

Internationalization of Small and Medium Sized Enterprises and Longevity

A Study of SMEs from Software Publishing Services Industry

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DEDICATIONS

To my Parents

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ABSTRACT

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Internationalization of small and medium sized enterprises (SMEs) is an increasingly important area in international business research. One of the important discussions in internationalization of SMEs is relationship between internationalization and performance. A considerable amount of literature has been published on this relationship. Performance measures in these studies often include profitability, organization growth and competitiveness. So far, however, there has been little discussion about link between internationalization and longevity or survival of SMEs. Longevity as a measure of performance of internationalization of SMEs combined with other performance measures would give added understanding of internationalization of SMEs. The main purpose of this study, therefore, is to discover relationship between SMEs' internationalization and their longevity.

Despite their inherent vulnerabilities and heightened risks they face during their internationalization, SMEs continue internationalizing. Resource based view theories, location advantage theories and liabilities of foreignness theories can justify this counterintuitive behavior. SMEs' ability to reap benefits of internationalization using their resources and location advantages improve longevity. Internationalization risks SMEs face are for short period and after these short-term hurdles, liabilities of foreignness decrease, benefits of internationalization outweigh risks and chances of longer survival improve. This study proposes that, all else being equal, internationalization has positive impact on longevity.

This study focuses on SMEs from software publishing service industry. The study sample includes 67 USA based active and inactive small and medium sized software firms (SMSFs) existed between 1984 and 2013. Mean, Variation and Trend of degree of internationalization are related to number of years of firms' existence using multivariate linear regression methodology. This study finds that size of internationalization alone does not have significant impact on longevity of SMSFs. Variation in level of internationalization has significant positive impact on longevity. Considering variations in level of internationalization as result of firms' pro-active strategic actions, this study suggests that strategic variation rather than the level of internationalization help to improve longevity of SMSFs. This research also finds evidence that short-lived SMSFs spent more on R&D and acquired more assets when compared with long-lived SMSFs and SMSFs improved longevity through mergers and acquisitions.

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I INTRODUCTION

Small and Medium-sized Enterprises (SMEs) play important role in world economy. They provide high contribution to employment, productivity and innovation. A report by World Bank's International Finance Corporation states that about 90 percent of world business is of SMEs. The report also says that SMEs account for more than 50 percent of employment worldwide (International Finance Corporation, 2013). Though the share of international SMEs (ISMES) in total number of SMEs is less, they are increasingly internationalizing. Most SMEs are trying to take advantage of opportunities presented by rapid globalization of economies around the world. Besides international opportunities, heightened international competitions in home country also force SMEs to play a role in international markets. For both manufacturing and services SMEs, it is compulsory they involve in global business. SMEs' inherent vulnerabilities because of their smaller size enlarge the issues they face in their internationalization. The impediments international SMEs face are because of liabilities of foreignness, liabilities of newness and liabilities of smallness SMEs face in foreign markets. Liabilities of foreignness are all costs that foreign firms incur, which local firms do not incur (Zaheer, 1995). The risks of these liabilities have high impact on SMEs than on larger firms. In addition, SMEs are vulnerable domestically since they have lower market power and lesser ability to attract financing. Local business and internationalization risks that may

lessen the chances of survival do not deter SMEs from internationalization. Reports suggest there is greater international involvement by SMEs than often assumed (ACCA, 2013; European Commission, 2010).

This counterintuitive behavior of the SMEs suggests that SMEs expect higher prospects of longer survival period when they internationalize. Unlike larger firms, SMEs' have higher priority of building the business than achieving higher performance. For SMEs, internationalization is a way for ensuring longer period of survival as internationalization provides possibilities of market expansion and improved productivity. In addition, since international SMEs, in general, are high growth and innovative firms, their innovation abilities and experience built-up by their continued well-managed internationalization would reduce the risks over long run. When benefits of internationalization outweigh costs of liabilities of foreignness, liabilities of newness and liabilities of smallness, SMEs' vulnerabilities lessen. This in turn virtuously leads to longer period of survival of SMEs. Longer survival possibilities credited to internationalization motivates SMEs to internationalize despite their magnified risks they face during early internationalization.

This study analyzes this relationship between longevity and degree of internationalization of SMEs. This research, therefore, examines longevity of international SMEs from software publishing service industry and tries to establish a relationship between degree of internationalization and number of years of survival of Small and Medium-Sized Software Firms (SMSFs). Firm level characteristics and other

internationalization factors can also influence longevity of SMEs. Therefore, this research additionally analyzes relationship between longevity and other determinants of longevity of SMEs. Other factors of internationalization include international market size, number of countries of internationalization. Firm level characteristics include firm size and firms' innovativeness that influence longevity.

Before stating the research questions, since this research focuses on SMEs from software publishing service industry, it is worthwhile to mention the reasons for considering this industry. Software publishing industry is a service industry. It comprises of firms that design, develop and market or publish computer software programs for businesses and consumers and provide pre-sales and post-sales support for software. For example, Microsoft, Oracle and IBM are some of the larger software publishing companies. Firms of such larger size have financial and other resources to handle risks associated with internationalization. When compared with larger firms, small and medium sized software firms are new. They lack resource power and management experience to handle internationalization issues. Because of these, they usually live through the impacts of the risks of liabilities of foreignness, liabilities of newness and liabilities of smallness. They build market knowledge by experience by suitably adjusting degree of internationalization (J. Johanson & Vahlne, 1977; J. Johanson & Vahlne, 2009). Software publishing companies are dynamic in the sense that they are innovative and trendy – addressing latest and immediate needs of customers. Software publishing firms produce products of shorter life. Firms of these characteristics

would be a good population of firms that would have higher dynamics of international investments and would have wide range of survival periods.

Given the research context discussed above, the following research questions are stated. Does internationalization have influence on the longevity of the small and medium sized firms? What are the internationalization and firm characteristics that influence longevity of small and medium sized firms? The reason and importance of this research are discussed below.

First, the behavior of SMEs' involvement in international business despite survival threatening internationalization risks they face is counterintuitive. Larger multinational enterprises enjoy various internationalization benefits such as higher profitability, efficiency improvements and risk diversification. Like larger firms, SMEs can also achieve these benefits of internationalization and therefore can improve their chances of survival. However, besides performance, longevity is another major concern for SMEs. Even with poor financial results, firms can exist for longer period by capitalizing on their other strengths. Information about odds of survival irrespective of the financial performance would be valuable for SMEs. In addition, since survival is a precondition of financial performance, long-term survival becomes one of the critical business objectives of SMEs.

Second, international business research has not yet fully explored the link between internationalization and longevity of SMEs. Even though there is some research

linking internationalization and odds of survival (H. Lee, Kelley, Lee, & Lee, 2012; Mudambi & Zahra, 2007), there is less understanding of whether internationalization increases or decreases longevity of SMEs. Traditionally, international business research has focused on internationalization of larger multinational enterprises. Existing international business literature on SMEs has evidence of relationship between various internationalization factors and performances. Those performance measures include measures of financial profitability, competitiveness, resource strength, strength of relationship in networks and partnerships and similar measures (Beamish & Lee, 2003; Beamish & Lee, 2003; Hoffmann & Schlosser, 2001; Knight, 2001; Kundu & Katz, 2003; Lu & Beamish, 2001; Lu & Beamish, 2006). Research that includes longevity, as a measure of internationalization performance is less. For SMEs, assessing financial performance alone may not accurately capture their internationalization behavior. SMEs face higher uncertainties and have tremendous pressure to survive. SMEs will invest heavily to building business first and then focus on higher profitability. SMEs have larger incubation period in achieving a satisfactory return on investment. Therefore, profitability-based performance may not provide adequate information about internationalization performance for SMEs (Mudambi & Zahra, 2007). Thus, finding relationship between longevity and internationalization would provide added insight to the internationalization behavior of SMEs

Third, the evidence on relationship between longevity and internationalization and other factors of internationalization would be useful for policy makers, managers and international business researchers. Policy makers can use this research evidence to

support consideration of longevity of SMEs while planning domestic incentive programs to support internationalization of SMEs. Managers can use this information to decide about the degree of international involvement and researcher can do further research on identifying other ways to lengthen longevity of SMEs through internationalization.

Finally, this research is also one of first few that studies link between longevity and internationalization of SMEs. Results of this research with existing international business literature on financial performance and internationalization of SMEs can enrich literature on behavior of SMEs in conducting internationalization business. Results of this research would also add more insight into analyzing the survival possibilities at a point of time in firms' life since longevity research result may give clear evidence for investment adjustment to increase longevity. Therefore, this research on longevity and internationalization of SMEs will be a valuable contribution to international business literature.

Contribution of this study is organized in seven chapters including this introductory chapter. Chapter II begins with theories of internationalization of SMEs and impediments they face in their internationalization process. Then, internationalization of software firms is briefly discussed using existing literature on small and medium sized software firms. Chapter III, in which related literature review and hypotheses for research questions concerning relationship between longevity and internationalization follows this. Chapter IV is concerned with the methodology used for this study that includes discussion of models, statistical procedures and descriptions of data and sample.

Chapter V presents results of estimation of various models followed by Chapter VI where discussions of these results are presented. Finally, conclusion in chapter VII gives brief summary of this research, implications of the findings and identification of areas of future research.

II LITERATURE REVIEW

INTERNATIONALIZATION OF SMEs

SMEs, in the past internationalized mostly through exports and only to the developed countries (Fujita, 1995a; Fujita, 1995b). Recently, SMEs are increasingly exploring possibilities of internationalization in developing countries. This recent behavior of SMEs in internationalization process can be attributed to several facts. Institutional changes in many countries reduced uncertainties and lessened risks. Forces of globalization homogenized world markets, which creates market opportunities. In addition, integration of world financial markets enables SMEs to source capital globally. Similar to larger multinational enterprises, transaction cost economies (TCE), ownership and location advantages drive internationalization of SMEs. Transaction cost is a major issue that affects internationalization of SMEs. When compared with larger firms, resource constraints and smaller size of SMEs worsen the issues of transaction costs. Globalization, its resultant socio economic changes, homogenization of markets, information and communication technology (ICT) developments, and management's international business experience all favorably moderate TCE issues faced by SMEs. On the other hand, these environmental changes also pose threats that can be reason for

changed SMEs' behavior. In today's globalized environment, international competition in home country, force SMEs to take part in international business (Tanganelli & Schaan, 2011).

Majority of SMEs involve in internationalization through exports because of lower risks, lower resource requirements and possibilities of operational flexibilities in exports (Leonidou & Katsikeas, 1996). The share of multinational SMEs (MSMEs) – the SMEs that have at least one affiliate in foreign country – is small when compared with share of large MNEs (OECD, 2004; US International Trade Commission, 2010a). Even though there are extensive studies on entrepreneurship and SMEs in business literature, studies on SMEs' involvement in international business is less. This may be due to SMEs' less intensive international involvement. Alternatively, researchers may view that SMEs show similar characteristics as larger MNEs and the existing international business theories are applicable to SMEs too. Most of the existing literature asserts this view. However, technological advances and SME specific characteristics endow SMEs' ownership and internationalization advantages differently. Following sections give a brief survey of existing research on international SMEs.

A. DRIVERS AND MOTIVATIONS

The drivers for SMEs' internationalization are similar to those of larger firms. The research on SMEs to a large extent conforms to Dunning's OLI paradigm. O-advantages are the main drivers of internationalization of SMEs. While for large firms,

the knowledge base of O-advantage is from incremental innovation, it is from far-reaching innovations for SMEs. L-advantages are relevant but O-advantages are dominant in driving internationalization of SMEs (Hollenstein, 2005). Tacit skill such as management's international experience also plays a role in driving internationalization of SMEs (Oviatt & McDougall, 1994; Reuber & Fischer, 1997). Not just one factor influence SMEs' decision to internationalize. Firm specific situations and combination of multiple factors motivate SMEs to internationalize (Rundh, 2001). Market seeking and management control influence IJVs. Resource acquisition and need to control resources are the most important motives behind wholly owned subsidiary mode of entry of SMEs (Nisar, Boateng, Wu, & Leung, 2012). SMEs also internationalize to overcome the trade barriers (Millington & Bayliss, 1995).

B. STRATEGIES AND ENTRY MODES

A quantitative research to determine SMEs' internationalization patterns shows there are three internationalization patterns (Olejnik & Swoboda, 2012). The internationalization patterns found by mentioned research are traditional, born-global and born-again global. This research also says that SMEs' international orientations, growth orientations, capabilities such as communication capability and intelligence generation capability and market mix standardization determine these patterns of internationalization of SMEs (Olejnik & Swoboda, 2012). A study by Hagen, Zucchella, Cerchiello, & De Giovanni finds four broad types of strategic types of international SMEs (2012). They

are entrepreneurial and growth oriented SMEs, customer oriented SMEs, product oriented SMEs and those SMEs that lack strategic orientations.

Traditionally, exporting is the most widely used form of international strategy by SMEs. This is because, when compared with other modes of internationalization, exporting has low risk and requires lower resources. Exporting also provides possibilities of operational flexibilities (Leonidou & Katsikeas, 1996). One of the earliest researches on the SMEs' international involvement suggests that SMEs internationalize in stages in exporting. SMEs at first export to countries those are psychologically closer. As they gain experience, they start exporting to other countries that are psychologically farther (Bilkey & Tesar, 1977). To contrast this view, other research shows that this stages model of internationalization is not uniformly applicable to all industries of SMEs. For example, a research on internationalization of SMEs from software publishing industry shows the internationalization is not "psychic distance based" and these firms do not follow incremental or stages model (Bell, 1995).

SMEs internationalize by collaborative arrangements as well. These arrangements include strategies such as Strategic Alliances (SAs) and International Joint Ventures (IJVs). According to Tony O'Reilly, the CEO of H.J. Heinz, IJVs with host country partners are the best vehicle for SMEs. IJVs spread costs and provide needed expertise (Barret, 1992). With IJVs, SMEs can reduce the problems of host country institutional and cultural barriers; can share the financial burden; and since partners could handle host country related problems, SMEs can focus on domestic problems (Barret,

1992). SMEs use IJV mode of entry when they enter countries of high uncertainties such as developing countries (Fujita, 1995a; Fujita, 1995b). Larger firms internationalize by IJVs to pool resources and to reap benefits of economies of scale advantages – vertical integration approach. On the other hand, SMEs take IJVs to penetrate specific national market through product exploitation – horizontal integration approach (Millington & Bayliss, 1995). Though alliances and partnerships provide certain advantages to SMEs, they also have some disadvantages. For example, partners jockeying for control, partners' hidden agenda and poorly defined purpose of partnerships would affect SMEs negatively (Barret, 1992). However, there is evidence from research that SMEs with higher relative importance of investments and more number of employees can acquire dominant share in the partnership (Tanganelli & Schaan, 2011). For SMEs, the success of alliances depends on structural and cultural fit, previous partner knowledge, international experience and previous investments (Swoboda, Meierer, Foscht, & Morschett, 2011). Size of ownership, partner's dominant participation, and host country experience influence profitability and longevity of alliances. Lu and Beamish on a study of the performance implications of host country knowledge and size-based resources contributed by IJV partners of Japanese SMEs show that IJVs with local partners may have associated with decreased longevity of partnership especially when SMEs gain host country knowledge (2006). The authors also find that host country experience of Japanese partners does not have any effect on IJV profitability; size of IJV increases longevity of partnership but has negative effective on profitability when size of Japanese SMEs is more and they have low equity ownership (Lu & Beamish, 2006).

