was a manufacturing firm, a service firm, or some other type of firm based on the defined divisions of the SIC codes (K. D. Brouthers, L. E. Brouthers, & S. Werner, 2008; Brouthers, Mukhopadhyay, Wilkinson, & Brouthers, 2009).

Multi-Year Averages and Transformation of Variables

I calculated multiyear averages for all variables in this cross-sectional study. The use of multiyear averages minimizes the effect of single-year variations; pooling the data into multiyear averages provides more valid and reliable measures (Brouthers, et al., 1996).

I also examined the distributions for each variable to determine if any of the variables exhibited a right-skewed distribution. I transformed the data for those variables exhibiting such a right-skewed distribution by using either the square root function (for variables with values greater than or equal to zero) or the natural log function (for variables with values greater than zero) to better achieve normality and to avoid issues of heteroscedasticity (Berrone, Cruz, Gomez-Mejia, & Larraza-Kintana, 2010; Maclean, Morton, Elston, & Yee, 1976; Riahi-Belkaoui, 1996). As a result, I used the log
transformation for firm age, firm revenue, Return on Assets (ROA), and Tobin’s Q whereas I used the square root transformation for firm debt ratio, advertising intensity, R&D intensity, and DOG. Additionally, as recommended by Edwards (2001), I transformed the data for actual DOG (DOG<sub>Actual</sub>) and predicted DOG (DOG<sub>Predicted</sub>) to center the scales for these two variables for the difference score analysis to avoid issues of multicollinearity (due to the interaction and squared terms in the difference score polynomial regression).

Hierarchical Multiple Regression (HMR) and Difference Score Analysis

I used hierarchical multiple regression (HMR) to test Hypothesis 1 (a firm’s technological and marketing capabilities are positively related to its globalization). I used difference score analysis (Edwards, 2001) to test Hypothesis 2 (the degree of fit between a firm’s actual and predicted globalization is positively related to its performance). Difference score analysis uses hierarchical multiple regressions to test the difference score polynomial for conformance with the hypothesis. Difference score analysis also required comparing the conformance of the regression driven response surface for firm performance to the expected shape of the response surface indicated by the hypothesis.

Results

Model 1 – Technical and Marketing Capabilities as Antecedents to DOG

I began my analysis by reviewing the descriptive statistics for the variables and by checking for multicollinearity (Hair, et al., 2010). Table 3 provides the descriptive
statistics and correlations for the variables used to test my first hypothesis. The magnitude of the largest correlation between the dependent and other variables was 0.53, and the magnitude of the largest correlation between independent and/or control variables was 0.46. As indicated, a number of these correlations were significant. However, I concluded that multicollinearity was not an issue in this analysis since the largest variance inflation factor (VIF) for any variable in Model 1 had a value of 1.677; this is well below the cutoff level for acceptable values of 10 (Hair, et al., 2010).
Table 3: Descriptive Statistics for Antecedents to DOG

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>S.D.</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 DOG</td>
<td>0.36</td>
<td>0.31</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 Home Country Per Capita GDP</td>
<td>36.78</td>
<td>14.51</td>
<td>0.30***</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 Firm Age</td>
<td>3.80</td>
<td>0.78</td>
<td>0.15*</td>
<td>0.18**</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 Revenue</td>
<td>8.37</td>
<td>1.16</td>
<td>0.06</td>
<td>0.07</td>
<td>0.26***</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 Manufacturing</td>
<td>0.68</td>
<td>0.47</td>
<td>0.40***</td>
<td>-0.06</td>
<td>0.23***</td>
<td>0.06</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 Services</td>
<td>0.08</td>
<td>0.27</td>
<td>-0.09</td>
<td>0.09</td>
<td>-0.20**</td>
<td>-0.15*</td>
<td>-0.42***</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7 Advertising Intensity</td>
<td>0.74</td>
<td>0.87</td>
<td>-0.22***</td>
<td>0.08</td>
<td>-0.06</td>
<td>0.09</td>
<td>-0.30***</td>
<td>0.07</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>8 R&amp;D Intensity</td>
<td>1.19</td>
<td>1.31</td>
<td>0.53***</td>
<td>0.13*</td>
<td>-0.05</td>
<td>0.08</td>
<td>0.46***</td>
<td>-0.10</td>
<td>-0.39***</td>
<td>1.00</td>
</tr>
</tbody>
</table>

