The International Journal of
Business and Finance RESEARCH

VOLUME 9 **NUMBER 4** **2015**

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International Journal of Business and Finance Research
Vol. 9, No. 4, 2015, pp. 1-10
ISSN: 1931-0269 (print)
ISSN: 2157-0698 (online)

IBFR
www.theIBFR.com

RELATIONSHIP BETWEEN FEMALE ILLNESS AND SAVINGS: EVIDENCE FROM JAPANESE WOMEN

Yoko Mimura, California State University Northridge
Kim Love-Myers, University of Georgia
Janine E. Aronson, University of Georgia

ABSTRACT

Unexpected life events, such as the onset of illness, can alter our ability to follow the life cycle model of personal financial planning, yet there are limited studies at a micro-level examining such impacts among households in Japan. We assessed the association between the onset of illness and the presence and amount of financial savings among marrie7d and single middle-aged women, using the Japanese Panel Survey of Consumers (2005-2009) and Analysis of Covariance (ANCOVA). Compared to married women (n=27), single women (n=16) spent more on life insurance premiums following an illness than the year before. Unlike married women, none of the single women had savings or investments prior to the onset of illness, not to mention following such events. In conclusion, middle-aged single women, a growing population in modern Japan, are further disadvantaged following the onset of illness than their married counterparts.

JEL: D140, J120

KEYWORDS: Health, Investments, Japan, Life Insurance, Marital Status, Savings, Women

INTRODUCTION

In many industrialized nations, more individuals are delaying marriage, and more remain single than in earlier generations. In Japan, the average age for a first marriage among women steadily increased between 1975, when the average age was 24.7 years old, and 2009, when it was 28.6 years old (Ministry of Health, Labour and Welfare, 2010). Consequently, being single at 30 and over is more common now than in earlier years. Marriage can provide a number of benefits ranging from having a family to financial security. Our paper examines the extent to which marriage provides a financial buffer when unpleasant and unexpected events occur in women's lives. We explored how unpleasant and unexpected health events may be associated with the rate and the amount of savings relative to income among single and married women in Japan. Saving is an inter-temporal choice between current and future consumptions and "is largely cued by different institutional and mental frames" (Akerlof & Shiller, 2009, p. 123). We hypothesized that unexpected health events, such as illness and depression, would cause reframing that initiates changes in savings behaviors and that changes would be different for women with different financial, social, and human capital. For instance, in the U.S., the economic consequence of divorce on women varies with variations in individual socio-demographic backgrounds (Mauldin, 1990).

There are a limited number of studies about savings in Japan at the micro level. One study confirmed that motivations to save vary according to the age of the householders and that the life cycle model applies to Japan (Horioka & Watanabe, 1997). In an earlier study, the total number of unexpected life events experienced in recent years did not explain the variations in current household savings among married Japanese women (Mimura, 2014). While different types of events may have different directions and magnitudes of impact on savings, in this paper, we examined how unwelcome, unexpected health events affect women's immediate *future* savings. Specifically, we asked the following questions: What is the impact of illness and depression on financial savings among women in Japan? More specifically, how does

the onset of illness relate to the presence of and amount of financial savings? How does the impact of unexpected life events on financial savings affect married and single women's households differently? Policy implications include the importance of a social security system that covers the entire society. Following the literature review on individual and family financial preparedness and the impact of unexpected events on individual and family financial preparedness, this article discusses the study's data and methodology, results, and concluding comments.

LITERATURE REVIEW

After summarizing the trends in household savings over the past two decades to describe individual and family financial preparedness in Japan, the following literature review provides an overview of studies that examined the impact of unexpected life events on financial preparedness primarily in Japan, including the association between financial preparedness and marital status among women. Brief descriptions of the theoretical framework and the hypotheses for the current study conclude this section.