Other alliance based entry modes used by SMEs include outsourcing and co-opetition. A research on SMEs' outsourcing of administrative and technical activities shows that offshore outsourcing enables international competitiveness by reducing cost, expanding relational ties, serving customers more effectively, using resources efficiently and improving ability to leverage skills of foreign partners (Di Gregorio, Musteen, & Thomas, 2008). In addition, Kock, Nisuls, & Söderqvist, from multiple case analyses find evidence for co-opetition providing international opportunities for analyzed companies (2010). The authors also point out that SMEs show all three types of co-opetition namely, equal competition and cooperation, strong cooperation and weak cooperation.

C. ENTREPRENEURSHIP VIEW OF INTERNATIONAL SMEs

Entrepreneurial activities usually originate from firms of relatively smaller sizes. International entrepreneurship theories of SMEs are cross sections of entrepreneurship theories about investigation of cross border activities and international business researchers' investigation of SMEs (McDougall & Oviatt, 2000). Entrepreneurship view of SMEs considers internationalization activities of SMEs as proactive and risk taking initiatives by entrepreneurs to take their innovations to international level. In this view, internationalization of SMEs is not just for market expansion. It is also to acquire, organize and influence resources at global level to create value from their innovations. SMEs of certain industries such as SMEs from high-tech and high-growth industries go international with these motivations. They are global from inception or they become

global within three years of inception. Oviatt and Benjamin call these firms international new ventures (INV) (1994). These firms, from inception seek to achieve competitive advantage by deriving resources from or selling products to multiple countries. Moreover, they need not own foreign assets but strategic alliances may be arranged for resources. The authors further explain that born global start-ups especially from high-tech industries often raise capital, manufacture, and sell products on several countries (Oviatt & McDougall, 1994). Crick distinguishes between the terms INV and born-global by level of presence of the firms in the global context (2009). The author further says that even though there is no significant difference exists between these two types of firms, several years after internationalization took place, INVs have regional focus while born-global have global focus.

D. SOURCES OF COMPETITIVE ADVANTAGES

SMEs have limited resources and because of their smaller size, they cannot have scale advantages as an important advantage for internationalization justification. SMEs' competitive advantages stem from their proprietary technology, flexible management, organizational and marketing capabilities, reputation and supplier-customer relationships (Fujita, 1995b). Their internationalization success also depends on their ability to influence resources, reduce transaction costs and mitigate risks through partnerships and business networks (Oviatt & McDougall, 1994). Social capital business networks are also an important source of advantage (Pinho, 2011) especially for family owned SMEs. On the network based advantages, Zimmerman, Barsky and Brouthers say that strength of

the ties to international firms rather than the size of the networks significantly influence the decision to international diversification (2009). Family run SMEs that lack strong network ties find international opportunities reactively through weak ties set up during trade show participations (Kontinen & Ojala, 2011; Kontinen & Ojala, 2012).

E. INSTITUTIONS AND INTERNATIONAL SMEs

There is some research about link between local institutions and SMEs' internationalization even though the research on impact of host country institution on international SMEs is less. The local financial, educational and regulatory institutions influence entrepreneurial activities. Better local financial, educational institutions increase high growth entrepreneurial effort allocations (Bowen & De Clercq, 2007). While regulations do not have any influence on the entrepreneurial effort (Bowen & De Clercq, 2007) they do influence initial size and growth level of start-ups (Capelleras, Mole, Greene, & Storey, 2007). Capelleras, Mole, Greene and Storey empirically prove that with only registered SMEs, in highly regulated countries, initial size of start-ups are large and have slow growth; and in lightly regulated countries, initial size of start-ups are small and have higher subsequent growth rate (2007). Research also shows that SMEs, especially from high technology industries choose countries that have stronger IPR policies and the domestic regime bias moderates the decision to internationalize (Coeurderoy & Murray, 2008).

F. SMEs' INTERNATIONALIZATION AND PERFORMANCE

From international SMEs' performance perspective, research in general shows that international SMEs outperform non-international SMEs (Fujita, 1995a). One reason for this difference is that international SMEs differ with non-international SMEs in international entrepreneurship and innovation intensity. International SMEs usually take organizational innovations to a greater level than non-international SMEs do (O'Cass & Weerawardena, 2009). Other factors influencing international SMEs performance include firm size, resource availability and ability to make use of extraordinary business opportunities. For example, some European SMEs experienced hyper growth because of extraordinary business opportunities and extraordinary access to resources, especially knowledge-based resources (Cassia & Minola, 2012). Knight argues that international entrepreneurial orientation also indirectly improves overall performance since international entrepreneurial orientation promotes developing internationalization preparation and strategic competence (2001). The level of foreign market knowledge also influences the performance. As SMEs undertake different entry modes in foreign markets, tacit knowledge about foreign markets gained through experience also improves performance (Mogos Descotes & Walliser, 2010).

As evidenced with larger MNEs, empirical studies on international performance with internationalization of SMEs also show mixed results. However, in general, SMEs' international performance has positive relationship with internationalization. Lu and Beamish in their study on the joint effect of SMEs' export and FDI on performance find

evidence for positive relationship between FDI level and performance (2001). These authors also point out that higher levels of export concurrent with FDI reduce the performance. In Korean IJVs, degree of control exercised by parent SMEs and exporting levels significantly determine performance of affiliates of SMEs (Beamish & Lee, 2003). Pinho, in his research on link between social capital characteristics and dynamic capabilities shows that social capital by network relationships can give access to knowledge and therefore can positively influence international performance of SMEs (2011). A research on the relationship between profitability and international diversification strategies of Spanish SMEs evidenced a negative relationship between profitability and internationalization strategies (Muñoz-Bullón & Sanchez-Bueno, 2011). There also exists a non-linear relationship between international performance and international R&D investment in a research on regional orientation of R&D investment and performance of Korean international SMEs (I. H. Lee & Marvel, 2009).

BARRIERS TO INTERNATIONALIZATION OF SMEs

SMEs face several barriers to internationalization. Even though, the barriers faced by SMEs are same as those faced by larger firms, resource constraints inherent to SMEs amplify the impact of these barriers. Therefore, SMEs behave differently than the behavior expected of from larger firms. Barriers to SMEs' internationalization can be internal to the firms or from external environment. Internal barriers rise from limits on SMEs' resources and their ability to handle internationalization issues. External barriers are because of constraints in home-country and host-country business environments such

as socio economic conditions, political conditions, laws and regulations and market conditions.

Most of the barriers and impediments that SMEs face originate from nations institutions, infrastructure and economic conditions (OECD, 2004; OECD, 2009; OECD, 2013). The barriers and impediments affect SMEs disproportionately when compared with larger MNEs (US International Trade Commission, 2010b). Literature identifies following barriers to SMEs international initiatives. Domestic barriers include access to finance; certain local government regulations such as export controls; high transport costs and SMEs' smaller size. Barriers posed by foreign country environment include government regulations; difficulties in acquiring knowledge about foreign markets; and language and cultural differences.

US International Trade Commission states that service SMEs ranked, "insufficient intellectual property protection", "foreign taxation", and "obtaining financing" higher burdensome than larger firms did. Manufacturing SMEs ranked "inability to find foreign partners", "difficulty receiving or processing payments" and "high tariffs" higher burdensome than larger firms did. In addition, when compared with manufacturing SMEs, higher proportions of service SMEs have marked that "language and cultural barriers" have been burdensome impediments (US International Trade Commission, 2010b). Intensive information flow, customization needs of software products, and location needs and requirements of international software markets are some of the barriers specific to software publishing industry (Ojala & Tyrväinen, 2007). Domestic

barriers such as export control may restrict software publishing service firms selling their products, which may include modules of national security concern. While larger firms can expend resources on lobbying with government with issues of export controls, SMEs adjust their internationalization strategies. The costs of understanding and complying with foreign government regulations can be substantial to SMEs when compared with larger firms.

SMEs' INTERNATIONALIZATION AND SURVIVAL

As of this study, although considerable amount of research exists on SMEs, none discusses about relationship between internationalization and longevity of SMEs. However, there are few studies on relationship between internationalization and SMEs' survival possibilities. Basis for these studies is that while SMEs face costs of foreignness and newness that increase risks and reduce their chances of survival, internationalization and firms' strategies reduce these risks and improve the odds of survival. According to a recent study on 1612 Korean SMEs, SMEs' survival prospects are positively associated with sales internationalization and R&D alliances. The study also shows that R&D intensity moderates internationalization – survival relationship (H. Lee et al., 2012). Another study of 275 UK based INVs compares odds of survival of INVs with that of firms that sequentially internationalized. Results of this study suggest, not considering the mode of entry of internationalization, INVs have lower probability of survival. The study also says that with consideration of FDI strategies of other established firms, INVs have the same probability of survival (Mudambi & Zahra, 2007).

INTERNATIONALIZATION OF SOFTWARE FIRMS

Global software industry is highly potent and fast growing industry. A Gartner's industry report shows that annual spending on enterprise software in 2012 is about \$300 billion globally. Another report by Hoovers' suggests that global software market had total revenue of \$292.9 billion in 2011; experienced an annual growth rate of 3.6 percent between 2007 and 2011 and the global software market will experience a growth rate of 6.3 percent in the future into 2016. In the spring 2013, there are over 166 thousands software companies (operating in NAICs industry code 511210: Software publishers) worldwide. Out of these companies, roughly 132 thousands firms are small and medium sized (with number of employees less than or equal to 500). In other words, roughly 80 percent of the software companies in the world are SMEs.

Software publishing industry SMEs create value through innovative products of proprietary, copyrighted software programs. Their growth, performance, productivity and even their own existence depend on how well they are familiar to host country market. Familiarity of the SMEs in a host country influences liabilities of newness, foreignness and smallness. Larger software firms have resources to handle issues related to liabilities of foreignness and liabilities of newness. Small and medium sized software-publishing firms' limited resources, experience and management skills inhibit them from addressing issues of these liabilities. Risks associated with these liabilities severely affect internationalization of software publishing service firms. However, as SMEs

continue investing more in foreign countries, they accumulate market knowledge, gain acceptance from host country buyers. Acceptance of SMEs in host country market reduces liabilities of foreignness and newness.

Technology advancements help SMEs reducing liabilities of smallness. Liabilities of smallness are all costs that SMEs incur because of their smaller size that their larger competitors do not. Internet and other telecommunication advancements enabled software-publishing firms to deliver their products to customers at lowest costs. These international SMEs can reach any customer of any language and culture from any part of the world to deliver their products through advanced electronic media.

A. CHARACTERISTICS OF SOFTWARE FIRMS

Software industry is a high technology service industry and comprises of software firms that develop and publish computer software products and provide software services for consumers and businesses. Computer software products can be packaged software products such as operating system software, application software or customized software programming. Packaged software products are generally software programs that customers can install by themselves with no or little support. Custom programming can be a newly created software program for a specific application or customer or can be a standard product customized for specific needs. The software industry, a high competitive industry, faces intense competition in global markets. It is an industry of high knowledge intensity with high rate of product and process innovation. Software

industry products are intangible in nature and have short product and technology life cycles (S. Li, Shang, & Slaughter, 2010; Nambisan, 2002). Shorter software product life that is result of rapid changes in technology and market demand requires software companies to introduce new products at high frequency. As mentioned in the business literature, for most of the high technology industries such as software industries, innovation and knowledge creation are primary forces to drive growth. Similarly, software-publishing companies derive their competitiveness through their technical capabilities and marketing skills. Small software companies mainly focus on small niche markets and provide packaged products or produce custom products for individuals and businesses.

B. MARKET ENTRY

Literature on internationalization of software industry firms is limited, especially for small and medium sized firms. Existing literature on internationalization of small and medium sized software firms show that network relationship they form through agents and distributors significantly influence their internationalization entry decision (Coviello & Munro, 1997; Zain & Ng, 2006). They use different entry forms in different countries and even multiple entry forms in the same country depending on various choices provided by the network relationships they established (Moen, Gavlen, & Endresen, 2004). Small and medium sized software firms also show evidence for rapid internationalization, that is, they internationalize in different ways than manufacturing firms do in a short period (Bell, Crick, & Young, 2004). Even though small and medium

sized software firms internationalized in sequential approach, psychic distance is not the basis for the sequencing. For example, Ojala says that, the eight Finland based small and medium sized software companies they surveyed directly entered Japan market at their earlier stages of internationalization; and handled psychic distance issues by hiring local employees or western managers who had working experience in Japan (2008). Other studies also show that software firms internationalized incrementally in an accelerated fashion and there was no experimental or trial stage (Coviello & Munro, 1997; Zain & Ng, 2006). Some research show evidence for externalizing through network relationships because of the firms' resource limitation in forming their own subsidiaries (Coviello & Munro, 1997; Zain & Ng, 2006). As per Moen et al., even though firms entered through different entry forms, all of them for exports mode only. There was no clear-cut distinction among these entry forms. They were all agents or distributors (2004). On the driving forces of internationalization of small and medium software firms, research shows that market size is the best indicator of the entry decision. Experience of the firms does not have any relationship with market entry decision (Moen et al., 2004; Ojala & Tyrväinen, 2008).

C. ENTRY BARRIERS

Even though advancements in ICT lessened entry barriers for small and medium sized companies especially for the software companies, they still face problems that are specific to firms and are different from the barriers faced by the larger firms. Ojala & Tyrväinen mention that firm specific barriers are related to their resources and

capabilities to operate in a market (2007). The authors also point out that common entry barriers faced by small and medium sized software companies are because of intensive knowledge information flow needed for customization and localization needs and marketing requirements of the software products.

Piracy is another major entry barrier faced by small and medium sized software firms. Piracy is an illegal act of copying software product for any non-backup reasons without explicit permission from and compensation to the copyright holder. Piracy significantly affects firms in achieving return for their innovations. Piracy rate – percentage of illegal uses of computer software – globally is 42 percent and the total revenue loss of global software companies because of the piracy is \$63.4 billion in 2011. Software companies have an option of implementing piracy prevention measures such as encryption, watermarks and special hardware in their products. However, these prevention controls are not usually efficient. Research shows that having prevention control in software products actually drains the revenue. Only deterrent controls such as governments' IPR violations laws and regulations reduce piracy as well as improve profitability (Gopal & Sanders, 1998; Gopal & Sanders, 2000).

III HYPOTHESIS DEVELOPMENT

Using the above-discussed literature on internationalization of SMEs, this study states the following hypotheses for SMSFs.

SMEs internationalize to expand into international market and improve efficiency of operations. SMEs take sales internationalization by various methods such as direct export, sales through value added retailers (VARs) and sales through firms' own sales subsidiaries. Operations internationalization methods that reduce costs and improve efficiency may include outsourcing of value chain activities, IJVs and other collaborative arrangements for production and R&D. Sale's internationalization improves financial and other resource conditions. Operations internationalization improves firms' competitive advantage through market knowledge, scale economies and lower cost of production. International business literature has evidence for higher internationalization reducing market uncertainties faced by international firms. For example, Johanson & Vahlne say that as firms increase foreign investment, they gain market knowledge. Higher market knowledge helps firms perceive reduced uncertainties and lower chances of losses. When firms' perceived risk falls below their tolerable risk level, they invest further (2009). Further increase in foreign involvement by sales internationalization and/or by operations internationalization further improves resources, capabilities and

competitiveness. Therefore, SMEs with higher internationalization strongly position themselves to handle future risks and to take advantage of future opportunities earlier than competitors can. This ability gained through higher level of international involvement leads to longer period of survival of SMEs.