Notes:
1. N=222
2. *p<0.05; **p<0.01; ***p<0.001
3. The largest variance inflation factor (VIF) for this data set was 1.677.
4. All data represent the average for the 2007 to 2010 period.
5. The following variables were transformed by the natural logarithm function: Firm Age and Revenue.
6. The following variables were transformed by the square root function: DOG, Advertising Intensity, and R&D Intensity.
7. Manufacturing and Service are dummy variables such that firms in that industry have a value of 1 and other firms have a value of 0.
I tested Hypothesis 1 concerning the antecedents of a firm’s DOG by hierarchical multiple regression. Hypothesis 1a predicts that the extent of a firm’s technological capabilities (measured by the proxy of a firm’s R&D intensity) will be positively related to its degree of globalization (measured by DOG). Hypothesis 1b predicts that the extent of a firm’s marketing capabilities (measured by the proxy of a firm’s advertising intensity) will be positively related to its degree of globalization (measured by DOG). Table 4 provides the results of this analysis. The model including only the control variables explained 26.9% of the variance of the square root of DOG while the complete model (including the control variables and the hypothesized independent variables) explained 38.6% of this same variance. Both the $R^2$ and the change in $R^2$ for the complete model was significant at the $p<0.001$ level.

With respect to the specific elements of Hypothesis 1, the coefficient for the R&D intensity variable was positive as predicted and significant at the $p<0.001$ level. Thus H1a (a firm’s technological capabilities are positively related to its degree of globalization) was supported. However, the coefficient for the advertising intensity variable was not significant. Thus H1b (a firm’s marketing capabilities are positively related to its degree of globalization) was not supported.
## Table 4: Model 1 Regression Results for Antecedents of DOG

<table>
<thead>
<tr>
<th></th>
<th>Control Variables Only</th>
<th>Complete Model</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B (SE)</td>
<td>B (SE)</td>
</tr>
<tr>
<td>Constant</td>
<td>-0.146 (0.150)</td>
<td>-0.140 (0.138)</td>
</tr>
<tr>
<td>Control Variables</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Home Country Per Capita GDP</td>
<td>0.007 (0.001)**</td>
<td>0.005 (0.001)***</td>
</tr>
<tr>
<td>Firm Age</td>
<td>0.000 (0.025)</td>
<td>0.035 (0.024)</td>
</tr>
<tr>
<td>Revenue</td>
<td>0.006 (0.016)</td>
<td>-0.004 (0.015)</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>0.297 (0.043)***</td>
<td>0.152 (0.046)**</td>
</tr>
<tr>
<td>Services</td>
<td>0.091 (0.076)</td>
<td>0.054 (0.070)</td>
</tr>
<tr>
<td>Main Effects</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Advertising Intensity</td>
<td>-0.003 (0.021)</td>
<td></td>
</tr>
<tr>
<td>R&amp;D Intensity</td>
<td>0.094 (0.016)***</td>
<td></td>
</tr>
<tr>
<td>Model Indices</td>
<td></td>
<td></td>
</tr>
<tr>
<td>R²</td>
<td>0.269***</td>
<td>0.386***</td>
</tr>
<tr>
<td>Adjusted R²</td>
<td>0.252***</td>
<td>0.366***</td>
</tr>
<tr>
<td>Change in R²</td>
<td>0.269***</td>
<td>0.117***</td>
</tr>
</tbody>
</table>

Notes:
1. N=222
2. Unstandardized coefficients and standard error are reported.
3. *p<0.05; **p<0.01; ***p<0.001
4. All data represent the average for the 2007 to 2010 period.
5. The following variables were transformed by the natural logarithm function: Firm Age and Revenue.
6. The following variables were transformed by the square root function: DOG, Advertising Intensity, and R&D Intensity.
7. Manufacturing and Service are dummy variables such that firms in that industry have a value of 1 and other firms have a value of 0.
Model 2 – The Degree of Fit and Firm Performance

Hypothesis 2 suggests that the degree of fit between a firm’s actual and predicted globalization is positively related to firm performance. I examined this hypothesis using a difference score analysis (Edwards, 2001). Based on the requirements of a difference score analysis (Edwards, 2001), I first performed a hierarchical multiple regression to test the coefficients of the difference score polynomial. The difference score polynomial took the form of Equation 6.

\[
\text{Performance} = 
C_0 + C_1 \cdot \text{Actual DOG} + C_2 \cdot \text{Predicted DOG} + C_3 \cdot \text{Actual DOG} \cdot \text{Predicted DOG} + 
C_4 \cdot \text{Actual DOG}^2 + C_5 \cdot \text{Predicted DOG}^2 
\] (6)

Where:

- \( C_i = \) regression equation coefficients (where i ranges from 0 to 5).

Thus, as developed above, for Hypothesis 2 to be supported: (1) \( C_1 \) and \( C_2 \) should not be significant; (2) \( C_4 \) and \( C_5 \) should be significant, negative, and approximately equal to each other; and (3) \( C_3 \) should be significant and should be twice the negative of \( C_4 \) (or, equivalently, \( C_5 \)).