During the economic recession of the 1990's, the Japanese national household savings rate sporadically increased in some years due to uncertainties regarding future income, after a constant decline for a few decades (Okada & Kamata, 2004). Among younger households, the increase in financial reserves was indeed due to future uncertainties (Murata, 2003). At the same time, there were still some households with no savings or investments for the future (Institute for Research on Household Economics, 2003). In 2009, about a quarter of the households in Japan had no savings. Ages of the householders and household income are two of the determinants of household savings. About 29% of households headed by individuals in their twenties had no savings, and about 20% of households headed by those in their sixties had no savings. The lower the income group, the more likely it was to have no savings. Among households with incomes below ¥3,000,000 (equivalent to US $29,283 in the U.S. when $1=¥102.45, the exchange rate of March 19, 2014), 34.5% had no savings, while among those with incomes over ¥12,000,000 (equivalent to US $117,130), only 5% had no savings (Bank of Japan, 2012). Studies point to the aging of the population as the cause of the decline in the household savings rate (Koga, 2006; Nakata, 2009; Shindo, 2006). Delaying marriage and an increase in one-person households can further challenge some women to maintain financial stability. Given the U.S.'s experiences in the expansions of earning gaps among male workers (Haider, 2001), increased Americanization of the Japanese labor market gives less guarantee that life earning patterns will continue to ensure that younger generations of workers will experience increases in earnings as did their older counterparts (Suzuki, Ito, Ishida, Nihei, & Maruyama, 2010).

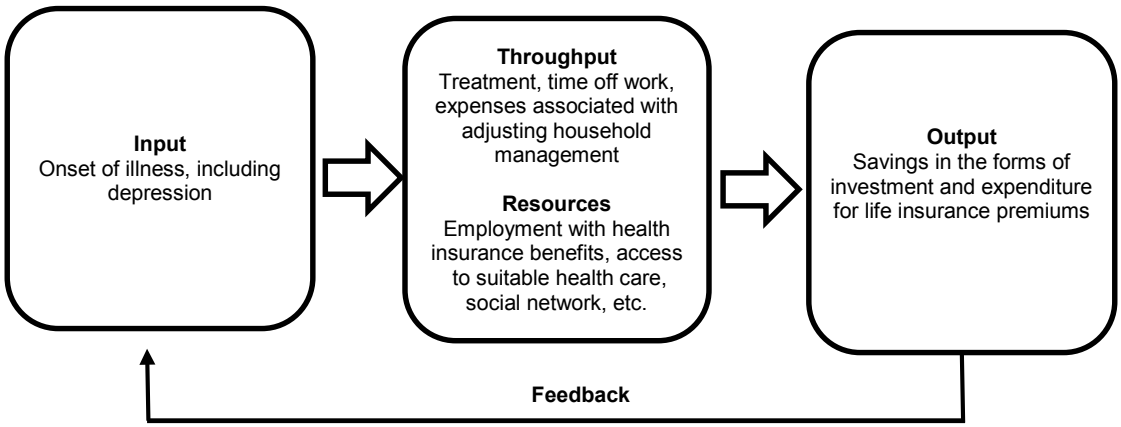
Unexpected events may hit households in a nation or region all at once or individually. Some are unique to regions, such as natural disasters. Natural disasters motivate households to save more (Skidmore, 2001). Other events are unique to individuals and families, such as the onset of illness, job loss, and marital disruptions. Job loss is one such example that affects household finances. In a study utilizing the Japanese Panel Survey of Consumers (1995-2004), the job loss of husbands was associated with increased earning among wives, both through labor force participation and increased hours at work (Kohara, 2010). While the job loss of self and spouse has strong implications on household financial preparedness, it is outside the scope of the current study. One of the motivations to save is to prepare for unexpected events such as the onset of illnesses. Precaution, or preparing for unexpected events, such as illness, job loss, accidents, and longevity, is one of the major motivations to save among Japanese households (Horioka & Watanabe, 1997). For self-employed farm households in Japan, the motivation to save for farm investments was greater than that to save for unexpected events such as illness (Kamo & Fujita, 2002), and the motivation to save for possible illness was far greater than for households that rely on salaried income (Zhou, 2003).

Generally, onsets of illness have negative impacts on household finances. One of the reasons is because such onsets and experiences correlate with other socio-demographic factors that disadvantage financial wellbeing (Kessler & Bromet, 2013). Indeed, illness and disabilities negatively affect earnings. An added

complication is that the presence of illness and marital disruption are associated with the presence of depressive symptoms among men in Japan (Ogami, Muto, Haruyama, & Yoshikawa, 2013).