Hypothesis 1a

The duration of survival of SMEs is positively related to the level of sales internationalization

Hypothesis 2a

The duration of survival of SMEs is positively related to the level of operations internationalization

SMEs face different risks and opportunities because of changing internal and external environmental conditions with limited resources and capabilities (ACCA, 2013). SMEs react to these changes by pro-actively adjusting level of international involvement according to the opportunities available and risks they perceive. When there are higher risks of losses, multinational firms reduce internationalization to preserve financial resources for future opportunities and even for their survival. When foreign opportunities – both market expansion opportunities and efficiency improvement opportunities – are higher, multinational firms may increase their international investment depending on their resource strength. Well-managed firms that adjust investments strategically, pro-actively in this manner, preserve resources, improve competitiveness and experience

improved growth (Mudambi & Swift, 2011). Such SMEs can survive for longer period than those SMEs that passively manage investments with less change in the degree of international involvement. Therefore, SMEs that show higher variations in size of foreign investment will be in operation for longer period when compared with SMEs that show less variation in their foreign investment size because of reasons such as resource constraints or poor management.

Hypothesis 1b

The duration of survival of SMEs is positively related to variation in the level of sales internationalization

Hypothesis 2b

The duration of survival of SMEs is positively related to variation in the level of operations internationalization

Firms internationalize to different countries wherever opportunities are higher and risks are lower to expand into high potential markets and to reduce operations costs. SMEs also internationalize to multiple countries to diversify risk. International business research suggests that foreign direct investment can be a risk diversification vehicle as well. Investing in lower risk country reduces systematic risk faced by multinational firms (Fatemi, 1984; Reeb, Kwok, & Baek, 1998; Rugman, 1976; Shaked, 1986). Worldwide market expansion, cost reduction and risk diversification improve financial strength and firms' growth. Therefore, SMEs operating in many countries can have longer life when

compared with SMEs operating in less number of countries. However, if SMEs concentrate their investment in countries from high uncertainty region such as Asia, they may face higher risks. Higher risks would lead to negative internationalization performance that may threaten existence of SMEs. On the other hand, SMEs' investment concentration in low risk region such as Europe would improve SMEs' risk diversification and profitability. This would result in longer life of SMEs. Upstream-downstream hypothesis of international business theory states that when firms form low risk countries internationalize in high-risk region countries, they experience higher systematic risk and vice versa (Kwok & Reeb, 2000). Therefore, for SMEs that have relatively higher investment in more number of high uncertainty countries, longevity of SMEs will be lower. On the other hand, SMEs that have relatively higher investment concentration in lower uncertainty countries will experience longer life.

Hypothesis 3a

The duration of survival of SMEs is positively related to total number of countries of internationalization

Hypothesis 3b

The duration of survival of SMEs is negatively related to number of high uncertainty countries of internationalization

Besides the internationalization factors discussed above, other firm level characteristics also influence longevity of SMEs. Theories of resource-based view

(RBV) of internationalization suggest that firms' internationalization is result of firms' valuable, rare, inimitable resources and their organization. The resources and capabilities are firm specific advantages of the firm. They include both tangible and intangible advantages such as adequate capital, R&D strength and technology know-how, managerial talents, brand image and reputation and so on (Peng, 2001). Firms that have higher of these valuable, rare and inimitable resources, internationalize more and reap benefits of internationalization and therefore the resource strength of firms influence the longevity of firms.

SMEs that have high-level of technological competence can introduce new products and improve competitive advantages. Ability to introduce new products through innovation deters competitors from imitating (Lu & Beamish, 2001; Mudambi & Zahra, 2007). Firms that have ability to introduce new products based on proprietary technology gain higher market share. Therefore, technological and innovative strength may enable SMEs to be in business for longer time.

Hypothesis 4

The duration of survival of SMEs is positively related to the level of technological competence of the SMEs

Larger size of SMEs suggests their resource strength and their ability to overcome issues and ability to make use of opportunities earlier or just in time when compared with their competitors. Size of the firm is also an indication to foreign customers about the

firm's capabilities and assurance to foreign customers that the firm will stay in business for longer time (Mudambi & Zahra, 2007). In short, larger firm size reduces the costs associated with liabilities of smallness – the costs incurred by SMEs because of their smaller size that their larger counterparts would not incur. Therefore, size of SMEs positively influences duration of survival of SMEs.

Hypothesis 5

The duration of survival of SMEs is positively related to the size of SMEs

Different mode of entries of internationalization has different levels of risks and costs. Research shows evidence that firms that take low risk and risk sharing entry modes such as wholly owned subsidiaries and exports have better possibility of reaping the benefits of internationalization (J. Li, 1995; Mudambi & Zahra, 2007). Firms that take mergers and acquisitions have risk of not achieving targeted results in time to avoid losses. These firms also have risk of incurring high integration costs. Hence, the firms that internationalize by mergers and acquisitions would have higher odds of failure.

Hypothesis 6

The duration of survival of SMEs is reduced when SMEs internationalize through acquisitions and mergers mode of entry

In addition to the resources and other competitiveness, experiential and tacit knowledge about internationalization is important to keep the firm alive for longer

period. Top management team of firms that has tacit knowledge of internationalization steers companies in right direction in response to risks and opportunities foreseen. More international business experience and tacit knowledge of handling internationalization issues also enable managers to foresee and estimate risks, identify opportunities well in advance and decide strategic actions (Mudambi & Zahra, 2007; Oviatt, McDougall, & Loper, 1995). Strategic decisions made in this manner can avoid firms from incurring existence-threatening losses. Therefore, SMEs that have top management team with managers with higher level of international business experience can survive longer than SMEs that do not have top management team with high international business experience.

Hypothesis 7

The duration of survival of SMEs is positively related to the level of international experience of management team

SMEs are generally resource constraint. They lack experience in running business. They lack marketing power to attract customers and attract business. They face hard time getting adequate financing in time. Local government guidance on conducting business globally, institutional support and government financial support enable SMEs to overcome these hurdles. SMEs that receive these support options from local government can handle critical business issues domestically and internationally and focus on major issues that threaten existence and opportunities that help to grow business. Therefore, SMEs that receives local government support have better chance of surviving

for longer period when compared with SMEs that do not receive, use, or have the local government support.

Hypothesis 8

The duration of survival of SMEs is positively related to the level of government support received

IV RESEARCH METHODOLOGY

In this research, the term small and medium sized software firm (SMSF) indicates software firm that has average number of employees equal to or fewer than 500. This definition is based on definition of SME used in various business research on the topics of SME internationalization (see for example: Cassia & Minola, 2012; Hagen et al., 2012; Kenny & Fahy, 2011; Kontinen & Ojala, 2012; Nisar et al., 2012; Olejnik & Swoboda, 2012). The reports on SMEs business trends also use this definition (OECD, 2004).

SAMPLE

To analyze the link between SMEs' internationalization and their longevity and test the hypotheses presented above, this study uses a sample comprising of small and medium sized software firms. A sample of software firms shows a varied range of level of internationalization and longevities. From market perspective, there can be two broad categories of software products namely (1) consumer software and (2) business to business software. From use perspective these types include both application software and systems software. Software firms are more dynamic in the sense that they change investment decisions often with survival as one of the primary concerns. Frequent

changes in investment decisions by software firms can be due to frequent changes in product requirements. Most of the software product categories such as general business productivity, home applications and gaming software products are pre-packaged software products. Both systems and applications software can be pre-packaged products. There are also software firms that produce customized software solutions according to special needs of their clients. These kinds of pre-packaged software products and customized solutions software have shorter life cycle because of customers changing needs. These are highly innovative technologies based and change or become obsolete quickly. They are also vulnerable to piracy. Language and culture affect these products directly and need frequent updates. Since all of these internal and external environmental causes influence software product requirements, software firms' investment decision change frequently. Since this research, aims to analyze impact of SMEs' internationalization on longevity, a sample comprising of firms with these high dynamic investment characteristics that have potential influence on the longevity would be more suitable. Therefore, this study analyzes a sample of small and medium sized public software firms that produce applications and systems software, both pre-packaged and customized, for both consumers and businesses. The sample consists of USA based public small and medium sized international software firms.

MODELS

The research method uses Multivariate Ordinary Least Squares (OLS) regression procedure to find evidence for significant relationship between SMSFs' longevity and

internationalization factors. Firms' internationalization can be in the form either sales in foreign countries and or in the form of extending their value chain activities through foreign investments. Therefore, this study uses two sets of models of OLS estimation for the analysis. First set of models is for sales internationalization. Second set of models is concerned with operations internationalization or international investments.

Longevity, YOF_AGE, is the dependent variable for both sets of models. Longevity is measured as the number of years SMSF existed or the number of years SMSF is in operation as on year 2013. For the firms that are not in operation by year 2013, year of end of life of the firm is the year when the firm filed for bankruptcy (USA: Chapter 7) or for liquidation (USA: Chapter 11). The dependent variable YOF_AGE is derived as given below

For in-active firms:

$$YOF_AGE = Firms' inactive year - Year of Founding$$

For active firms:

$$YOF_AGE = 2013 - Year of Founding$$

The independent variables for these models include level, variation and trend of degree of sales internationalization, degree of production internationalization and other variables that influence firms' survival. Longevity is a single point measure while other measures that influence longevity are available for multiple periods throughout the life of

a firm. Therefore, to relate single point measure of longevity with multiple point measures of internationalization over period of existence of the firms, this study uses generally used time series summarization approaches. To aggregate measure of internationalization over the period of existence of the firm, this study uses three methods of series summarization viz., (1) Average, (2) Variation and (3) Trend. As often used in existing international business literature about internationalization and performance (see, Sullivan, 1994) this research also uses FSTS (Foreign Sales to Total Sales) ratio and FATA (Foreign Assets to Total Assets) ratio as measures of degree of internationalization.

INDEPENDENT VARIABLES

A. PREDICTORS

First set of models relates firms' longevity with sales internationalization. According to hypotheses *Hypothesis 1a* and *Hypothesis 1b*, on average, firms with higher level of international involvement in the form of foreign sales stay in business for longer period when compared with the firms that have relatively lower level of international sales. For the model that uses the average as the summarization method, the predictor is average of annual FSTS of all years of existence of SMSF – AVG_FSTS. Average of the annual FSTS over the period of SMSFs' existence is cumulative average of FSTS over the period of SMSFs' existence. It is derived as given below.

$$AVG_FSTS = \sum_{y=Y_i}^{Y_e} \frac{FSTS_y}{Y_e - Y_i + 1}$$

(Eq1)

Where,

Y_i – The year of first valid data

Y_e – The year of end of life of the firm for non-active firms. For active firms, $Y_e = 2013$

To relate longevity with variations in the level of sales internationalization, the predictor is standard deviation of annual FSTS of all years of existence of SMSF – VAR_FSTS. Standard deviation as measure of the variation in the level of sales internationalization is derived as follows.

$$VAR_FSTS = \sqrt{\sum_{y=Y_i}^{Y_e} \frac{(FSTS_y - AVG_FSTS)^2}{Y_e - Y_i}}$$

(Eq2)

To relate longevity with trend of sales internationalization over period of SMSFs existence, the predictor, TREND_FSTS, the slope co-efficient of simple linear regression line derived using FSTS as regressand and time as the regressor is used. The trend of sales internationalization is calculated as follows.

$$TREND_FSTS = r \left(\frac{\sigma_{FSTS}}{\sigma_y} \right)$$

(Eq3)

Where,

σ_{FSTS} – Standard deviation of series of annual *FSTS* between Y_i and Y_e

σ_y – Standard deviation of series $y = \{Y_i, Y_{i+1}, \dots Y_e\}$

Y_i – The year of first valid data

Y_e – The year of end of life of the firm for non-active firms. For active firms, $Y_e = 2013$

r – Correlation coefficient between series *FSTS* and y

Second set of models is for analyzing relationship between longevity and operations internationalization. Hypotheses, *Hypothesis 2a* and *Hypothesis 2b* state that, on average, firms with higher level of foreign involvement in the form of extension of value chain activities through foreign investments survive for longer period when compared with firms that do not have higher level of foreign investments. For models with time series summarization using average, the predictor is average of annual FATA of all years of existence of SMSF – AVG_FATA. Average of the annual FATA over the period of SMSFs' existence is cumulative average of FATA over the period of SMSFs' existence. Derivation of average of FATA is similar to derivation of AVG_FSTS as given in equation (Eq1).

To relate longevity with variations in the level of foreign investments, the predictor is standard deviation of annual FATA of all years of existence of SMSF – VAR_FATA. Standard deviation as measure of the variation in the level of operation internationalization is derived as it is derived for sales internationalization as given by equation (Eq2).

To relate longevity with trend of operations internationalization over period of SMSFs existence, TREND_FATA, the slope co-efficient of simple linear regression line derived using FATA as regressand and time as the regressor, is used as predictor. The trend of operation internationalization is calculated as it is calculated for sales internationalization using equation (Eq3).

B. CONTROLS FOR MODELS USING AVERAGES AND VARIATIONS OF INTERNATIONALIZATION

Hypotheses, *Hypothesis 3* through *Hypothesis 8* describe other determinants of longevity of SMSFs. These determinants also represent control variables for the estimation models. The measure of number of countries of internationalization is the number of foreign countries where SMSFs have foreign subsidiaries (NFC). The number of high-risk countries where SMSFs have foreign subsidiaries (NHUFC) is another control variable. NHUFC is the subset of NFC. This variable represents the measure of concentration of internationalization in high uncertainty countries. To represent control for size of the firm, average of annual average number of employees of SMSF

(AVG_EMP) is used. To represent the technological capabilities of the firm, two measures are used. One is the number of USA patents the firm filed and approved over period of existence of the firm standardized by size of the firm (NPATINT_EMP). Another measure of technological capabilities is the average of R&D expenditure as percent of total sales over the life of firm (AVG_RND). To control for the capital raising capability of SMSF, as proxy variable, average of annual total asset over the period of existence of the firm is used (AVG_TA). Number of mergers and acquisitions by which the firm internationalized over the period of its existence, standardized by the firm's size represents measure for mode of entries (MNAINT_EMP). Average of number of years of experience of top management team's overall experience over the firm's life (AVG_TMTE) represents control for influence of top management experience on longevity. A dummy variable that indicates whether the sample firm used government aid is used as the control for government support (GOVAIDD). A value of one for this variable indicates that any SMSF received government support in the form of loan, subsidy or grant. A value of zero for this variable indicates the SMSF as a non-recipient of government monetary support during its lifetime. The amount of risk the firms take and growth opportunities the firms face influence longevity of the firms. Therefore, to control for the size of risks SMSFs take, a variable for average of annual debt ratio over the period of existence of the firm is used (AVG_DEBT). To control for the growth opportunities SMSFs experienced, average of market to book value ratio over the period of existence of the firm is used (AVG_MTB).

C. CONTROLS FOR MODELS USING TREND OF INTERNATIONALIZATION

Trend based control variable include TREND_TA, TREND_RND, TREND_MTB and TREND_DEBT. These trends are slope coefficients of simple linear regression line derived with the measures total assets, R&D intensity, market to book ratio and debt ratio respectively as regressand and year of data as the regressor. These trend values are calculated similar to slope co-efficient calculated for TREND_FSTS using equation (Eq3).