Finally, I also evaluated whether the regression generated response surface adhered to the expected contour based on Hypothesis 2 (Edwards, 2001). Figure 2 illustrates the expected response surface based on Hypothesis 2. This surface can generally be described as being saddle-shaped such that: firm performance is highest when \( \text{Actual DOG} \) is equal to \( \text{Predicted DOG} \) (along the ridge of the saddle); and firm
performance diminishes as Actual DOG and Predicted DOG diverge in value (the sides of the saddle).

Figure 2: Expected Hypothesis-Driven Response Surface for Firm Performance

I tested Hypothesis 2 using two measures of firm performance. I first tested this hypothesis using ROA as an accounting-based measure, and then tested this hypothesis using Tobin’s Q as a market-based measure.
The Degree of Fit and ROA

My analysis of Hypothesis 2 using ROA as the measure of firm performance began by reviewing the descriptive statistics for the variables and by checking for multicollinearity (Hair, et al., 2010). Table 5 provides the descriptive statistics and correlations for the variables used in these models. The largest magnitude of a correlation between the dependent variable and other variables was 0.34, and the largest magnitude of a correlation between independent and/or control variables was 0.78. A number of these correlations were significant. However, I concluded that multicollinearity was not an issue in this analysis since the largest variance inflation factor (VIF) for any variable in this model had a value of 4.603 which is well below the cutoff limit of acceptable values of 10 (Hair, et al., 2010).
Table 5: Descriptive Statistics for Antecedents of ROA

<table>
<thead>
<tr>
<th>Variables</th>
<th>Mean</th>
<th>S.D.</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Return on Assets (ROA)</td>
<td>1.78</td>
<td>0.60</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 Debt Ratio</td>
<td>5.47</td>
<td>2.18</td>
<td>-0.34***</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 Revenue</td>
<td>8.37</td>
<td>1.16</td>
<td>-0.17**</td>
<td>0.29***</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 Manufacturing</td>
<td>0.68</td>
<td>0.47</td>
<td>0.05</td>
<td>-0.06</td>
<td>0.06</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 Services</td>
<td>0.08</td>
<td>0.27</td>
<td>0.12*</td>
<td>0.00</td>
<td>-0.15*</td>
<td>-0.42***</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 Actual DOG</td>
<td>(0.14)</td>
<td>0.31</td>
<td>0.17**</td>
<td>-0.01</td>
<td>0.06</td>
<td>0.40***</td>
<td>-0.09</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7 Predicted DOG</td>
<td>(0.14)</td>
<td>0.19</td>
<td>0.17**</td>
<td>-0.09</td>
<td>0.10</td>
<td>0.64***</td>
<td>-0.14*</td>
<td>0.62***</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8 Actual DOG x Predicted DOG</td>
<td>0.05</td>
<td>0.08</td>
<td>-0.04</td>
<td>0.00</td>
<td>-0.10</td>
<td>-0.48***</td>
<td>0.02</td>
<td>-0.61***</td>
<td>-0.57***</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9 Actual DOG Squared</td>
<td>0.11</td>
<td>0.11</td>
<td>-0.03</td>
<td>-0.12*</td>
<td>-0.19**</td>
<td>-0.19**</td>
<td>-0.11</td>
<td>-0.16**</td>
<td>-0.33***</td>
<td>0.59***</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>10 Predicted DOG Squared</td>
<td>0.05</td>
<td>0.06</td>
<td>-0.03</td>
<td>0.07</td>
<td>-0.07</td>
<td>-0.65***</td>
<td>0.06</td>
<td>-0.47***</td>
<td>-0.68***</td>
<td>0.78***</td>
<td>0.44***</td>
<td>1.00</td>
</tr>
</tbody>
</table>

Notes:
1. N=222
2. *p<0.05; **p<0.01; ***p<0.001
3. The largest variance inflation factor (VIF) was 4.603.
4. All data represent the average for the 2007 to 2010 period.
5. Predicted DOG is the predicted value of DOG based on Hypothesis 1.
6. The following variables were transformed by the natural logarithm function: Return on Assets and Revenue.
7. The following variables were transformed by the square root function: Debt Ratio, Actual DOG, and Predicted DOG.
8. The Actual DOG and Predicted DOG variables were re-centered on their respective scales for the Difference Score Polynomial.
9. Manufacturing and Service are dummy variables such that firms in that industry have a value of 1 and other firms have a value of 0.
Table 6 provides the results of my analysis. The model using only the control variables explained 14% of the variance in the natural log of ROA whereas the complete model (including the control variables and the difference score polynomial) explained 20% of this same variance. The $R^2$ was significant at the $p<0.001$ level for both the control variables model and the complete model. The change in $R^2$ for the complete model versus the control variables was significant at the $p<0.05$ level. These results suggest that the difference score polynomial adds significant explanatory power beyond that of the control variables.