In addition to financial preparedness prior to the event's occurrence, socio-economic environments may explain the *degree* of economic impact for individuals and households. Presently, for women, being married has generally provided financial advantage over being single (Suzuki et al., 2010). Perhaps, because of such disadvantage, single women who have no immediate plans to marry showed more willingness to save more for precautionary and retirement purposes (Kureishi & Wakabayashi, 2013). In conclusion, onsets of illness have negative impacts on household finances, and so, individuals and households prepare for such unexpected unwelcomed events, and the negative impacts are greater among women at social and economic disadvantage, including being single.

Figure 1: Conceptual Model of the Impact of Illness on Savings



This figure shows the conceptual model of the impact of illness on individual and family savings, based on the Family Resource Management Model (Deacon & Firebaugh, 1988). Input, such as the onset of illness, places a demand on families. Individuals and families respond to such input in the throughput process, employing available resources. The output we observe is the financial savings upon recovery. The output informs future input through feedback, such as for individual families and for natural aggregate savings.

The theoretical framework of this study comes from the family resource management model (Deacon & Firebaugh, 1988), shown in Figure 1. Unexpected life events, such as the onset of illness including depression, are *demands*, which are one type of external *input*. They affect the *throughput*, the process that occurs within individuals and families that is often unobservable. *Resources*, which are also part of the throughput, are measured by some of the control variables. The *input* goes through the *throughput*, resulting in observable *output*. The *output* in this study is the observable savings. *Feedback* may be the aggregate household savings statistics that mass media delivers, which informs individual perceptions about where the country and its households stand in terms of financial preparation for the future. We hypothesized that the onset of illness, including depression, among women significantly lowers financial savings as such events may limit earnings and deplete savings. The negative impact is greater among households with less financial and social resources. The relative magnitude of negative financial consequences of unexpected life events are greater for women from less advantageous economic backgrounds than those from more advantageous economic backgrounds, such as being single versus married; thus, such events magnify inequality.

DATA AND METHODOLOGY

Data and Sample

The data came from the Japanese Panel Survey of Consumers (JPSC), provided by the Institute for Research on Household Economics in Tokyo, Japan. Survey respondents are women, and those in the study sample were between the ages of 30 and 50 for the questionnaire collected in 2009. The latest year of the survey available to the public in 2013 was 2009.

Single and married women who experienced an illness or depression were included in the study. While keeping track of other events would further enhance our understanding of life events and savings dynamics, it is beyond the scope of the current exploratory study. Data from five years of surveys, 2005 through 2009, provided three consecutive years of data for the survey respondents who experienced an illness or depression in a year between 2006 and 2008, but not for two or more consecutive years. In other words, for the purpose of this paper, we excluded women whose records indicated they were still experiencing an illness or depression in the second year. Some women experienced more than one event during the observation period. Such cases, although removed from the sample for the present study, are certainly worthy of consideration for further analysis on the consequences of subsequent unpleasant, unexpected life events on savings. The year prior (t-1) provided the baseline financial information, the middle year (t) provided the life event information, the year after (t+1) provided the response variable for the financial information, and all three years were examined for marital status. We focused on the changes in amount of savings associated with the experience of illnesses, instead of both illnesses and changes in marital status. Therefore, only the observations with consistent marital status during the three observation years (t-1, t, t+1) were included in this study (n=43, n=27 married, n=16 non-married).

Analytical Approach

To show descriptive statistics of the data, we employ Chi-square tests and t-tests. We then utilized mixed models to assess the impact of illness and depression on the savings behaviors of women in Japan through ANCOVA. The model for determining the impact on household income for individual *i* was

$$HouseholdIncome_i = \beta_0 + \beta_1 PreviousIncome_i + \beta_2 Married_i + \beta_3 (Married_i \times PreviousIncome_i)$$

where *Household Income* refers to the household income the year after the event, *Previous Income* refers to household income the year prior to the event, and *Married* refers to an indicator variable that is 1 if the individual is married and 0 otherwise. A similar model substituted life insurance premium payments before and after the event for household income. Because none of the non-married women had financial savings or investments before or after the event, for these two measurements, we assessed the odds of having savings or investments with logistic regression.

$$ln\left(\frac{\mathrm{P}(Savings)}{1-\mathrm{P}(Savings)}\right) = \beta_0 + \beta_1 PreviousSavings_i$$

where P(*Savings*) refers to the probability of having savings the year after the event, and *Previous Savings* is an indicator variable that is a 1 if the individual had savings in the previous year and 0 otherwise.