With the variables discussed above, to test the stated hypotheses for relationship between longevity as performance measure and level, variation and trend of sales internationalization the following statistical models are used.

$$YOF_AGE_i = \alpha_0 + \alpha_1 AVG_FSTS_i + \sum_{j=1}^m \alpha_{(1+j)}(X_j)_i + \varepsilon_i \quad (Eq4)$$

$$YOF_AGE_i = \alpha_0 + \alpha_1 VAR_FSTS_i + \sum_{j=1}^m \alpha_{(1+j)}(X_j)_i + \varepsilon_i \quad (Eq5)$$

$$YOF_AGE_i = \alpha_0 + \alpha_1 AVG_FSTS_i + \alpha_2 VAR_FSTS_i + \sum_{j=1}^m \alpha_{(2+j)}(X_j)_i + \varepsilon_i \quad (Eq6)$$

$$YOF_AGE_i = \alpha_0 + \alpha_1 TREND_FSTS_i + \sum_{j=1}^m \alpha_{(1+j)}(Z_j)_i + \varepsilon_i$$

(Eq7)

Where,

YOF_AGE = Number of years of existence of SMSF as of year 2013

AVG_FSTS = Average of annual FSTS over the period of existence of SMSF derived using equation (Eq1)

VAR_FSTS = Variation in annual FSTS over the period of existence of SMSF derived using equation (Eq2)

$TREND_FSTS$ = Trend of annual FSTS over the period of existence of SMSF derived using equation (Eq3)

$i = 1, 2, 3 \dots n$, the number of SMSFs in the sample

$j = 1, 2, 3 \dots m$, the number of control variables or other determinants of longevity from set X and Z given below

$$X \in \{AVG_EMP, AVG_TA, AVG_RND, AVG_MTB, \\ AVG_DEBT, MNAINT_EMP, PATINT_EMP, NFC, NHUFC\}$$

$$Z \in \{AVG_EMP, TREND_TA, TREND_RND, TREND_MTB, \\ TREND_DEBT, MNAINT_EMP, PATINT_EMP, NFC, NHUFC\}$$

ε = Regression error term

Similarly, specifications of the models for relationship between longevity and level, variation and trends of operations internationalization with above discussed variables to test above-mentioned hypotheses are as follows

$$YOF_AGE_i = \alpha_0 + \alpha_1 AVG_FATA_i + \sum_{j=1}^m \alpha_{(1+j)}(X_j)_i + \varepsilon_i \quad (Eq8)$$

$$YOF_AGE_i = \alpha_0 + \alpha_1 VAR_FATA_i + \sum_{j=1}^m \alpha_{(1+j)}(X_j)_i + \varepsilon_i \quad (Eq9)$$

$$YOF_AGE_i = \alpha_0 + \alpha_1 AVG_FATA_i + \alpha_2 VAR_FATA_i + \sum_{j=1}^m \alpha_{(2+j)}(X_j)_i + \varepsilon_i \quad (Eq10)$$

$$YOF_AGE_i = \alpha_0 + \alpha_1 TREND_FATA_i + \sum_{j=1}^m \alpha_{(1+j)}(Z_j)_i + \varepsilon_i \quad (Eq11)$$

Where,

YOF_AGE = Number of years of existence of SMSF as of year 2013

AVG_FATA = Average of annual FATA over the period of existence of SMSF derived using equation (Eq1)

VAR_FATA = Variation in annual FATA over the period of existence of SMSF derived using equation (Eq2)

$TREND_FATA$ = Trend of annual FATA over the period of existence of SMSF derived using equation (Eq3)

$i = 1, 2, 3 \dots n$, the number of SMSFs in the sample

$j = 1, 2, 3 \dots m$, the number of control variables or other determinants of longevity from set X and Z given below

$$X \in \left\{ \begin{array}{c} AVG_EMP, AVG_TA, AVG_RND, AVG_MTB, \\ AVG_DEBT, MNAINT_EMP, PATINT_EMP, NFC, NHUFC \end{array} \right\}$$

$$Z \in \left\{ \begin{array}{c} AVG_EMP, TREND_TA, TREND_RND, TREND_MTB, \\ TREND_DEBT, MNAINT_EMP, PATINT_EMP, NFC, NHUFC \end{array} \right\}$$

ε = Regression error term

DATA

Data for the model variables were collected from different sources. The data sources are Worldscope database from Datastream, Mergent Online company database, A.M.Best country risk tier raking, SEC company filings and Company archives and websites. For all SMSFs, only post IPO data were considered for estimation of models. All financial information that is available after IPO of the sample firms was retrieved from Worldscope database. Initially data were retrieved for all USA based active and inactive software firms. Datastream sector “Software and Computer Services” was used as filter to obtain a list of 2468 active and inactive firms as on year 2013. This

Datastream sector is equivalent to SIC industry code 7372 (Software publishers) and 737x (Computer services related). Descriptive data and yearly numerical data were retrieved for the period of 30 years between years 1984 and 2013 (Inclusive). Yearly numerical data retrieved include (1) FSTS – Foreign Sales to Total Sales ratio, (2) FATA – Foreign assets to Total Assets ratio, (3) Total Assets (4) R&D to Sales ratio, (5) Debt ratio (Total Debt to Total assets ratio), (6) Market to Book value ratio and (7) Average number of employees. Descriptive data retrieved include (1) Company status, which says whether the firm is Active or Inactive as on year 2013, (2) Year the firm became inactive and (3) Reason for the firm becoming inactive that says the reason for delisting such as Bankruptcy, Merged, and Acquired and so on.

Since the research focus is on SMSFs, the sample was adjusted to have only those firms that have an average of 500 or fewer employees. The resultant, adjusted sample consisted of approximately 400 SMSFs. Longevity of SMSFs that were targets of mergers and acquisitions might be influenced by characteristics and factors of parent firms. Therefore, the sample was further adjusted to have only those SMSFs that were delisted for reasons other than mergers and acquisition. After dropping, all inactive merged and acquired software firms sample size adjusted to 179 SMSFs. Data completeness requires presence of data for all six above-mentioned variables at least for three contiguous years in the life of sample firm. After removing SMSFs that had missing and incomplete data final sample size lessened to 62 for sale internationalization models and to 37 for operation internationalization models. With this process of adjusting sample to a smaller size poses the risk of selection bias. In order to make sure

that final samples of this study represent the whole population of SMSFs, tests for differences between final set of firms and excluded firms were conducted. An independent two-sample t-test showed no significant differences between the two groups on total assets, number of employees, debt level, R&D spending, market value, level of sales internationalization and level of foreign investments. Appendix A, Table A1 shows the results of independent two-sample t-test.

Mergent online company database was referred to obtain data that were not readily or completely available in Worldscope database. Data retrieved from Mergent online included (1) Year of founding of firms, (2) Number of mergers and acquisitions the sample firm made and (3) Number and name of countries where sample SMSFs has or had foreign subsidiaries. Mergent online company history information was also referred to cross verify the reason for delisting.

SEC filings for all years of life of SMSFs were referred to get information about whether the firm was recipient of monetary government aid in the form loans, subsidies and grants. Information on country risk rating was obtained from A.M.Best's report on Countries Risk Tier rating. In A.M.Best's country risk rating, "[C]ountries are placed into one of five tiers, ranging from Country Risk Tier 1 (CRT-1), denoting a stable environment with least amount of risk, to Country Risk Tier 5 (CRT-5) for countries that pose the most risk and, therefore the greatest challenge to [firm's] financial stability and performance". Listing of countries in these tiers is based on A.M.Best's definition of country risk given as "the risk that country-specific factors could adversely affect [a

firms'] ability to meet its financial obligations" (A.M.Best Company). For this research, the countries that are not in CRT-1 are high-risk countries and counted to number of high uncertainty foreign country variable NHUFC.

The models use cross-sectional information. However, the financial data retrieved from sources mentioned are time series data. That is, each observation in the regression sample is series. This series information for each firm is summarized and related with the life of the firm. As stated earlier, the time series information is summarized by common time series summarization methods. The methods of time series are formally presented as equations from (Eq1) through (Eq3).

V RESULTS

DATA DESCRIPTIONS

A. SALES INTERNATIONALIZATION DATA

Table 1 and Table 2 given below summarize data of sample used in models that use sales internationalization. The sample's data consists of average, variation and trend of time series data for each firm in the sample. The sample for sales internationalization models consists of 62 USA based SMSFs. The sample has SMSFs with mean age of 19 years, median age of 17 years, SMSFs of minimum life of 5 years and SMSFs of longest life of 43 years. On average, the lifetime average of firms' foreign sales has been 30.43% of total sales and this varied between 3.81% and 71.67% of total sales. Average of variation of FSTS during firms' lifetime is 11.54% with minimum variation of 2% and maximum variation of 30.17%. The average number of employees of the sample firms is in the range between 15 and 495 with sample mean of average employees 246 and median of 229. On average, the sample firms spent 71.14% of their revenue for research and development during their lifetime with minimum average R&D spending of zero percent and maximum average R&D spending of 2744.43%. On average, sample firms

had lifetime average of total assets of US\$ 49.69 million and 20.36% of these total assets have been debt. On average, the firms had a market value 3.59 times higher than book value. On average, the sample firms made five mergers and acquisitions and invested in two high-risk foreign countries during their lifetime.

Table 1								
Sample description: Sales Internationalization models using Averages and Variations								
This table shows descriptive statistics of data of subsample used in this study. The descriptive statistics are given for the subsample used for analysis of link between average and variation of sales internationalization and longevity. The subsample for sales internationalization model consists of 62 observations of information for USA based small and medium sized software firms.								
	Mean	Median	Maximum	Minimum	Std. Dev.	Jarque-Bera	Prob.	N
YOF_AGE	19.11290	17.00000	43.00000	5.000000	8.234483	8.564482	0.013812	62
AVG_FSTS	30.42864	27.39200	71.66640	3.811700	17.56195	4.869318	0.087628	62
VAR_FSTS	11.53926	10.15255	30.16960	1.998900	6.739046	9.841600	0.007293	62
AVG_EMP	245.0161	228.5000	495.0000	15.00000	135.8836	3.199383	0.201959	62
AVG_TA	49692.47	28105.24	349940.4	428.2118	63098.80	329.5039	0.000000	62
AVG_RND	71.13572	19.52235	2744.430	0.000000	346.8246	8639.568	0.000000	62
AVG_MTB	3.589423	3.813500	25.48140	-39.6929	8.425808	446.2160	0.000000	62
AVG_DEBT	20.35828	3.978550	482.2340	0.000000	65.12067	4457.460	0.000000	62
MNAINT_EMP	0.023044	0.015800	0.137900	0.000000	0.025670	179.2161	0.000000	62
NHUFC	1.387097	1.000000	11.00000	0.000000	1.919314	244.7585	0.000000	62

Table 1. Sample description for FSTS models using Averages and Variations

Appendix B, Figure B1 depicts the scatter plot of all independent variables against dependent variable for variables used in sales internationalization models that use averages and variations of variables.

Table 2								
Sample description: Sales Internationalization models using Trends								
This table shows descriptive statistics of subsample used in this study. The descriptive statistics are given for the subsample used for analysis of link between trends of sales internationalization and longevity. The subsample for sales internationalization model consists of 62 observations of information for USA based small and medium sized software firms.								
	Mean	Median	Maximum	Minimum	Std. Dev.	Jarque-Bera	Prob.	N
YOF_AGE	19.11290	17.00000	43.00000	5.000000	8.234483	8.564482	0.013812	62
TREND_FSTS	0.899102	0.888500	11.03500	-11.201	3.524604	11.90774	0.002596	62
AVG_EMP	245.0161	228.5000	495.0000	15.00000	135.8836	3.199383	0.201959	62
TREND_TA	-2891.29	-556.25	43610.79	-106878	16718.38	1533.172	0.000000	62
TREND_RND	-52.5454	-0.21815	25.00500	-3189.61	405.0087	8995.003	0.000000	62
TREND_MTB	-0.6883	-0.36425	16.38290	-45.5179	6.752467	2582.809	0.000000	62
TREND_DEBT	4.597940	0.000200	222.2570	-74.4937	30.59781	4567.351	0.000000	62
MNAINT_EMP	0.023044	0.015800	0.137900	0.000000	0.025670	179.2161	0.000000	62
NHUFC	1.387097	1.000000	11.00000	0.000000	1.919314	244.7585	0.000000	62

Table 2. Sample description for FSTS models using Trends

The sample has an average of 0.9% of year-over-year upward trend of foreign sales of as percent of total sales. While sample has an average year-over-year upward trend of 4.6% in debt as percent of total assets, there are down ward trends for total assets, R&D spending and market to book value. Appendix B, Figure B2 depicts the scatter plot of all independent variables against dependent variable for variables used in sales internationalization models that use trends of independent variables.

B. OPERATIONS INTERNATIONALIZATION DATA

Table 3 and Table 4 given below summarize data of the sample used in models that use operations internationalization. The sample's data consists of average, variation and trend of time series data for each firm in the sample. The sample for operations internationalization models consists of 37 USA based SMSFs. The sample has SMSFs with mean age of 19 years, median age of 17 years, SMSFs of minimum life of 7 years

and SMSFs of longest life of 40 years. On average, the lifetime average of firms' foreign assets has been 8.54% of total assets and this varied between 0.34% and 55.85% of total sales. Average of variation of FATA during firms' lifetime is 5.68% with minimum variation of 0.14% and maximum variation of 28.18%. The average number of employees of the sample firms is in the range between 15 and 495 with sample mean of average employees 251 and median of 235. On average, the sample firms spent 97.43% of their revenue for research and development during their lifetime with minimum average R&D spending of zero percent and maximum average R&D spending of 2744.43%. On average, sample firms had lifetime average of total assets of US\$ 43.01 million and 12.41% of these total assets have been debt. On average, the firms had a market value 5.16 times higher than book value. On average, the sample firms made four mergers and acquisitions and invested in two high-risk foreign countries during their lifetime.

Table 3

Sample description: Operations Internationalization models using Averages and Variations

This table shows descriptive statistics of subsample used in this study. The descriptive statistics are given for the subsample used for the analysis of link between average and variation of operations internationalization and longevity. The subsample for operations internationalization model consists of 37 observations of information for USA based small and medium sized software firms.

	Mean	Median	Maximum	Minimum	Std. Dev.	Jarque- Bera	Prob.	N
YOF_AGE	18.51351	17.00000	40.00000	7.000000	8.088475	4.887211	0.086847	37
AVG_FATA	8.535292	2.374200	55.85400	0.341300	12.02766	60.78221	0.000000	37
VAR_FATA	5.679976	2.479300	28.17990	0.138900	7.574544	16.56867	0.000252	37
AVG_EMP	250.1351	235.0000	495.0000	15.00000	139.1548	1.543432	0.462219	37
AVG_TA	43014.88	28355.13	155989.5	428.2118	43254.99	12.10620	0.002351	37
AVG_RND	97.42815	22.34830	2744.430	0.000000	447.4402	1784.901	0.000000	37
AVG_MTB	5.161408	3.813100	26.49670	-24.52	7.467979	73.84471	0.000000	37
AVG_DEBT	12.41342	2.981700	86.93670	0.000000	19.82476	80.43554	0.000000	37
MNAINT_EMP	0.021132	0.013200	0.137900	0.000000	0.025458	211.4851	0.000000	37
NHUFC	1.675676	1.000000	11.00000	0.000000	2.322045	70.88616	0.000000	37

Table 3. Sample description for FATA models using Averages and Variations

Appendix B, Figure B3 depicts the scatter plot of all independent variables against dependent variable for variables used in operations internationalization models that use averages and variations of variables.