Hypothesis 2 using ROA as a measure of firm performance was not supported; the difference score analysis coefficients failed to follow the pattern required to support this hypothesis for predicting the log of ROA. In order for this hypothesis to be supported, the coefficients of the square root of Actual DOG and the coefficients of the square root of Predicted DOG should have been insignificant. However, in contradiction of this requirement, the coefficient for the square root of Actual DOG was significant at the $p<0.05$ level.

Additionally, to support Hypothesis 2, the coefficients for the interaction term between the square root of Actual DOG and the square root of Predicted DOG and the squares of both these variables should have been significant such that: the coefficients for the two squared terms would have had to have been approximately equal and negative; and the coefficient for the interaction term would have had to have been twice the negative of the coefficient for the two squared variables. In further contradiction of Hypothesis 2, however, none of these terms were significant. Thus the hierarchical multiple regression of the polynomial difference score failed to support Hypothesis 2 that
the degree of fit between a firm’s actual and predicted globalization was positively
targeted to firm performance as measured by ROA.

Table 6: Model 2 Regression Results for Antecedents of ROA

<table>
<thead>
<tr>
<th></th>
<th>Control Variables Only</th>
<th>Complete Model</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B (SE)</td>
<td>B (SE)</td>
</tr>
<tr>
<td>Return on Assets (ROA)</td>
<td></td>
<td>2.60 (0.33)***</td>
</tr>
<tr>
<td>Control Variables</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Debt Ratio</td>
<td>-0.09 (0.02)***</td>
<td>-0.09 (0.02)***</td>
</tr>
<tr>
<td>Revenue</td>
<td>-0.03 (0.03)</td>
<td>-0.04 (0.03)</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>0.13 (0.09)</td>
<td>0.09 (0.13)</td>
</tr>
<tr>
<td>Services</td>
<td>0.34 (0.16)*</td>
<td>0.32 (0.16)*</td>
</tr>
<tr>
<td>Difference Score Polynomial</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Actual DOG</td>
<td></td>
<td>0.44 (0.18)*</td>
</tr>
<tr>
<td>Predicted DOG</td>
<td></td>
<td>0.38 (0.33)</td>
</tr>
<tr>
<td>Actual DOG x Predicted DOG</td>
<td></td>
<td>1.21 (1.02)</td>
</tr>
<tr>
<td>Actual DOG Squared</td>
<td></td>
<td>-0.76 (0.47)</td>
</tr>
<tr>
<td>Predicted DOG Squared</td>
<td></td>
<td>1.47 (1.26)</td>
</tr>
<tr>
<td>Model Indices</td>
<td></td>
<td></td>
</tr>
<tr>
<td>R²</td>
<td>0.14***</td>
<td>0.20***</td>
</tr>
<tr>
<td>Adjusted R²</td>
<td>0.12***</td>
<td>0.16***</td>
</tr>
<tr>
<td>Change in R²</td>
<td>0.14***</td>
<td>0.06*</td>
</tr>
</tbody>
</table>

Notes:
1. N=222
2. Unstandardized coefficients (B) and standard errors (SE) are reported.
3. *p<0.05; **p<0.01; ***p<0.001
4. All data represent the average for the 2007 to 2010 period.
5. Predicted DOG is the predicted value of DOG based on Hypothesis 1.
6. The following variables were transformed by the natural logarithm function: Return on Assets and Revenue.
7. The following variables were transformed by the square root function: Debt Ratio, Actual DOG, and Predicted DOG.
8. The Actual DOG and Predicted DOG variables were re-centered on their respective scales for the Difference Score Polynomial.
9. Manufacturing and Service are dummy variables such that firms in that industry have a value of 1 and other firms have a value of 0.
Completing the difference score analysis to test Hypothesis 2 (that the degree of fit between the actual and predicted globalization of a firm is positively related to firm performance) also required a comparison of the hypothesized response surface versus the regression generated response surface (Edwards, 2001).

Figure 3 is the response surface for the log of ROA generated by the complete model. As indicated by visual comparison, Figure 3 fails to follow the contour of Figure 2 (the hypothesized shape of the response surface). Thus both the hierarchical multiple regression of the difference score polynomial and the response surface analysis required for a difference score analysis (Edwards, 2001) failed to support Hypothesis 2 that the degree of fit between a firm’s actual and predicted globalization would be positively related to firm performance when firm performance was measured by ROA. Having tested Hypothesis 2 by using ROA, I next tested this hypothesis using Tobin’s Q.
Figure 3: Regression Response Surface for ROA
The Degree of Fit and Tobin’s Q