Variables

There were two sets of main response variables of interest. The first was the values of household income, savings, investments, and expenditures for life insurance policies the year following the illness or

depression. The second was the presence of household savings and investments. Unlike income and expenditures for life insurance, these did not allow us to compare between married and single women. This is because none of the single women had any savings, and therefore, the probability would have been zero. For this reason, we assessed the presence of savings and investments separately without a comparison between the marital status groups.

The main explanatory variable for the value after the event model was the value of the financial preparedness the year before the event experience. We assessed marital status and the interaction between the value of financial preparedness and marital status, although the latter was eliminated from the presented results when insignificant. The model assessed the magnitude and direction of the overall association between health related events and savings and investments; however, the results do not show the magnitudes of all potential positive and negative impacts. Unpleasant, unexpected life events can have both impacts. The positive impact is making individuals realize the importance of savings, thereby enhancing their motivation to save. The negative impact is that it is impossible to save due to either reduced income or increased expenditure associated with the events, thus decreasing the likelihood and the amount of savings. Finally, we expect that unpleasant, unexpected life events may reduce household income. Therefore, in addition to financial preparedness, we examined income changes, as well. Finally, while control variables, such as life satisfaction (Mimura, 2014) and socioeconomic characteristics of the respondents and households may explain the variations in the changes in financial preparedness upon experiencing illness and depression, due to the small sample size, the current study did not incorporate these other possible explanatory variables.

RESULTS

In this section, after presenting the sample based on descriptive statistics, the model results that explain the changes in household financial preparedness following an illness or depression are described. When comparing the amount of household income, savings, investments, and payment for life insurance policies in the year following illness or depression through bivariate t-tests, none of these was different from the amount from the year prior to the event experience. In other words, the mean amount of each among 43 households was not different after experiencing the event. In terms of differences between married and non-married women included in this study, shown in Table 1, a few differences are noteworthy. First, while the household income between the two types of households was not different prior to the event experience, it was significantly lower among non-married women's households than among married women's households after the event.

None of the 16 non-married women's households had financial savings before or after the event, nor did they have financial investments. Finally, while the amount of life insurance policy payments prior to the event experience was higher among married women's households than among non-married women's households, the difference was not statistically significant following the event.

Table 2 shows the number of married and single women in the sample that held each of the three types of financial preparation, savings, investments, and life-insurance premium payments, before and after experiencing significant illness or depression. It shows a lack of savings and investments among single women, a loss in investments for one married woman, a loss in life-insurance premium payments for one single woman, and finally, an addition of life-insurance premium payments for three single women, all following an event.

Table 1: Descriptive Statistics of Financial Preparedness among Married and Single Women Who Experienced Significant Illness or Depression

	Married				**Single**			
Variable	**Mean (Standard Deviation)**	**Minimum**	**Maximum**	**Column %**	**Mean (Standard Deviation)**	**Minimum**	**Maximum**	**Column %**
Income before (in 1,000 yen)	1401.0 (764.7)	314.0	3084.0		1223.9 (1118.9)	236.0	4232.0	
Income after (in 1,000 yen)**	1444.4 (970.0)	120.0	4189.0		870.3 (448.2)	336.0	2026.0	
Had savings before***				85.19%				0.0%
Had savings after***				77.78%				0.0%
Had investment before				14.81%				0.0%
Had investment after				11.1%				0.0%
Life insurance payment before (in 1,000 yen)***	57.6 (96.2)	0	500.0		4.8 (7.0)	0	24.0	
Life insurance payment after (in 1,000 yen)	76.2 (266.2)	0	1400.0		8.25 (10.67)	0	39.0	
N	16				27			