Table 4								
Sample description: Operations Internationalization models using Trends								
This table shows descriptive statistics of subsample used in this study. The descriptive statistics are given for the subsample used for the analysis of link between trends of operations internationalization and longevity. The subsample for operations internationalization model consists of 37 observations of information for USA based small and medium sized software firms.								
	Mean	Median	Maximum	Minimum	Std. Dev.	Jarque-Bera	Prob.	N
YOF_AGE	18.51351	17.00000	40.00000	7.000000	8.088475	4.887211	0.086847	37
TREND_FATA	0.001500	-0.1363	12.46740	-8.414	2.826805	182.1457	0.000000	37
AVG_EMP	250.1351	235.0000	495.0000	15.00000	139.1548	1.543432	0.462219	37
TREND_TA	1395.412	30.85780	43610.79	-21913.4	13122.69	31.41282	0.000000	37
TREND_RND	-86.7986	-0.4637	25.00500	-3189.61	524.2967	1790.414	0.000000	37
TREND_MTB	-0.48124	-0.3743	24.18000	-10.895	4.847527	508.8552	0.000000	37
TREND_DEBT	-0.2761	0.000000	20.79860	-74.4937	13.80668	795.1193	0.000000	37
MNAINT_EMP	0.021132	0.013200	0.137900	0.000000	0.025458	211.4851	0.000000	37
NHUFC	1.675676	1.000000	11.00000	0.000000	2.322045	70.88616	0.000000	37

Table 4. Sample description for FATA models using Trends

The sample has an average of 0.002% of year-over-year upward trend of foreign sales of as percent of total sales. While sample has an average year-over-year upward trend of US\$ 1.4 million in total assets, there are down ward trends for debt, R&D spending and market to book value. Appendix B, Figure B4 depicts the scatter plot of all independent variables against dependent variable for variables used in operations internationalization models that use trends of independent variables.

SPECIFICATION STABILITY AND ROBUSTNESS

The models were validated for specification errors and were robustness tested for over-all fitness, presence of irrelevant variables, reliability of coefficients and residuals. One of the independent variables AVG_TA has values range comparatively larger than values ranges of other independent variables and dependent variable. Therefore, instead of using AVG_TA directly, natural logarithm of AVG_TA is used in the estimation.

Early models showed unexpected sign for main dependent variables FSTS and FATA. This study included two additional theoretically relevant variables in the models. Literature on internationalization relating performance stability use firms' financial leverage and indicator of growth options as control variables (Kwok & Reeb, 2000; Reeb et al., 1998). Following this literature, since financial leverage and growth opportunities are influencers of SMSF's performance stability also and since stability of performance influences the firms' survival and longevity, this research added variables DEBT and MTB as controls to the models. DEBT, the financial leverage, measured as the total debt to total assets ratio represents amount of risks SMSFs take. Market value to book value ratio (MTB) is used as the proxy for the growth options. Adding these two control variables resulted in improvement of over-all fitness of the models.

Earlier estimation results showed that, in the proposed specifications, variables for government aid, number of patents and number of foreign countries of operations are irrelevant. These variables were excluded from the models. Over-all fitness of all

models was relatively lower with presence of these variables. Adding these variables to all models of both FSTS and FATA resulted in increased AIC¹ and SC², Reduced t-scores for all variables and reduced \bar{R}^2 . Moreover adding these variables did not have significant impact on the magnitude of coefficients of other variables. Dropping variables for government aid, number of patents and number of foreign countries out of the specifications is also theoretically justified. The variable for number of patents, which represents the technological strength of SMSFs, is redundant since R&D to sales ratio covers the technological strength. The variable for number of foreign countries that represents SMSF's international diversification and level of foreign involvement is redundant since this is covered by main independent variables FSTS and FATA. The dummy variable representing SMSFs receiving any government aid is dropped since most of the firms in the sample are non-recipient of any form of government aid.

For these modified specifications, Ramsey's RESET (Regression Specification Error Test) test of specification validation was conducted. For all models, with three fitted terms, this test results suggest no potential specification errors. Appendix A, Table A2 and Table A3 show the results of Ramsey's RESET test for all of the models.

Tests for multicollinearity among independent variables were conducted. The tests suggest no severe multicollinearity exists among independent variables for all models. Appendix A, Table A4 and Table A5 present variance inflation factors for all variables from all models. Regression's residuals were validated for serial correlation

¹ Akaike's Information Criterion (AIC) used for comparing alternative specifications

² Schwartz Criterion (SW) used for comparing alternative specifications

and heteroskedasticity. The DW³ test statistics for all models show there is no significant positive serial correlation exists for all models. Appendix A, Table A6 and Table A7 list the DW *d* test statistics for all the models. Heteroskedasticity tests conducted on cross-sectional data used for all models also suggest there is no evidence for significant heteroskedasticity. Appendix A, Table A8 and Table A9 show the results of Breusch-Pagan-Godfrey test for heteroskedasticity.

ESTIMATION RESULTS

The results of the multivariate OLS regression conducted for the hypothesis testing are shown in Table 5 and Table 6. These tables show regression results for the analysis done for subsamples used for sales internationalization hypotheses and operations internationalization hypothesis. Table 5 and Table 6 show intercepts and slope coefficients of the independent variables used in various analyses. Table 5 and Table 6 also show statistics for over-all fitness of specification for each model.

Results of sales internationalization based models are given in Table 5. First column lists independent variables of different models. Other columns list the coefficients of these independent variables.

³ Durbin-Watson *d* test used for serial correlation test

Table 5				
Estimation Results for FSTS Models				
<p>This table shows the results of multivariate OLS regression that estimates impact of sales internationalization on longevity of SMSFs. The FSTS is used as the measure of sales internationalization for analysis of relationship between sales internationalization and longevity. Relationship between longevity and sales internationalization is analyzed with three time-series summarization parameters of time-series of FSTS. The time series-summarization parameters used are mean, standard deviation and trend. Longevity (YOF_AGE) is the dependent variable and is analyzed with each of these summarization parameters (AVG_FSTS, VAR_FSTS and TREND_FSTS) for FSTS with other control variables. Longevity is also analyzed with mean and standard deviation together. Standard errors are given in parentheses.</p>				
Variable/Stat	FSTS			
	Model 1	Model 2	Model 3 w/ AVG and VAR	Model 4 w/ TREND
Intercept	47.2144*** (10.6256)	47.7360*** (10.0380)	47.7414*** (10.1250)	12.9609*** (2.6659)
AVG_FSTS	0.0012 (0.0556)		-0.0163 (0.0535)	
VAR_FSTS		0.3850*** (0.1520)	0.3911*** (0.1547)	
TREND_FSTS				0.0325 (0.2820)
AVG_EMP	0.0514*** (0.0114)	0.0536*** (0.0107)	0.0532*** (0.0109)	0.0255*** (0.0081)
LOG(AVG_TA)	-4.0400*** (1.2253)	-4.5149*** (1.1580)	-4.4652*** (1.1793)	
AVG_RND	-0.0031 (0.0026)	-0.0061** (0.0027)	-0.0062** (0.0028)	
AVG_MTB	0.0548 (0.1201)	0.1209 (0.1147)	0.1282 (0.1181)	
AVG_DEBT	-0.0242 (0.0195)	-0.0237* (0.0170)	-0.0214 (0.0186)	
MNAINT_EMP	114.0942*** (43.1213)	76.2369** (42.7148)	73.3156* (44.1321)	118.0683*** (45.2223)
NHUFC	-1.3247*** (0.5034)	-1.1822*** (0.4771)	-1.1679*** (0.4835)	-1.5268*** (0.5395)
TREND_TA				0.0001** (0.0001)
TREND_RND				0.0032* (0.0024)
TREND_MTB				0.1305 (0.1434)
TREND_DEBT				-0.0382 (0.0356)
R ²	0.3748	0.4423	0.4433	0.3033
F-Stat	3.9719***	5.2539***	4.6006***	2.8835***
AIC	6.8589	6.7447	6.7752	6.9673
SC	7.1677	7.0535	7.1182	7.2760
DW	1.9055	1.9627	1.9773	1.8160
Note: *** Significant at p-value < 0.01 ** Significant at p-value < 0.05 * Significant at p-value < 0.1				

Table 5. Estimation results for FSTS models

Hypotheses *Hypothesis 1a* and *Hypothesis 1b* that are tested by sales internationalization based models say that higher level of foreign sales and higher variations in the foreign sales are positively related to longevity. Foreign Sales as percentage of Total sales is used as measure of sales internationalization. FSTS Model 1 analyzes relationship between average levels of sales internationalization with longevity. The regression results for this model show that there exists a positive relationship between average levels of foreign sales as percent of total sales as hypothesized by *Hypothesis 1a*. Nevertheless, this relationship is not significant. FSTS Model 2 is to analyze the relationship between variations in sales internationalization and longevity. Standard deviation of foreign sales as percent of total sales is used as the measure of variation in the sales internationalization. Results of this model show that standard deviation of FSTS is significantly positively related to longevity at 1% level of significance as hypothesized by *Hypothesis 1b*. FSTS Model 3 analyzes relationship between longevity with both level of sales internationalization and variation in sales internationalization together. By this model, the effect of level or variation of sales internationalization on longevity is analyzed taking the effects of variation or level into account. This model shows that average of sales internationalization is negatively related to longevity but this counterhypothesis (*Hypothesis 1a*) relationship is not a significant relationship. However, in line with FSTS Model 2, the results of FSTS Model 3 show that standard deviation of FSTS is significantly positively related to longevity at 1% level of significance. This result also conforms to *Hypothesis 1b*. The FSTS model that uses trends of internationalization, the FSTS Model 4 analyzes the impact of trends in FSTS

on longevity. The results suggest that trends in sales internationalization is positively related to longevity as expected but this relationship is not significant one.

Results of hypothesis testing for relationship between longevity and operations internationalization are given in Table 6. The first column lists independent variables used in different models. Other columns list the coefficients of these variables.

Table 6 Estimation Results for FATA Models				
This table shows the results of multivariate OLS regression that estimates impact of operations internationalization on longevity of SMSFs. The FATA is used as the measure of operations internationalization for analysis of relationship between operations internationalization and longevity. Relationship between longevity and operations internationalization is analyzed with three time-series summarization parameters of time-series of FATA. The time series-summarization parameters used are mean, standard deviation and trend. Longevity (YOF_AGE) is the dependent variable and is analyzed with each of these summarization parameters (AVG_FATA, VAR_FATA and TREND_FATA) for FATA with other control variables. Longevity is also analyzed with mean and standard deviation together. Standard errors are given in parentheses.				
	FATA			
	Model 1	Model 2	Model 3	Model 4
Variable/Stat	w/ AVG	w/ VAR	w/ AVG and VAR	w/ TREND
Intercept	33.6194** (16.6534)	19.4488 (15.4746)	19.3394* (14.5047)	12.6376* (4.2197)
AVG_FATA	0.0244 (0.1225)		-0.3028** (0.1352)	
VAR_FATA		0.5342*** (0.2003)	0.9020*** (0.2511)	
TREND_FATA				0.5443 (0.4870)
AVG_EMP	0.0424*** (0.0160)	0.0357** (0.0145)	0.0346*** (0.0136)	0.0248** (0.0143)
LOG(AVG_TA)	-2.6511* (1.7992)	-1.2503 (1.6710)	-1.0991 (1.5678)	
AVG_RND	-0.0025 (0.0028)	-0.0028 (0.0025)	-0.0030 (0.0024)	
AVG_MTB	0.0047 (0.2156)	0.0064 (0.1908)	-0.0632 (0.1816)	
AVG_DEBT	0.0714 (0.0824)	-0.0099 (0.0792)	-0.0337 (0.0750)	
MNAINT_EMP	94.3488* (56.9652)	77.1494* (50.7043)	87.4498** (47.7547)	97.3266* (63.7484)
NHUFC	-1.0543* (0.6903)	-0.9021* (0.6142)	-1.0221** (0.5783)	-1.2291** (0.7096)
TREND_TA				-0.0001 (0.0001)
TREND_RND				0.0024 (0.0026)
TREND_MTB				0.0015 (0.2854)
TREND_DEBT				0.0329 (0.1052)
R ²	0.3298	0.4648	0.5466	0.2393
F-Stat	1.7222*	3.0391***	3.6159***	1.1010
AIC	7.0777	6.8528	6.7410	7.2043
SC	7.4695	7.2447	7.1764	7.5962
DW	1.7687	1.9725	2.0041	2.1297
Note: *** Significant at p-value < 0.01 ** Significant at p-value < 0.05 * Significant at p-value < 0.1				

Table 6. Estimation results for FATA models

Hypotheses *Hypothesis 2a* and *Hypothesis 2b*, which are tested by operations internationalization based modes say that higher level of foreign investments and higher variations in foreign investments are positively related to longevity. Foreign Assets as percentage of Total Assets is used as measure of operations internationalization. FATA Model 1 analyzes relationship between average levels of operations internationalization with longevity. Similar to FSTS model 1, the regression results for FATA Model 1 show that there is positive relationship between average levels of foreign assets as percent of total sales as hypothesized by *Hypothesis 2a*. However, this relationship is not significant. FATA Model 2 is to analyze the relationship between variations in operations internationalization and longevity. Standard deviation of foreign assets as percent of total assets is used as the measure of variation in the operations internationalization. Similar to FSTS Model 2, the results for this model also show that standard deviation of FATA is significantly positively related to longevity at 1% level of significance as hypothesized by *Hypothesis 2b*. FATA Model 3 analyzes combined effect of both level and variations of operations internationalization on longevity. That is, the effect of variation of operations internationalization on longevity is analyzed with consideration of effect of level of operations and vice versa. This model's results shows that average of operations internationalization is significantly negatively related to longevity at 5% level of significance. This result does not conform to *Hypothesis 2a*. However, in line with FATA Model 2, the results of FATA Model 3 show that standard deviation of FATA is significantly positively related to longevity at 1% level of significance. This result conforms to *Hypothesis 2b*. The FATA model that uses trends

of internationalization, the FATA Model 4, analyzes the impact of trends in FATA on longevity. Similar to FSTS Model 4, the results of FATA Model 4 also suggest that trends in operations internationalization is positively related to longevity as expected but this relationship is not significant one.

For both FSTS models and FATA models, size of the firm as average number of employees (AVG_EMP) is significantly positively related to longevity at less than 5% level of significance as hypothesized. For all FSTS and FATA models, number of high-risk countries of investment (NHUFC) is significantly negatively related to longevity as hypothesized at less than 10% level of significance. For all FSTS and FATA models, except for FATA Model 3 that uses both average and variations of FATA, market to book value ratio (MTB), the proxy for growth options, has positive relationship with longevity as expected but the relationship is not significant. For all FSTS and FATA models, except for FATA Model 1 that uses average of FATA and FATA Model 4 that is based on trends, debt ratio (DEBT), the proxy for firms' risk approach, has negative relationship with longevity as expected. However, this relationship is not significant except for FSTS model 2, in which this relationship is significantly negative at 10% level of significance. This conforms to hypothesis. For average and variations based models of both sales and operations internationalization, the relationship of Total Assets with longevity is negative as opposed to hypothesis. In addition, this relationship is significant for all FSTS models while insignificant for all FATA models except for FATA model 1. Trend of total assets in FSTS model is significantly positively related to longevity while trend of total assets in FATA model is negatively related to longevity but insignificant. Similarly, for RND, for

all average and variation based models of sales and operations internationalization, it is seen there is negative relationship with longevity but only for FSTS models 2 and 3, this relationship is significant. Trend of RND is positively related to longevity in both FSTS and FATA models. However, only for FSTS model, this relationship is significant. The relationship between the number of mergers and acquisitions the firms made and longevity is significantly positive at less than 10% level of significance for all sales and operations based internationalization models.