The analysis of Hypothesis 2 using Tobin’s Q as a measure of firm performance also began by reviewing the descriptive statistics for the variables and by checking for multicollinearity (Hair, et al., 2010). Table 7 provides the descriptive statistics and correlations for the variables used in these models. The largest magnitude of a correlation between the dependent variable and other variables was 0.27, and the largest magnitude of a correlation between independent and/or control variables was 0.78. A number of these correlations were significant. However, I concluded that multicollinearity was not an issue in this analysis since the largest variance inflation factor (VIF) for any variable in this model had a value of 4.603 which is well below the cutoff limit of acceptable values of 10 (Hair, et al., 2010).
Table 7: Descriptive Statistics for Antecedents of Tobin’s Q

<table>
<thead>
<tr>
<th>Variables</th>
<th>Mean</th>
<th>S.D.</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Tobin's Q</td>
<td>0.66</td>
<td>0.48</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 Debt Ratio</td>
<td>5.47</td>
<td>2.18</td>
<td>-0.25***</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 Revenue</td>
<td>8.37</td>
<td>1.16</td>
<td>-0.09</td>
<td>0.29***</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 Manufacturing</td>
<td>0.68</td>
<td>0.47</td>
<td>0.05</td>
<td>-0.06</td>
<td>0.06</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 Services</td>
<td>0.08</td>
<td>0.27</td>
<td>0.15*</td>
<td>0.00</td>
<td>-0.15*</td>
<td>-0.42***</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 Actual DOG</td>
<td>(0.14)</td>
<td>0.31</td>
<td>0.27***</td>
<td>-0.01</td>
<td>0.06</td>
<td>0.40***</td>
<td>-0.09</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7 Predicted DOG</td>
<td>(0.14)</td>
<td>0.19</td>
<td>0.25***</td>
<td>-0.09</td>
<td>0.10</td>
<td>0.64***</td>
<td>-0.14*</td>
<td>0.62***</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8 Actual DOG x Predicted DOG</td>
<td>0.05</td>
<td>0.08</td>
<td>-0.05</td>
<td>0.00</td>
<td>-0.10</td>
<td>-0.48***</td>
<td>0.02</td>
<td>-0.61***</td>
<td>-0.57***</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9 Actual DOG Squared</td>
<td>0.11</td>
<td>0.11</td>
<td>-0.04</td>
<td>-0.12*</td>
<td>-0.19**</td>
<td>-0.19**</td>
<td>-0.11</td>
<td>-0.16**</td>
<td>-0.33***</td>
<td>0.59***</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>10 Predicted DOG Squared</td>
<td>0.05</td>
<td>0.06</td>
<td>-0.02</td>
<td>0.07</td>
<td>-0.07</td>
<td>-0.65***</td>
<td>0.06</td>
<td>-0.47***</td>
<td>-0.68***</td>
<td>0.78***</td>
<td>0.44***</td>
<td>1.00</td>
</tr>
</tbody>
</table>

Notes:
1. N=222
2. *p<0.05; **p<0.01; ***p<0.001
3. The largest variance inflation factor (VIF) was 4.603.
4. All data represent the average for the 2007 to 2010 period.
5. Predicted DOG is the predicted value of DOG based on Hypothesis 1.
6. The following variables were transformed by the natural logarithm function: Tobin's Q and Revenue.
7. The following variables were transformed by the square root function: Debt Ratio, Actual DOG, and Predicted DOG.
8. The Actual DOG and Predicted DOG variables were re-centered on their respective scales for the Difference Score Polynomial.
9. Manufacturing and Service are dummy variables such that firms in that industry have a value of 1 and other firms have a value of 0.
Hierarchical Multiple Regression (HMR) including the difference score polynomial was used to test Hypothesis 2 (the degree of fit between a firm’s actual and predicted globalization is positively related to firm performance) while using Tobin’s Q as a measure of firm performance. Table 8 provides the results of this analysis. The model containing only the control variables explained 10% of the variance in the log of Tobin’s Q while the complete model (including the control variables and the difference score polynomial) explained 24% of this same variance. Thus for the complete model, the $R^2$ and the change in $R^2$ were significant at the $p<0.001$ level. These results again suggest that the difference score polynomial adds significant explanatory power beyond that of the control variables.

As was the case with ROA, Hypothesis 2 using Tobin’s Q as a measure of firm performance was not supported; the difference score analysis coefficients failed to follow the pattern required to support this hypothesis for predicting the log of Tobin’s Q. In order for this hypothesis to be supported, the coefficients of the square root of Actual DOG and the coefficients of the square root of Predicted DOG should have been insignificant. However, in contradiction of this requirement, the coefficient for the square root of Actual DOG was significant at the $p<0.001$ level and the coefficient for the square root of Predicted DOG was significant at the $p<0.05$ level.