*This table describes financial preparedness, measured through income, savings, investment, and life insurance premium payment, among married and single women in Japan who experienced illness or depression. The figures for "before" are from the year prior to the illness experience, and those for "after" are from the year after such an experience. Means, standard deviation, minimum, and maximum are in ¥1,000. T-tests compared the mean differences between married and single women. These t-tests utilized the Satterthwaite method that assumes unequal variances between two groups. Chi-square tests assessed the dependency between each of the four "had … before/after" and marital status. ***<0.01, **<0.05, *<0.10*

Table 2: the Number of Married and Single Women Who Maintained Financial Preparedness before and after the Significant Illness or Depression

			Married		**Single**	
			After		After	
			No	Yes	No	Yes
Savings	Before	No	2	2	16	0
		Yes	4	19	0	0
Investment	Before	No	23	0	16	0
		Yes	1	3***	0	0
Life Insurance	Before	No	0	1	4	3
		Yes	2	24	1	8**

*This table describes the frequency distribution of women who held each of the three types of financial preparedness the year prior to and following the significant illness or depression. These figures are the number of observations in each category. For each of the financial preparation items and marital status, the upper left (No-No) and lower right (Yes-Yes) indicate no changes in the status, while the upper right (No-Yes) and lower left (Yes-No) indicate changes in the status. Chi-square tests assessed the dependency each of the four "had … before/after" separately based on marital status. Due to the small cell size, the Chi-square tests may not be valid. ***<0.01, **<0.05, *<0.10*

Model Results

Table 3 shows the estimated changes in household financial preparedness following illness or depression among married and non-married women's households using ANCOVA. Income, savings, investments, and life insurance policy payments were higher when their values were higher the year before the event experience. At a lower income level, the difference in the household income level the year after was not significantly different between married and non-married women's households. The gap in the income levels of married and non-married women's households was greater at higher income levels. Due to the

confounding of having savings and investments and marital status, the models for these two did not include marital status. The amount of savings prior to experiencing illness or depression had a positive association with the amount of savings following such events.

Similarly, the amount of investment assets prior to experiencing illness or depression had a positive association with the amount of investments following such events. The coefficients of less than one in both estimates suggest a possible negative impact of the event on the amount of savings and investments. Estimated life insurance premium payments the year after the event experience were higher when the amount paid the year before the event experience was higher, and it was higher among non-married women's households than among married women's households.

Table 3: Estimated Changes in the Household Savings Following Significant Illness among Married and Single Women through ANCOVA

Effect	Income	Savings	Investments	Life Insurance Premium Payment
Intercept	380.98	251.43***	-1.72	-71.66***
Value the year before experiencing the illness	0.76***	0.54***	0.86***	2.58***
Married (vs. single)	178.54			67.64***
Value the year before*single	-0.52**			
-2 Log Likelihood	662.62***	624.3***	415.9***	491.91***
N	43	43	43	43

*This table shows the estimated changes in the household savings following significant illness or depression among married and single women in Japan through ANCOVA. For each model, the response variables, the values the year after, and the value of the year before are in 1,000 Japanese yen. ***<0.01, **<0.05, *<0.10*

None of the non-married women included in the study had savings or investments both before and after the event experience. Further, only a handful of the married women had investments. Table 3 shows the results of logistic regression models for savings and investments. The odds of having had savings following an illness or depression were over 42.75, as much when the households had savings the year before as when they had no savings. The investment model did not have a significant variable. We presume that the sample size was too small to assess a robust model.

Table 4: Odds Ratios of Having Had Financial Savings Following Illness among Married and Single Women

Effect	Savings	Investments
Intercept	4.75***	3.00
Have had the year before	42.75***	17,273,774.77
N	43	43

*This table shows the odds ratios of having had financial savings following illness, including depression, among married and single women in Japan, based on two logistic regression models. For each model, the predictor variable was having had the respective financial savings the year before the illness or depression. We eliminated the predictor variable marital status from both models because no single woman in our sample had savings or investments. ***<0.01*

CONCLUDING COMMENTS

The goal of this paper was to assess the association between the onset of illness among middle-aged women in Japan and the extent to which it negatively affects the presence and amount of financial savings in their households. In particular, we compared the difference in the impact of the illness between married and single women. The data for the study came from the Japanese Panel Survey of Consumers (2005-2009). The methodological approach utilized was Analysis of Covariance (ANCOVA), where the model compared individual household observations from the year after the onset of illness to that from the year prior to the onset of illness. In summary, the amounts of household income, savings, investments, and life insurance policy payments from the year prior to an onset of illness or depression among women had positive associations with the amount of each held by their households the year following such events.