The samples of the research include both active and inactive SMSFs. For FSTS models, the sample consists of 62 SMSFs out of which 35 are active. For FATA models, the sample consists of 37 SMSFs out of which 18 are active. The measures of longevity and other independent variables of active SMSFs do not cover for their whole life. The effect on longevity using these partial measures of active SMSFs is not comparable with the effect of these independent variables on longevity of inactive SMSFs for which these independent variables measure for SMSFs' whole life. To make sure that effects of independent variables of both active and inactive SMSFs are comparable, test of significance of effect of firm status on longevity was conducted. To test whether the status of firms has significant effect on longevity, a dummy variable indicating whether the firm is active or inactive as on 2013 is used. The dummy variable is ACTIVE_D. The value of this variable is one if the SMSF is active as on 2013. A value of zero for this variable indicates that the firm is inactive as on 2013. This dummy variable is included in all models for both FSTS and FATA. Since this study uses data of public SMSFs, the active SMSFs from the sample lived sufficiently longer such that their

characteristics until 2013 would be representative of their remaining life. Therefore, this reasoning yields a hypothesis that firms' active or inactive status does not have significance relationship with longevity.

Results of regression with firm status dummy variable, ACTIVE_D are shown in Appendix A Table A10 and Table A11. The results suggest that status of firm does not have significant impact on any of the models for both FSTS and FATA as expected. This variable is an irrelevant variable for all models. Including firm status has not affected the significance of other variables in all FSTS and FATA models. There are also no significant changes in the magnitude of coefficients of existing variables for all FSTS and FATA models. Therefore, analysis of relationship between longevity and level of internationalization of SMSFs without considering the status of firm is indifferent from the analysis with consideration of status of firm.

VI DISCUSSION

This research set out with an objective of discovering relationship between SMEs' longevity and their internationalization strategies. Internationalization strategies were inferred from the degree of international involvement of the firms. The relationship between degree of internationalization and longevity was tested on a sample of USA based small and medium sized firms from software publishing services industry. The internationalization strategies of SMSFs were inferred from the level of foreign sales and foreign investments they make during their lifetime. Three measures of time series summarization of degree of internationalization were used. These measures include: (1) Average level of internationalization over period of SMSF's existence. This is measured as average of degree of sales and operations internationalization over period of SMSF's existence, (2) Variations in level of internationalization during period of SMSF's existence. This is measured as standard deviation of degree of sales and operations internationalization and (3) Trends in SMSFs' internationalization over period of their existence. These three measures were analyzed with number of years the SMSFs have lived as on 2013.

Table 7 given below presents summary of findings of analysis for the main hypotheses.

<p style="text-align: center;">Table 7 Summary of estimation results for main hypothesis</p>			
<p>This table gives the description of results of estimations for relationship between longevity and independent variables of foreign sales and foreign investments. For independent variable of foreign sales, under column “Variance not considered”, estimation result of relationship between longevity and average of size of foreign sales without controlling for variance of foreign sales is described. Under column “Size not considered”, estimation result of relationship between longevity and variation of size of foreign sales without controlling for average of size of foreign sales is described. Under column “Variance and Size both are considered”, estimation result of relationship between average of size of foreign sales and variation in size of foreign sales with consideration of both size and variation of foreign sales is described. Similar descriptions are given for foreign operations under the above-mentioned columns along the row “Foreign Operations”.</p>			
	Variance not considered (Model 1)	Size not considered (Model 2)	Variance and Size both are considered (Model 3)
Foreign Sales	Size of sales has no relationship with Longevity	Higher variance of sales increases longevity	Size of sales has no relationship while variance is same for all firms Higher variance of sales increases longevity while size is same for all firms
Foreign Operations	Size of investments has no relationship with Longevity	Higher variance of investments increases longevity	Higher size of investments reduces longevity while variance is same for all firms Higher variance of investments increase longevity while size is same for all firms

Table 7. Summary of results of estimations for main hypothesis

Above presented results for analysis of relationship between SMSFs’ longevity and their foreign sales, suggest that, when variation in level of foreign sales is not considered, size of foreign sales does not have significant relationship with longevity of the firm. That is, if variance of size of foreign sales of firms were not considered, all firms would have same duration of life, irrespective of average of size of foreign sales

they would make over their lifetime. This can be seen from the results of FSTS model 1. In this model, the results show that, without controlling for variations in FSTS, the average FSTS (AVG_FSTS) is not significantly related to longevity. Even with the consideration of variation in size of foreign sales of firms, on average, the level of foreign sales does not have significant relationship with longevity. That is, even if all firms have same variation in level of foreign sales, all firms would have same duration of life irrespective of average size of foreign sales they make over their lifetime. This can be seen from the results of FSTS model 3. The result of FSTS model 3 suggests that while all firms have same variation in level of foreign sales, relationship of level of foreign sales with longevity is insignificant. These findings do not conform to hypothesis.

The results, on the other hand, suggest that, irrespective of consideration of size of foreign sales, the variation in level of foreign sales has positive relationship with longevity. That is, if average of size of foreign sales over the period of life firms is not considered, firms that have higher variation in size of foreign sales would experience longer life when compared with firms that do not. Even if lifetime average of size of foreign sales is considered and it is same for all firms, the firms with higher variation in foreign sales would experience longer life. This conforms to the hypothesis made. This can be seen from estimation of FSTS model 2 and model 3. The results show that variation in level of foreign sales is positively related to longevity, irrespective of controlling for average of size of foreign sales. The estimations show that, on average, all else being equal, one percent higher deviation in foreign sales (as percent of total sales) leads to 0.39 years longer life.

The estimations for relationship between foreign investments and longevity also yield similar results. The results suggest that, without consideration of variation in level of foreign operations, size of foreign investments does not have significant relationship with longevity of the firm. That is, if variance of size of foreign investments of firms were not considered, all firms would have same duration of life, irrespective of average of size of foreign investments they would make over their lifetime. This can be seen from the results of FATA model 1. In this model, the results show that, without controlling for variations in FATA, the average FATA (AVG_FATA) is not significantly related to longevity. However, with the consideration of variation in size of foreign investments, on average, the level of foreign investments has negative relationship with longevity. That is, if all firms have same variation in level of foreign investments, firms that invested more in foreign countries over their lifetime would have shorter life when compared with firms that made relatively lower foreign investments. This can be seen from the results of FATA model 3. The results of FATA model 3 suggest that when all firms have same variation in level of foreign investments, relationship of level of foreign investments with longevity is significantly negative. This is a counterhypothesis result.

From variation in level of foreign investments point of view, similar to foreign sales, the results suggest that irrespective of consideration of size of foreign investments, the variation in level of foreign investments has positive relationship with longevity. That is, if the average of level of international involvement in terms of foreign investment were not considered, firms that have higher variation in size of foreign investments would

experience longer life when compared with firms that do not. Even if the lifetime average of size of foreign investments is considered and it is same for all firms, the firms with higher variation in foreign sales would experience longer life. This result conforms to the hypothesis made. This can be seen from estimation of FATA model 2 and model 3. The results show that variation in level of foreign investments is positively related to longevity irrespective of controlling for average of size of foreign investments. The results suggest that, on average, all else being equal, one percent higher deviation in foreign investments (as percent of total assets) results in 0.53 to 0.90 years of longer life.

Above discussion of observations suggests different messages for relationship of SMSFs' longevity with their foreign sales and foreign investments. Relationship of SMSF's longevity with their foreign sales is different from that with foreign investments. With foreign sales, even if all firms have same average level of foreign sales, they may have different longevity depending on variation of level of foreign sales. Firms with foreign sales of relatively higher volatility can be expected to have comparatively higher longevity. However, in the case of foreign investments, evidence suggests that even though firms that have higher volatility in foreign investments can experience longer duration of life, firms with higher average size of foreign investments would experience shorter life if the firms do not have variations in those foreign investments. Therefore, for SMSFs' international involvement in terms of international operations or foreign investments, volatility in the level of foreign investments appears to be a significant differentiator.

Volatility in the level of foreign investments can be considered as results of firms' pro-active strategic decisions taken based on firms' internal strengths and weakness and external opportunities and risks the firms face. Majority of SMSFs are resource constraint to assess foreign opportunities and risks. They may also lack managerial experience and talent to make strategic decisions to bring appropriate level of changes in foreign investments. For such cases, if firms cannot adjust foreign investments and therefore would not result in higher variation in size of foreign investments, they may experience longer life by keeping average level of foreign investments to a lower level, provided, other factors such as debt, growth opportunities, risks of entry modes and foreign country uncertainties do not affect longevity.

When variation strategy is considered for foreign sales, the results may seem contradictory to generally expected. It is generally expected that less fluctuations in revenues results in better performance and hence will result in longer life. However, for SMSFs, the volatility in the foreign sales can be thought of as strategy or capability driven rather than market demand driven. For example, even if the SMSFs face higher revenue opportunities due to great market demand, because of their liabilities of newness and liabilities of foreignness, they will be unable to maintain steady foreign revenue. Depending on level of effort spent on reducing liabilities of newness and liabilities of foreignness, there will be higher fluctuations in foreign revenues. Therefore, higher fluctuations in foreign revenue can be result of SMSFs pro-active strategic actions. This also conforms to similar idea presented for higher volatility of R&D expenditure and improved performance in existing literature (Mudambi & Swift, 2011).

This research also shows evidence for the hypothesis that international involvement in high-risk countries negatively influences longevity. Increased operations in more high uncertainty countries reduce the life. From the results, it can be observed that on average, all else being equal, when SMSFs operate in one more additional high uncertainty country, the life of SMSF reduces by 1 to 1.2 years. In other words, short-lived SMSFs had more operations in high uncertainty countries when compared to long-lived SMSFs. This conforms to general expectation that SMSFs investing in high risk countries risk losses and hence their survival. Over-all, both R&D spending and Total Assets have negative relationship with longevity. For this research, Total Assets is used as proxy for SMSFs' capital availability and R&D spending is an indicator of SMSF's technological competitive strength. The results show that on average, all else being equal, an increase of average one percent of total sales for research and development spending results in 0.006 years (approximately 2.2 days) of reduction in life. In other words, when compared to SMSFs that lived 2.2 days longer, short-lived SMSFs spent average one percent higher of total sales for research and development. The results for total assets as control also show that, on average, all else being equal, when compared to SMSFs that lived 2.7 years to 4.5 years shorter, the long-lived SMSFs had one percent lower total assets. SMSFs, during their startup periods make higher levels of investments in research and development. For this higher level of R&D investments, they also source higher level of capital. Depending on results of the R&D investments in terms of innovative products and services, SMSFs' chance of continuing operation for longer time changes. Evidence of this analysis indicates that on average, all else being equal,

relatively higher R&D spending through higher capital rising has not yielded longevity improving results for SMSFs.

On contrary to existing literature findings, number of mergers and acquisitions made by SMSFs positively influences longevity. Existing literature indicates that high-risk entry modes such as mergers and acquisitions have lower possibilities of reaping benefits of internationalization (J. Li, 1995; Mudambi & Zahra, 2007). The contradictory results noted in this research could be attributed to characteristics specifics to firms from software industry. For the case of SMEs from software industry, mergers and acquisitions might have actually given opportunities to grow and therefore might have improved the longevity. Small and medium sized software firms might have managed the post merger and acquisition integration efficiently such that the negative impacts of integration efforts have not affected longevity. The efficient handling of post mergers and acquisition integration could be attributed to SMSFs' agility that arises out of their smaller size. In addition, the mergers and acquisitions that small and medium sized software firms make would have been smaller so that the integration effort would be manageably lower. Since the negative effects of mergers and acquisitions mode of entry is over-shadowed by the greater benefits such as technology, knowledge resources, scaling ability, expanded market, for software firms, more number of mergers and acquisitions actually improves longevity.

The table given below is the summary of results of hypothesis testing conducted using results of estimations of different models.

Table 8 Summary of results of hypothesis testing	
Hypothesis	Support
1a: Longevity of SMSFs is positively related to size of sales internationalization	No
1b: Longevity of SMSFs is positively related to variation in sales internationalization	Yes
2a: Longevity of SMSFs is positively related to size of operations internationalization	No
2b: Longevity of SMSFs is positively related to variation in operations internationalization	Yes
3b: Longevity of SMSFs is negatively related to number of high uncertainty countries of internationalization	Yes
4: Longevity of SMSFs is positively related to technological competence of the firm	No
5: Longevity of SMSFs is positively related to size of the firm	Yes
6: Longevity of SMSFs is negatively related to number of mergers and acquisitions the firms make	No

Table 8. Summary of results of hypothesis testing

VII SUMMARY AND CONCLUSIONS

The research objective was to discover relationship between internationalization and longevity for SMEs. The research objective was also to discover other factors that influence longevity of SMEs. For this objective, the research was conducted on small and medium sized firms from software publishing services industry. This study used data on USA based small and medium sized software firms. Theories of resource-based view, Location advantages, Liabilities of Foreignness and International New Venture were used to support the framework of analysis and to hypothesize relationship between longevity and internationalization strategies. The research discovered the following. (1) Level of internationalization alone does not have significant impact on longevity. (2) Volatility in level of internationalization, both sales based and investments based, has significant positive impact on longevity. Since volatility in level of internationalization can be considered as results of firms' pro-active strategic decisions, it can be suggested that strategic variation in international involvement rather than the amount of international involvement would help improving the longevity of SMSFs. These discoveries are consistent with results and proposals from existing literature on internationalization and survival prospects of SMEs. (3) Short lived SMSFs have spent more on R&D and acquired more assets when compared to long-lived SMSFs and (4) SMSFs also improved longevity through mergers and acquisitions.

Over all this research shows evidence to indicate that SMSFs enjoyed the benefits of internationalization and improved their longevity by appropriately adjusting their international involvement in terms of foreign sales and foreign investments. Thus, SMSFs' attempts of risky international business despite their inherent vulnerabilities such as resource constraints, lack of marketing power and inexperience, due to their smaller size are justified. The significant statistical evidence of this research gives message to managers of small and medium sized software firms that not the amount but the strategic adjustment of internationalization is important to help improve longevity and survival possibilities.

This research comes with some limitations and assumptions. The effect of internationalization on longevity is not controlled for one of important variables, the top management team experience, as used in existing literature. Since this study's samples comprise both active and inactive firms, getting information about executives and their experience profiles through interviews and other data collections avenues for all companies of the sample is not viable. The variable for average top management team experience, AVG_TMTE, was excluded from the estimation specifications due to difficulty in collecting data. Even without this variable, this study discovered statistical evidence for the relationships hypothesized. Main concern of this study is about the direction of effect of internationalization on longevity but not on the magnitude of effect of internationalization on longevity. Therefore, the bias on the coefficients due to omitted variable is not expected to undermine findings of this research. This research

makes the following assumptions. The data used for the research is publicly available data that are typically available only after the sample firms went public. Therefore, this research is based on the assumption that data available after the firms' IPO represent firms' characteristics for the whole life of the firm starting from year of founding.