Additionally, to support Hypothesis 2, the coefficients for the interaction term between the square root of Actual DOG and the square root of Predicted DOG and the squares of both these variables should have been significant such that: the coefficients for the two squared terms would have had to have been approximately equal and negative; and the coefficient for the interaction term would have had to have been twice the
negative of the coefficient for the two squared variables. In further contradiction of Hypothesis 2, however, none of these terms were significant. Thus the hierarchical multiple regression of the polynomial difference score failed to support Hypothesis 2 that the degree of fit between a firm’s actual and predicted globalization was positively related to firm performance when firm performance was measured by Tobin’s Q.

Table 8: Model 2 Regression Results for Antecedents of Tobin’s Q

<table>
<thead>
<tr>
<th></th>
<th>Dependent Variable: Tobin's Q</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Control Variables Only</td>
</tr>
<tr>
<td>Control Variables</td>
<td>B (SE)</td>
</tr>
<tr>
<td>Debt Ratio</td>
<td>-0.05 (0.01)***</td>
</tr>
<tr>
<td>Revenue</td>
<td>0.00 (0.03)</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>0.13 (0.07)</td>
</tr>
<tr>
<td>Services</td>
<td>0.37 (0.13)**</td>
</tr>
<tr>
<td></td>
<td>Complete Model</td>
</tr>
<tr>
<td></td>
<td>B (SE)</td>
</tr>
<tr>
<td>Constant</td>
<td>0.84 (0.24)***</td>
</tr>
<tr>
<td></td>
<td>1.04 (0.26)***</td>
</tr>
<tr>
<td>Difference Score Polynomial</td>
<td></td>
</tr>
<tr>
<td>Actual DOG</td>
<td>0.50 (0.14)***</td>
</tr>
<tr>
<td>Predicted DOG</td>
<td>0.63 (0.26)*</td>
</tr>
<tr>
<td>Actual DOG x Predicted DOG</td>
<td>1.28 (0.79)</td>
</tr>
<tr>
<td>Actual DOG Squared</td>
<td>-0.59 (0.37)</td>
</tr>
<tr>
<td>Predicted DOG Squared</td>
<td>1.89 (0.99)</td>
</tr>
<tr>
<td>Model Indices</td>
<td></td>
</tr>
<tr>
<td>$R^2$</td>
<td>0.10***</td>
</tr>
<tr>
<td>Adjusted $R^2$</td>
<td>0.08***</td>
</tr>
<tr>
<td>Change in $R^2$</td>
<td>0.10***</td>
</tr>
<tr>
<td></td>
<td>0.24***</td>
</tr>
<tr>
<td></td>
<td>0.20***</td>
</tr>
<tr>
<td></td>
<td>0.14***</td>
</tr>
</tbody>
</table>

Notes:
1. N=222
2. Unstandardized coefficients (B) and standard errors (SE) are reported.
3. *p<0.05; **p<0.01; ***p<0.001
4. All data represent the average for the 2007 to 2010 period.
5. Predicted DOG is the predicted value of DOG based on Hypothesis 1.
6. The following variables were transformed by the natural logarithm function: Tobin's Q and Revenue.
7. The following variables were transformed by the square root function: Debt Ratio, Actual DOG, and Predicted DOG.
8. The Actual DOG and Predicted DOG variables were re-centered on their respective scales for the Difference Score Polynomial.
9. Manufacturing and Service are dummy variables such that firms in that industry have a value of 1 and other firms have a value of 0.
Completing the difference score analysis to test Hypothesis 2 (that the degree of fit between the actual and predicted globalization of a firm is positively related to firm performance) again required a comparison of the hypothesized response surface versus the regression generated response surface (Edwards, 2001). Figure 4 provides the response surface generated by the complete model for the predicted values of the natural log of \( \text{Tobin's Q} \). Visual comparisons clearly indicate that the regression generated response surface for the log of \( \text{Tobin's Q} \) (Figure 4) exhibits a dramatically different shape than the expected response surface based on Hypothesis 2 (Figure 2). Thus by using the log of \( \text{Tobin's Q} \) as a measure of firm performance, both the hierarchical multiple regression of the difference score polynomial and the response surface analysis required for a difference score analysis (Edwards, 2001) failed to support Hypothesis 2 that the degree of fit between a firm’s actual and predicted globalization would be positively related to firm performance. Thus Hypothesis 2 was not supported when using either \( \text{ROA} \) or \( \text{Tobin's Q} \) as the measure of firm performance.
Figure 4: Regression Response Surface for Tobin’s Q
Discussion, Implications, and Limitations

I began this study by asking two research questions. First, what are the antecedents of firm globalization? And second, what is the relationship between firm globalization and firm performance? These are new research questions since, as explained in the first essay of this dissertation (Marshall, 2012), the globalization of a firm and the internationalization of a firm are two distinct concepts (and constructs); the internationalization of a firm refers to the extent to which a firm has established an economic presence beyond its borders whereas the globalization of a firm refers to the extent to which a firm has established a similar economic presence and penetration when its home country market is compared to the rest of the world (Marshall, 2012). While there has been extensive research into the antecedents and consequences of the internationalization of firms (Kirca, et al., 2011), the research into the globalization of firms has heretofore been hampered by the lack of a viable measure for this construct that could be applied to a large number of firms. This prior limitation has now been eliminated with the development of the measure the Degree of Globalization (DOG) (Marshall, 2012).