Further, non-married women with higher incomes experienced disproportionate declines in their household incomes following the event compared to married women, reflecting a marriage safety net by having husbands as primary or co-breadwinners. Non-married women who experienced significant illness or depression during the observation period had another disadvantage of not having savings or investments, while a majority of married women's households had savings, and some of them had investments. The relative magnitude of negative financial consequences of unexpected life events are greater for women from less advantageous economic backgrounds than those from more advantageous economic backgrounds, such as being married versus single; thus, such events magnify inequality. An increase in savings often follows an increase in investment (Shinha, 2002). These single female households may be at least two dimensions, savings and investments, behind their married household counterparts. Non-married women who experienced significant illness or depression were less likely to have had financial reserves to cope with lost incomes or added expenses due to such events. Finally, while non-married women's households spent less for life insurance policy premiums the year prior to an illness or depression than married women's households, the year after, their expenditures were not different from each other.

This study has a few limitations. First, the number of survey participants who experienced significant illness or depression who we could incorporate for this study was limited to a small number. The small sample size limited our ability to assess the association between various socio-economic characteristics, such as age, household structure beside marital status, and educational attainment, and the changes in financial preparedness among women in Japan. Second, women in the age range included in this study were limited to between 30 and 50 years of age as of 2009. The generalizability of the findings to younger and older women is limited. In particular, at an older age, men and women may be more vulnerable to illnesses, and the duration to recover financially through earned income may be more limited. Finally, we do not know if the changes in financial preparedness are indeed due to the onset of significant illness or depression of the women who responded to the survey.

A few directions future studies may take include an extension of the observation period. The five-year observation period for the present paper did not yield a large enough sample size for a robust analysis. Examining the impact of long-term illness, rather than the onset of illness, on the household finances will make a meaningful contribution to the literature. Finally, with a larger sample size, examining the nature of the relationship between these women and their extended family members and close friends will advance our understanding of the significance of a social network that may not reflect the financial aspect of the data. The findings suggest a significant disadvantage and decline in financial preparedness among single women who initially had less than married women. The findings have implications for professionals who serve middle-aged single women. Financial education, planning, and adjustments in plans and lifestyles are important before, during, and after experiencing unexpected, unpleasant significant illnesses or depression. Because the probability of having savings and their values are higher among individuals and families in higher social strata than those in lower social strata, the impact of the current, enduring recession on widening intra-national economic inequalities in Japan is of great concern.

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ACKNOWLEDGEMENTS

The Probationary Faculty Support Program the California State University Northridge and the NIH Research Infrastructure in Minority Institutions (RIMI) from the National Institute of Minority Health and Health Disparities, P20 MD003938, at the California State University Northridge supported the first author's contribution. We thank the Institute for Research on Household Economics in Tokyo, Japan for loaning the data for this study. We presented the preliminary stage of this study at the American Council on Consumer Interest 2013 Annual Meeting in Portland, Oregon in April 2013, where the audience provided helpful suggestions. We thank Stephanie Short of University of Georgia for valuable comments.

BIOGRAPHY

Yoko Mimura (Ph.D.) is Assistant Professor of Consumer Affairs in the Department of Family and Consumer Sciences, California State University Northridge. Her research focuses on financial practices of special populations, such as women, immigrants, and low-income families with children. She can be contacted at California State University Northridge, 18111 Nordhoff Street, Northridge, California 91330-8308, U.S.A.; phone: 818.677.7859, email yoko.mimura@csun.edu.