Possibilities of future research or extension of this research can be explored along the following lines. Since there is significant evidence for the finding that dynamics or variation in level of internationalization involvement is positively related to longevity, a follow up research on link between longevity and different internationalization strategies that result in higher variation in level of international involvement can be done. For example, software firms involved in outsourcing and contracting strategies have high chance of improving operations efficiency. Comparing and contrasting these two strategies to find statistical evidence for the strategies that result in higher variation in level of internationalization would be a valuable follow up of this research. This research used both active and inactive firms that inhibited collection of data for top management team experience. An adjusted research could be conducted only with active firms so that data on top management team experience can be collected for all companies of the sample and the effect of top management team experience can be analyzed while the effect of internationalization is controlled. Another research extension can be a comparative study of larger software firms and SMSFs for their characteristics and their influence on longevity. This research can also be extended to test relationship between longevity and internationalization of SMEs of other industries.

The time series summarization of time series values of degree of internationalization of SMSFs can be thought of as different strategies of international involvement of SMSFs. The average of degree of internationalization over the period SMSFs life can be equivalent to an international strategy of maintaining a constant level of international sales or international investment year-over-year. This strategy is especially useful for relatively young SMSFs that involve in less risky contract based sales and operations. Similarly, variations in degree of internationalization of SMSFs can be representing the strategy of pro-active and dynamic international involvement of SMSFs. This type of dynamic and pro-active investment adjustment strategy will be useful for more matured SMSFs that need high risky direct investments to meet their highly fluctuating business conditions. This research is one of the firsts to use the time-series summarization for internationalization strategy representation to link strategies and degree of internationalization with firms' longevity. As seen in the Literature Review section, there are few articles linking survival probabilities and firms' characteristics, especially for small and medium sized enterprises. Extensive search indicated that there are no articles linking longevity and firms' characteristics, especially internationalization in the literature as on 2014, when this study was conducted. However, research on business history concerning longevity and firm characteristics influencing longevity is gaining popularity. For example, Business History Journal called for research papers specifically for topic of business longevity and its influencers. Journal of International Business Studies called for papers for a special issue on SMEs that included topic of firms' survival. Therefore, this research would be a valuable contribution to such literature on business longevity and survival.

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APPENDIX A

Table A1. Independent two sample t-test for final set of firms and excluded firms

Table A1						
Selection Bias Test: Independent two-sample t-Test						
This table shows the results of independent two-sample t-Test conducted to verify that final set of firms or the sample is representing the population. Group 1 is the final set. Group 2 is the population. The test of equal variance results shows the F-statistics and probability of significance for null hypothesis of equal variances. If this null hypothesis is rejected, the t-Test is conducted assuming unequal variances between two groups and vice versa. The t-Test results show the t-Statistics and probability of significance for null hypothesis of zero mean difference. For all characteristics of firm, t-Test null hypothesis cannot be rejected at 10% level of significance indicating the final set/sample is not significantly different from population.						
	Group 1/ Final Set N	Group 2/ Population N	Test of Equal Variances		t-Test	
			F-Stat	Prob.	t-Stat	Prob. Two-tail
AVG_TA	64	327	1.5372	0.0092 ^{***}	0.8554 ^u	0.3949
AVG_EMP	64	327	0.8430	0.2074	-0.0283 ^c	0.9774
AVG_RND	64	326	0.0517	0.0000 ^{***}	-0.6668 ^u	0.5053
AVG_MTB	64	327	0.0040	0.0000 ^{***}	-1.0524 ^u	0.2933
AVG_DEBT	64	327	0.0649	0.0000 ^{***}	-0.6350 ^u	0.5258
AVG_FSTS	64	323	0.8042	0.1479	1.4791 ^c	0.1399
AVG_FATA	48	205	0.5572	0.0095 ^{***}	-1.6571 ^u	0.1009
Note:						
*** Significant at p-value < 0.01 ** Significant at p-value < 0.05 * Significant at p-value < 0.1						
^c t-Test assuming equal variances ^u t-Test assuming un-equal variance						

Table A2. Specification Stability Tests: Ramsey's RESET tests for FSTS models

Table A2			
Specification Stability Tests: Ramsey's RESET test for Sales internationalization models			
This table shows summary of results of Ramsey's RESET test for sales internationalization models with 3 fitted terms. F-statistic, degrees of freedom and significance of F-statistic are shown for models linking longevity with average, variation and trends of level of sales internationalization. The table also shows results for model that analyzes combined effect of average and variation of levels of sales internationalization on longevity. The results suggest null hypothesis that the concerned equation and fitted equation are same cannot be rejected at 5% level of significance.			
Model	F-Statistic	df	Prob.
AVG_FSTS Model	0.3650	(3, 50)	0.7785
VAR_FSTS Model	0.2027	(3, 50)	0.8940
(AVG_FSTS & VAR_FSTS) Model	0.1269	(3, 49)	0.9437
TREND_FSTS Model	1.6851	(3, 50)	0.1821

Table A3. Specification Stability Tests: Ramsey's RESET tests for FSTA models

Table A3			
Specification Stability Tests: Ramsey's RESET test for Operations internationalization models			
This table shows summary of results of Ramsey's RESET test for operations internationalization models with 3 fitted terms. F-statistic, degrees of freedom and significance of F-statistic are shown for models linking longevity with average, variation and trends of level of operations internationalization. The table also shows results for model that analyzes combined effect of average and variation of levels of operations internationalization on longevity. The results suggest null hypothesis that the concerned equation and fitted equation are same cannot be rejected at 5% level of significance.			
Model	F-Statistic	df	Prob.
AVG_FATA Model	1.7508	(3, 25)	0.1824
VAR_FATA Model	0.5122	(3, 25)	0.6775
(AVG_FATA & VAR_FATA) Model	0.2897	(3, 24)	0.8324
TREND_FATA Model	0.8719	(3, 25)	0.4688

Table A4. Coefficient Tests: Variance Inflation Factors (VIF) for FSTS Models

Table A4							
Variance Inflation Factors (VIF) for Sales internationalization models							
This table shows the variance inflation factor for each variable used in different sales internationalization models of this study. The results show that for all independent variables, $VIF < 5.0$, indicating no significant correlation exists among independent variables.							
AVG_FSTS (Model 1)		VAR_FSTS (Model 2)		AVG_FSTS + VAR_FSTS (Model 3)		TREND_FSTS (Model 4)	
Variable	VIF	Variable	VIF	Variable	VIF	Variable	VIF
AVG_FSTS	1.1936	VAR_FSTS	1.4712	AVG_FSTS	1.2140	TREND_FSTS	1.1086
AVG_EMP	3.0106	AVG_EMP	2.9778	VAR_FSTS	1.4963	AVG_EMP	1.3581
LOG(AVG_TA)	3.2481	LOG(AVG_TA)	3.2525	AVG_EMP	3.0228	TREND_TA	1.1135
AVG_RND	1.0259	AVG_RND	1.2454	LOG(AVG_TA)	3.3155	TREND_RND	1.0483
AVG_MTB	1.2809	AVG_MTB	1.3082	AVG_RND	1.2684	TREND_MTB	1.0523
AVG_DEBT	2.0234	AVG_DEBT	1.7151	AVG_MTB	1.3631	TREND_DEBT	1.3298
MNAINT_EMP	1.5320	MNAINT_EMP	1.6851	AVG_DEBT	2.0304	MNAINT_EMP	1.5118
NHUFC	1.1669	NHUFC	1.1752	MNAINT_EMP	1.7680	NHUFC	1.2029
				NHUFC	1.1864		

Table A5. Coefficient Tests: Variance Inflation Factors (VIF) for FATA Models

Table A5							
Variance Inflation Factors (VIF) for Operations internationalization models							
This table shows the variance inflation factor for each variable used in different operations internationalization models of this study. The results show that for all independent variables, $VIF < 5.0$, indicating no significant correlation exists among independent variables.							
AVG_FATA (Model 1)		VAR_FATA (Model 2)		AVG_FATA + VAR_FATA (Model 3)		TREND_FATA (Model 4)	
Variable	VIF	Variable	VIF	Variable	VIF	Variable	VIF
AVG_FATA	1.3864	VAR_FATA	1.8410	AVG_FATA	2.4787	TREND_FATA	1.0388
AVG_EMP	3.1603	AVG_EMP	3.2391	VAR_FATA	3.2916	AVG_EMP	2.2243
LOG(AVG_TA)	3.2016	LOG(AVG_TA)	3.4581	AVG_EMP	3.2432	TREND_TA	1.3375
AVG_RND	1.0292	AVG_RND	1.0312	LOG(AVG_TA)	3.4647	TREND_RND	1.0705
AVG_MTB	1.6559	AVG_MTB	1.6235	AVG_RND	1.0329	TREND_MTB	1.0765
AVG_DEBT	1.7054	AVG_DEBT	1.9701	AVG_MTB	1.6740	TREND_DEBT	1.1864
MNAINT_EMP	1.3430	MNAINT_EMP	1.3323	AVG_DEBT	2.0117	MNAINT_EMP	1.4818
NHUFC	1.6406	NHUFC	1.6264	MNAINT_EMP	1.3452	NHUFC	1.5276
				NHUFC	1.6410		

Table A6. Residual Tests: Serial Correlation (DW Test) test for FSTS Models

Table A6				
Residual Tests (Serial correlation) for Sales internationalization models				
This table shows Durbin-Watson statistics and lower and upper boundaries of Durbin-Watson critical values for all sale internationalization models. The results show that for all sales internationalization based models, d-statistic is greater than upper critical d value, suggesting, the null hypothesis of no positive serial correlation cannot be rejected.				
Model	DW d-stat	(k, N)	d_L (1% One-Sided)	d_U (1% One-Sided)
AVG_FSTS Model	1.9055	(8, 62)	1.186 > d _L > 1.144	1.726 > d _U > 1.720
VAR_FSTS Model	1.9627	(8, 62)	1.186 > d _L > 1.144	1.726 > d _U > 1.720
(AVG_FSTS & VAR_FSTS) Model	1.9773	(9, 62)	1.153 > d _L > 1.108	1.771 > d _U > 1.761
TREND_FSTS Model	1.8160	(8, 62)	1.186 > d _L > 1.144	1.726 > d _U > 1.720

Table A7. Residual Tests: Serial Correlation (DW Test) test for FATA Models

Table A7				
Residual Tests (Serial correlation) for Operations internationalization models				
This table shows Durbin-Watson statistics and lower and upper boundaries of Durbin-Watson critical values for all operations internationalization models. The results show that for all operations internationalization based models except for the model that uses, average, d-statistic is greater than upper critical d value, suggesting, the null hypothesis of no positive serial correlation cannot be rejected. For the model that uses average of FATA, the d-statistic is lower than upper critical d value, indicating an inconclusive DW test.				
Model	DW d-stat	(k, N)	d_L (1% One-Sided)	d_U (1% One-Sided)
AVG_FATA Model	1.7687	(8, 37)	0.8410	1.8250
VAR_FATA Model	1.9725	(8, 37)	0.8410	1.8250
(AVG_FATA & VAR_FATA) Model	2.0041	(9, 37)	0.7870	1.9110
TREND_FATA Model	2.1297	(8, 37)	0.8410	1.8250

Table A8. Residual Tests: Heteroskedasticity test for FSTS Models

Table A8 Residual Tests (Heteroskedasticity) for Sales internationalization models			
This table shows Breusch-Pagan-Godfrey test statistics (sample size times the coefficient of determination), degrees of freedom and Chi-squared probability for regression equation with residual-squared as regressand and all other dependent variables as regressors. The results show that for all models, the test statistic is insignificant at 1% level of significance, suggesting that the null hypothesis of homoskedasticity cannot be rejected.			
Model	NR²	df	Prob. χ^2
AVG_FSTS Model	9.1546	8	0.3294
VAR_FSTS Model	8.0883	8	0.4249
(AVG_FSTS & VAR_FSTS) Model	7.9636	9	0.5378
TREND_FSTS Model	10.6187	8	0.2243

Table A9. Residual Tests: Heteroskedasticity test for FATA Models

Table A9 Residual Tests (Heteroskedasticity) for Operations internationalization models			
This table shows Breusch-Pagan-Godfrey test statistics (sample size times the coefficient of determination), degrees of freedom and Chi-squared probability for regression equation with residual-squared as regressand and all other dependent variables as regressors. The results show that for all models, the test statistic is not significant at 1% level of significance, suggesting that the null hypothesis of homoskedasticity cannot be rejected.			
Model	NR²	df	Prob. χ^2
AVG_FATA Model	10.0251	8	0.2633
VAR_FATA Model	7.0519	8	0.5310
(AVG_FATA & VAR_FATA) Model	9.3261	9	0.4077
TREND_FATA Model	6.3922	8	0.6034

Table A10. Estimation results for FSTS models with dummy for status of firms

Table A10				
Estimation Results for FSTS Models with Status of Firms				
This table shows the results from cross-sectional regression that estimates impact of sales internationalization on longevity of SMSFs. The FSTS is used as the measure of sales internationalization for analysis of relationship between sales internationalization and longevity. Relationship between longevity and sales internationalization is analyzed with three time-series summarization parameters of time-series of FSTS. The time series-summarization parameters used are mean, standard deviation and trend. Longevity (YOF_AGE) is the dependent variable and is analyzed with each of these summarization parameters (AVG_FSTS, VAR_FSTS and TREND_FSTS) for FSTS with other control variables including status of firm. Longevity is also analyzed with mean and standard deviation together. Standard errors are given in parentheses.				
Variable/Stat	FSTS			
	Model 1	Model 2	Model 3 w/ AVG and VAR	Model 4 w/ TREND
Intercept	47.2635*** (10.8267)	46.9423*** (10.1917)	46.9827*** (10.2866)	13.4073*** (2.9478)
AVG_FSTS	0.0009 (0.0567)		-0.0131 (0.0541)	
VAR_FSTS		0.4072*** (0.1576)	0.4111*** (0.1599)	
TREND_FSTS				-0.0117 (0.3086)
AVG_EMP	0.0514*** (0.0116)	0.0532*** (0.0108)	0.0529*** (0.110)	0.0256*** (0.0082)
LOG(AVG_TA)	-4.0416*** (1.2380)	-4.5000*** (1.1656)	-4.4607*** (1.1874)	
AVG_RND	-0.0031 (0.0027)	-0.0060** (0.0027)	-0.0061** (0.0028)	
AVG_MTB	0.0547 (0.1213)	0.1278 (0.1160)	0.1333 (0.1192)	
AVG_DEBT	-0.0241 (0.0198)	-0.0237* (0.0171)	-0.0219 (0.0188)	
MNAINT_EMP	114.1826*** (43.6134)	71.9723* (43.5972)	69.8179* (44.8844)	119.8865*** (45.8612)
NHUF	-1.3220*** (0.5147)	-1.2168*** (0.4837)	-1.2036*** (0.4911)	-1.4954*** (0.5506)
ACTIVE_D	-0.0631 (1.8866)	1.0600 (1.8132)	1.0119 (1.8405)	-0.8136 (2.2060)
TREND_TA				0.0001** (0.0001)
TREND_RND				0.0034* (0.0025)
TREND_MTB				0.1379 (0.1460)
TREND_DEBT				-0.0393 (0.0360)
R ²	0.3748	0.4459	0.4466	0.3051
F-Stat	3.4641***	4.6501***	4.1152***	2.5365***
AIC	6.8911	6.7704	6.8015	6.9969
SC	7.2342	7.1135	7.1789	7.3400
DW	1.9048	1.9898	2.0009	1.7981
Note:				
*** Significant at p-value < 0.01 ** Significant at p-value < 0.05				
* Significant at p-value < 0.1				