Building on the resource based view (RBV), I first theorized that a firm’s technological and marketing capabilities are positively related to a firm’s globalization (Barney, 1991, 2001; Barney, et al., 2011; Krasnikov & Jayachandran, 2008; Newbert, 2007, 2008; Wernerfelt, 1984). I reasoned that, ceteris paribus, the greater a firm’s technological capabilities, the greater the number of countries where that firm could successfully compete. I similarly reasoned that, ceteris paribus, the greater the firm’s marketing capabilities (that enable a firm to understand and respond to new markets that
are different than its current markets), the greater the number of countries where that firm could successfully compete. Thus I hypothesized that a firm’s technological capabilities and marketing capabilities are positively related to the globalization of a firm.

In addition, I hypothesized that the degree of fit between a firm’s actual and predicted level of globalization (where the predicted level of globalization is based upon the firm’s technological and marketing capabilities) is positively related to a firm’s performance. The theory suggests that if a firm’s actual DOG is less than its predicted DOG, then firm performance will be diminished due to the inefficient underutilization of the firm’s ability to globalize. The theory also suggests that if a firm’s actual DOG is greater than its predicted DOG, then firm performance will be diminished due to the ineffective overutilization of the firm’s ability to globalize. Thus I hypothesized that a firm would have better performance if its actual DOG and predicted DOG were approximately equivalent.

Using a sample of 222 large firms from multiple industries across the globe, I did confirm my hypothesis that a firm’s technological capabilities (measured by R&D intensity) were positively related to the globalization of a firm (measured by DOG). In contrast, I could not confirm my hypothesis that a firm’s marketing capabilities (measured by advertising intensity) were positively related to the globalization of a firm (measured by DOG). I was surprised at not being able to confirm my hypothesis concerning a firm’s marketing capabilities being positively related to firm globalization since the relationship between a firm’s marketing capabilities and a firm’s internationalization had been confirmed in many studies (Delios & Beamish, 1999, 2001;
One potential reason for these results regarding a firm’s marketing capabilities is that this study included both B2C firms (that sell finished goods and services to consumers) and B2B firms (that sell intermediate goods and services to other businesses). Research has long used advertising intensity as a proxy for a firm’s marketing capabilities (Delios & Beamish, 1999, 2001; Fang, et al., 2007; Kirca, et al., 2011; Lu & Beamish, 2004). However, advertising is employed differently by B2B firms versus B2C firms (Glynn, 2012). Thus the use of advertising intensity as a proxy for marketing capabilities may not have been appropriate for this sample (which included both B2C and B2B firms) and may at least in part explain the inability to confirm the hypothesis concerning the positive relationship between a firm’s marketing capabilities and firm globalization.

Using this same sample, I also could not confirm my hypothesis that the degree of fit between a firm’s actual and predicted globalization (measured by the actual DOG and predicted DOG using a difference score analysis) was positively related to a firm’s performance (measured both by means of ROA and Tobin’s Q). Contrary to my hypothesis, I found both ROA and Tobin’s Q to be significantly positively related to a firm’s actual DOG, and I found that Tobin’s Q alone was significantly positively related to a firm’s predicted DOG. Though contrary to my RBV based hypothesis, these findings are consistent with a recent meta-analysis that found a positive relationship between internationalization and firm performance (Kirca, et al., 2011).
Contributions and Managerial Implications

The contribution from this research is that this is the first study to successfully develop and confirm a hypothesis regarding the antecedents to the globalization of a firm. As noted in prior research, the globalization of a firm and the internationalization of a firm are two distinct concepts (Marshall, 2012). This research posited and confirmed the positive relationship between a firm’s technological capabilities and a firm’s globalization.

With respect to managerial implications, this research suggests that firms with a high level of technological capabilities appear to have the ability to become more global with a higher probability of success. Thus managers of firms that have a high level of technological capabilities that have limited themselves to either domestic operations or very limited internationalization should carefully consider beginning to expand globally.

Limitations and Future Research

This study does have several limitations. First, the sample for this research was limited to large firms from across the globe from multiple industries with at least an average of $1 Billion (USD) in revenues for the 2007 to 2010 timeframe. Thus these results may not generalize to smaller firms. Future research could therefore examine the antecedents and consequences of DOG for small and medium-sized enterprises (SMEs).