Kim Love-Myers (Ph.D.) is the associate director of the Statistical Consulting Center in the Department of Statistics at the University of Georgia. The Statistical Consulting Center's web page is at www.stat.uga.edu/consulting. She can be contacted at the Department of Statistics, University of Georgia, 101 Cedar St., Athens, GA 30602-7952, U.S.A.; phone: 706.542.7348; email: krlove@uga.edu.

Janine E. Aronson (B.S., M.S., M.S., Ph.D., Carnegie Mellon University) is Professor of Management Information Systems in the Terry College of Business at The University of Georgia. Her research focuses on computational finance, business intelligence, artificial intelligence, knowledge management, network optimization, and parallel computing. She can be contacted at the Department of Management Information Systems, Terry College of Business, Brooks Hall, The University of Georgia, Athens, GA 30602-6273, U.S.A.; phone: 706.542.0991; email: jaronson@uga.edu.

International Journal of Business and Finance Research
Vol. 9, No. 4, 2015, pp. 11-20
ISSN: 1931-0269 (print)
ISSN: 2157-0698 (online)

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www.theIBFR.com

OUTSOURCING STRATEGIES AND THEIR IMPACT ON FINANCIAL PERFORMANCE IN SMALL MANUFACTURING FIRMS IN SWEDEN

Anders Isaksson, Chalmers University of Technology
Björn Lantz, Chalmers University of Technology

ABSTRACT

Outsourcing, i.e., the strategic use of outside resources to perform activities traditionally handled by internal staff and resources, have received increased attention in management practice around the world over recent decades. However, even though the main goal of outsourcing must be assumed to be improved financial performance, few researchers have been able to empirically establish this relationship. Furthermore, because most studies have been focusing on large firms, there is also a lack of knowledge on how small firms adopt outsourcing strategies. Therefore, the purpose of this study is to explore outsourcing strategies among small manufacturing firms, and to test how these strategies can be linked to financial performance. The study is based on questionnaire and financial data collected through a stratified sample of 700 small (<50 employees) manufacturing firms in Sweden (with a response rate of 56 percent or 400 firms). Measures of outsourcing were collected from the questionnaire, and performance indicators were collected from annual reports published one year later. We used Principal Component Analysis to identify four outsourcing strategies: Back office activities, Primary activities, Accounting activities, and Support activities. However, in line with previous research, multiple regressions did not reveal any significant relationship between these strategies and financial performance.

JEL: M55

KEYWORDS: Outsourcing, Financial Performance, Small Firms, Sweden

INTRODUCTION

Outsourcing, i.e., the strategic use of outside resources to perform activities traditionally handled by internal staff and resources, have received increased attention in management practice around the world over recent decades (Gottfredson *et al.*, 2005; Bhattacharya *et al.*, 2013). The reasons why firms decide to outsource vary, even if the most mentioned motive is often to achieve cost benefits and/or focus on core competencies. These two motives are often interlinked as one argument whereas managers use outsourcing in order to improve the use of capital investments by concentrating the firm's human and capital resources on its main activities (Quélin, Duhamel, 2003). Beside these main motives, other reasons for outsourcing mentioned in the literature are, to achieve best practice by acquiring access to external competencies (Kakabadse, Kakabadse, 2002) to transform fixed costs into variable costs (Alexander, Young, 1996), or as a tool in adapting to rapidly changing environments (Leavy, 2004). An increase of the firm's internal focus on its core business is often assumed to result in performance improvements, and, as a result, an increased market value. Despite some research that shows a positive effect on outsourcing on firm value (Hayes *et al.*, 2000; Jiang *et al.*, 2007), the empirical evidence of the direct effect of outsourcing on firm performance is inconclusive. Furthermore, as stated by Jiang and Qureshi (2006, p 45) in their comprehensive review of the field "*previous work on outsourcing has been primarily theoretical in nature and has relied mostly on anecdotal evidence, from case studies, surveys or other self-reported data, to*

support assertions". Moreover, they state that (p. 46) "*we have located no studies with fully reliable quantitative indicators of performance across a statistically representative sample of firms*".