Table A11. Estimation results for FATA models with dummy for status of firms

Table A11				
Estimation Results for FATA Models with Status of Firms				
This table shows the results from cross-sectional regression that estimates impact of operations internationalization on longevity of SMSFs. The FATA is used as the measure of operations internationalization for analysis of relationship between operations internationalization and longevity. Relationship between longevity and operations internationalization is analyzed with three time-series summarization parameters of time-series of FATA. The time series-summarization parameters used are mean, standard deviation and trend. Longevity (YOF_AGE) is the dependent variable and is analyzed with each of these summarization parameters (AVG_FATA, VAR_FATA and TREND_FATA) for FATA with other control variables including status of firm. Longevity is also analyzed with mean and standard deviation together. Standard errors are given in parentheses.				
Variable/Stat	FATA			
	Model 1	Model 2	Model 3 w/ AVG and VAR	Model 4 w/ TREND
Intercept	32.4836** (17.2237)	18.6080 (15.9229)	19.0787 (14.9645)	12.3773*** (4.4726)
AVG_FATA	0.0278 (0.1248)		-0.3010** (0.1407)	
VAR_FATA		0.5331*** (0.2036)	0.8995*** (0.2568)	
TREND_FATA				0.5662 (0.5004)
AVG_EMP	0.0425*** (0.0162)	0.0358** (0.0147)	0.0346*** (0.0138)	0.0247* (0.0145)
LOG(AVG_TA)	-2.4952* (1.8807)	-1.1287 (1.7362)	-1.0622 (1.6318)	
AVG_RND	-0.0027 (0.0029)	-0.0029 (0.0026)	-0.0030 (0.0025)	
AVG_MTB	-0.0157 (0.2266)	-0.0117 (0.2012)	-0.0685 (0.1909)	
AVG_DEBT	0.0742 (0.0841)	-0.0071 (0.0809)	-0.0327 (0.0770)	
MNAINT_EMP	96.2404* (58.1253)	79.0146* (51.8241)	87.9689** (48.8790)	97.6497* (64.8849)
NHUFC	-1.0310* (0.7044)	-0.8849* (0.6263)	-1.0161** (0.5917)	-1.2511** (0.7298)
ACTIVE_D	-1.0020 (2.8406)	-0.8521 (2.5321)	-0.2648 (2.3952)	0.6495 (3.1248)
TREND_TA				-0.0001 (0.0001)
TREND_RND				0.0023 (0.0028)
TREND_MTB				-0.0014 (0.2907)
TREND_DEBT				0.0386 (0.1105)
R ²	0.3329	0.4670	0.5468	0.2405
F-Stat	1.4968*	2.6285**	3.1365***	0.9501
AIC	7.1271	6.9027	6.7946	7.2568
SC	7.5625	7.3381	7.2735	7.6922
DW	1.7896	2.0032	2.0137	2.1272
Note:				
*** Significant at p-value < 0.01 ** Significant at p-value < 0.05				
* Significant at p-value < 0.1				

APPENDIX B

Figure B1. Scatter plots of YOF_AGE vs. independent variables for FSTS models using Averages and Variations

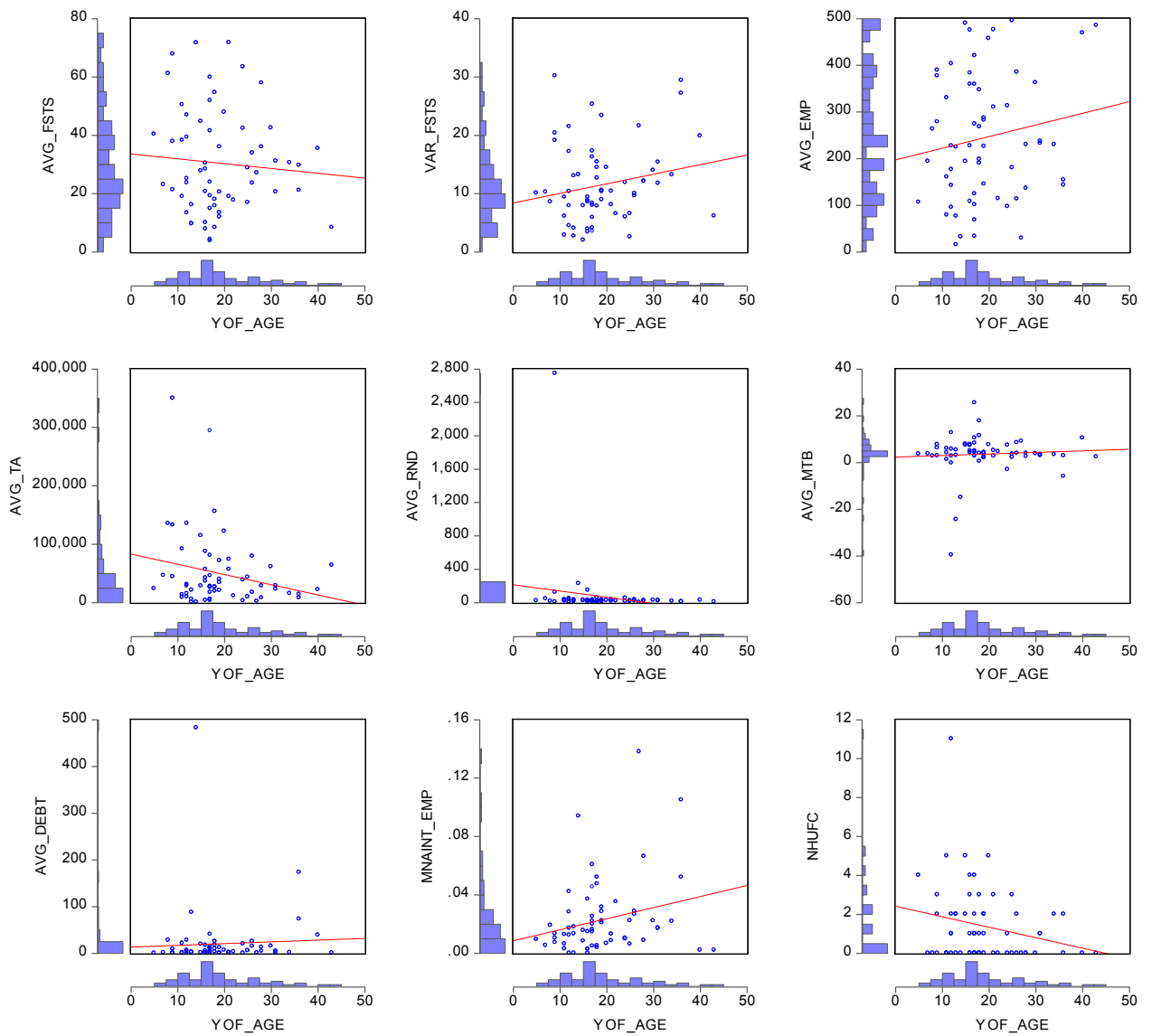


Figure B2. Scatter plots of YOF_AGE vs. independent variables for FSTS models using Trends

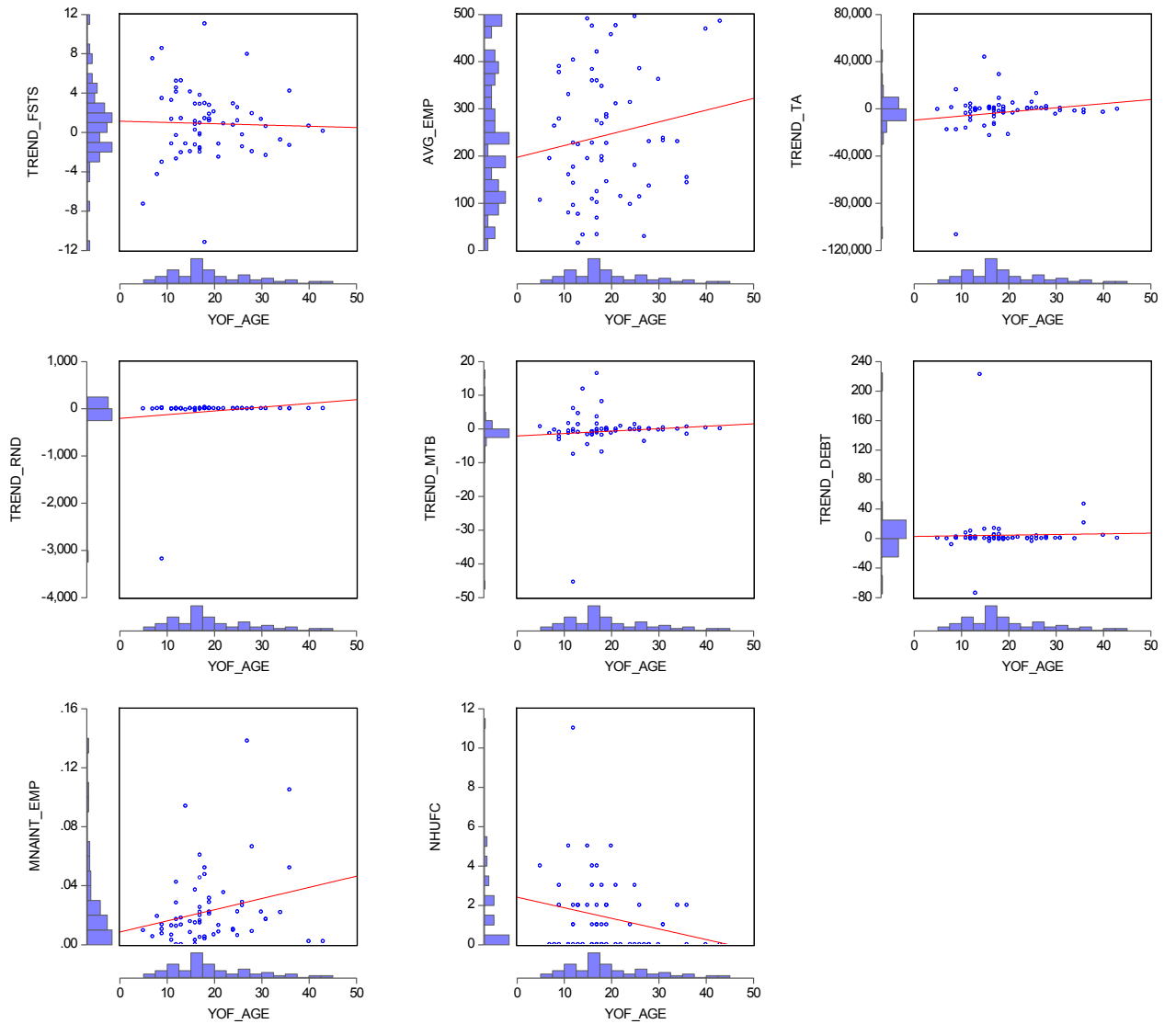


Figure B3. Scatter plots of YOF_AGE vs. independent variables for FATA models using Averages and Variations

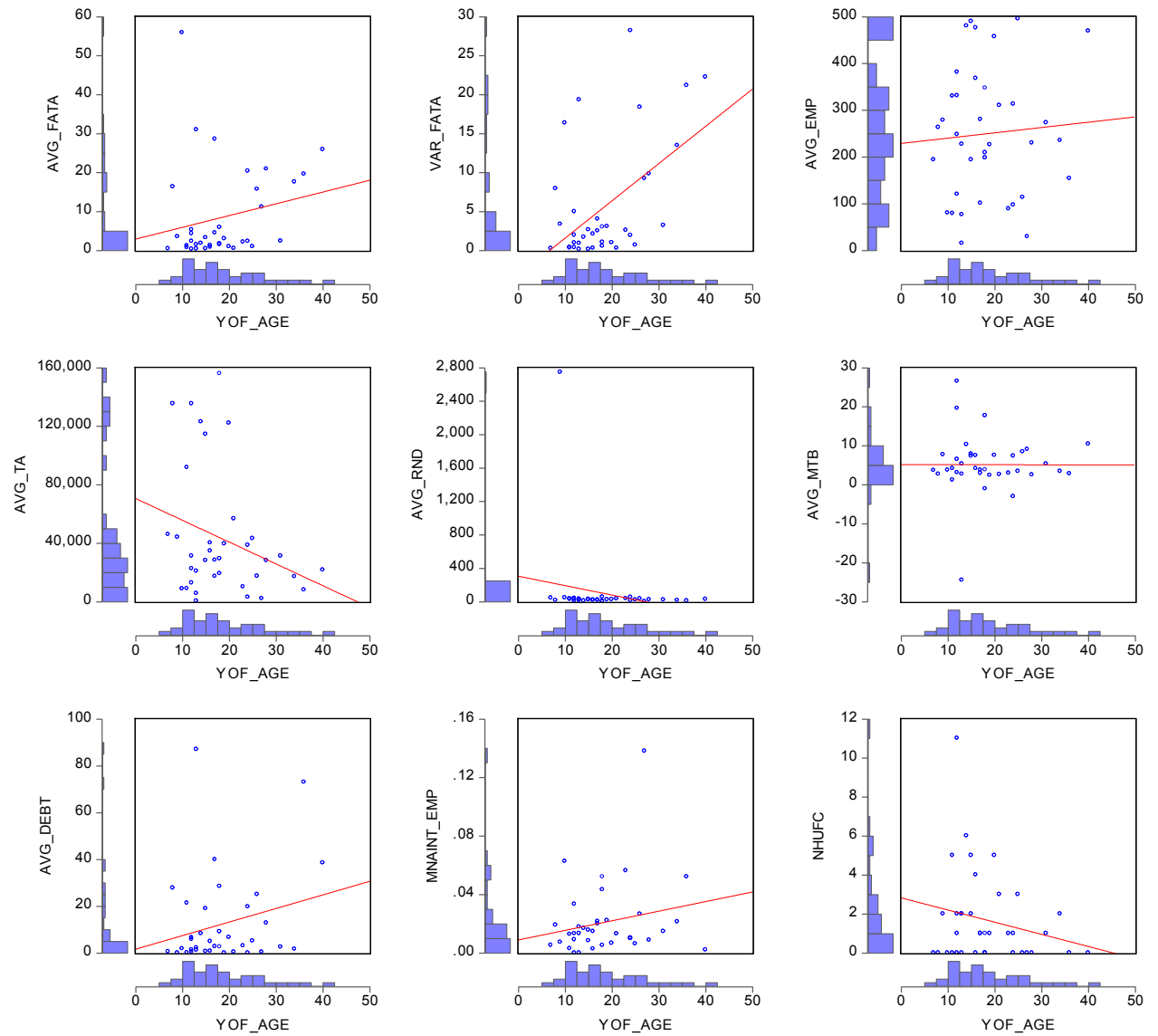


Figure B4. Scatter plots of YOF_AGE vs. independent variables for FATA models using Trends