Second, as mentioned above, advertising intensity may not be a viable proxy for the marketing capability of a firm for a sample that includes both B2B and B2C firms. Thus one possible future study could retest the hypothesis of the relationship between
marketing capabilities and firm globalization by either excluding B2B firms or using an alternative proxy measure.

Third, it might be argued that using R&D intensity as a single-item proxy for a firm’s technological capabilities and using advertising intensity as a single-item proxy for a firm’s marketing capabilities is a limitation. In both instances, each proxy represents an input measure (as opposed to a process or outcome measure) and thus has inherent limitations. However, there are numerous articles in extant literature from top-tier journals that use these two single-item proxies to capture the concepts of a firm’s technological and marketing capabilities. These include articles from AMJ (Chang, 1995; Delios & Beamish, 2001; Hambrick & Abrahamson, 1995; Kirca, et al., 2011; Lavie & Rosenkopf, 2006; Lu & Beamish, 2004), articles from SMJ (Anand & Delios, 2002; Chang & Singh, 1999; Delios & Beamish, 1999; Fang, et al., 2007; Goerzen & Beamish, 2003, 2005; Gupta & Govindarajan, 2000; Hennart & Park, 1994; Kobrin, 1991; Kotha & Nair, 1995; Lu & Beamish, 2001; Wiersema & Bowen, 2008), and articles from JIBS (Allen & Pantzalis, 1996; Erramilli, Agarwal, & Kim, 1997; Kim & Lyn, 1990; Kobrin, 1994; Kotabe, 1990; Kotabe, et al., 2002; Lee & Caves, 1998; Pan & Tse, 2000; Tan & Vertinsky, 1996). One of these articles went so far as to refer to the use of these proxies for these capabilities as “standard practice” (Delios & Beamish, 2001, p. 1032). Thus there is extensive precedent for using R&D intensity and advertising intensity as single-item proxies to represent a firm’s technological capabilities and marketing capabilities, respectively. That being said, however, both are single-item proxy measures for these capabilities that measure the relative degree of a key input resource to these capabilities without considering the effectiveness of how these resources are employed or the
resultant outcomes. Thus future research could focus on developing an improved multi-item construct for these capabilities.

Fourth, it might also be argued that my controlling for industry type at the SIC code division level is a limitation. Prior research that has examined firm performance and internationalization has frequently controlled for industry effects through the use of dummy variables. A number of studies have used from one to three dummy variables to identify industry groups based on the SIC divisions, groupings of two-digit SIC codes, or analogous categorization approaches (Brouthers, 2002; Brouthers, Mukhopadhyay, et al., 2009; Brouthers, Nakos, et al., 2009; Zimmerman, Barsky, & Brouthers, 2009). Other studies have used from four to six dummy variables to identify industry groups based on two-digit SIC codes (Geringer, et al., 2000; Ruigrok, et al., 2007). In the most granular examples that I found, studies used from eleven to twelve dummy variables to identify industry groups based on two-digit and four-digit SIC codes (Jung, et al., 2010; Kotabe, et al., 2002). Excluding the SIC code division for public administration (which does not apply to this research), there are nine remaining identified divisions in the SIC code structure, each of which encompasses several two-digit SIC code categories. Since several of these divisions had only a few firms in my sample, I combined these categories such that I ultimately used two dummy variables that categorized firms as manufacturing, services, or other. Additionally, controlling for industry at the two-digit SIC code was not feasible for this sample of 222 firms since this sample contained firms from over 40 unique two-digit SIC codes. Thus considering my sample’s characteristics in light of prior research suggested that using the SIC code divisions was the appropriate choice for controlling for industry type.
Fifth, this is a cross-sectional study as opposed to a longitudinal study. As such, it compares the relative levels of firm capabilities (measured by related proxies) with firm globalization and firm performance during a common time frame (in this case the average for the period 2007 through 2010). Such a cross-sectional study cannot, however, examine whether the accumulation of knowledge to develop these capabilities has a leading or lagging relationship with regard to firm globalization or whether the globalization of a firm has a leading or lagging relationship with regard to firm performance. Given the long-term, iterative process typically required for a firm to become a global firm, future research could also perform a longitudinal analysis of the antecedents and consequences of firm globalization that examines leading and lagging relationships between the constructs.

Finally, taking advantage of DOG, my new measure of firm globalization that provides a continuous ratio variable that can be calculated for more firms (Marshall, 2012), my research represents a beginning of the examination of the antecedents of firm globalization. The consequences of firm globalization, including the impact on firm performance, remain an open and unanswered question. Thus this research opens a broad, new field for future research that also offers the potential for significant managerial implications. By engaging in these and other future studies, scholarship will better understand this new measure of globalization, DOG.
REFERENCES