The purpose of our study is to explore outsourcing strategies among small manufacturing firms in Sweden, and to test how these strategies can be linked to financial performance. By using a large sample of randomly selected firms, and analyzing performance with unbiased quantitative indicators, we will seek to narrow the research gap identified by Jiang and Qureshi (2006). Furthermore, by researching small firms in a Swedish context our study aims to fill two other research gaps, the lack of studies in a non-US context and the lack of studies on small firms.

First, from previous literature reviews of the field (e.g. Jiang, Qureshi, 2006; Bustinza *et al.*, 2010; Kroes, Ghosh, 2010), it is obvious that previous research in the area has been dominated by studies in a U.S. context, even though there are some noteworthy exceptions (Bustinza *et al.*, 2010; Bhattacharya *et al.*, 2013). We believe that there is a need for research from other cultural settings in order to better understand outsourcing behavior. To support this claim, there are several examples of how operations management practice differs in different cultural settings, for instance in the use of flexible manufacturing system (Darrow, 1987), the adoption of new forms of work organization (Cagliano *et al.*, 2011) or how national culture influences investments in manufacturing practices (Kalchschmidt, Mazzoleni, 2013). Hence, in order to get a more general knowledge on outsourcing strategies, and their effect on firm performance, we aim to contribute to previous outsourcing research by adding results from a Swedish context.

Secondly, despite the fact that several researchers have proposed that there is a small firm effect on the use of outsourcing (e.g. Hayes *et al.*, 2000; Gilley *et al.*, 2004), we have found no study that has investigated outsourcing and its effects on a representative sample of small and medium sized firms, SME:s, (for a precise definition of SME:s see European Commission (2005)). Further, one reason why the study of SME:s is important is the fundamental role that they play in the economic activities, and growth, in society (Storey, 1998). For instance, in Europe SMEs account for 99.8% of all enterprises, 66.8% of total employment and 57.9% of total value added generated by the non-financial business sector (Muller *et al.*, 2014).

The difference between small and large firms is not only a matter of size. One important difference often highlighted in the literature is that smaller firms usually have a lower degree of structural complexity and bureaucracy vis-à-vis larger firms (Mintzberg, 1979), which increase their speed and flexibility in information-processing capacity (Chen, Hambrick, 1995). Several studies have also found that managers of small firms are often less prone to follow formal rational decision processes than managers from larger established firms (Smith *et al.*, 1988) and, hence, rely more on heuristics in their decision making (Busenitz, Barney, 1997). Other differences frequently highlighted are that the small business environment more often is characterized by higher levels of uncertainty about the market and technological development, due to the fact that these firms often are in early phases of their development (Wu, Knott, 2006). Furthermore, differences in access to critical resources, e.g. financial and human capital (Isaksson, 2006) and organizational structure can have important effects on how and why decisions are made, partly due to the effects these differences have on agency costs and information asymmetry issues (Schulze et al., 2001). Information asymmetry between owners and managers can for instance explain why operational decisions (e.g. to outsource or not) deviate from expected profit-maximizing capacity choices (Schmidt, Buell, 2014). Finally, transaction cost theory suggests that the benefits of outsourcing would be higher for SME:s than for large firms (Klaas *et al.*, 1999; Gilley *et al.*, 2004). However, as pointed out by Verbeke, Kano (2012), for many small firms traditional wealth maximizing goals are subordinated noneconomic goals such as socio-emotional values, the importance of preserving a family control etc. For example, Memili *et al.* (2011) argued that family firms that value noneconomic goals higher than economic goals favor outsourcing less than those that do not.

LITERATURE REVIEW

Relevant previous research (summarized in Table 1) has been identified through previous performed reviews (Jiang, Qureshi, 2006; Bustinza *et al.*, 2010; Kroes, Ghosh, 2010) combined with employment of different search engines for academic literature research, as Business Source Premiere, SSCI and Google Scholar.

Table 1: Sample Characteristics of Published Research on Effects of Outsourcing Included in Review

Authors	Country	Firm Size	Sample Size & Response Rate	Outcome Variable
(Hayes et al. 2000)	USA	n/a, mean sales $7M	76 (n/a)	Stock market data
(Gilley, Rasheed, 2000)	USA	>50, mean emp. 259	94 (17%)	Self-reported
(Jiang et al. 2006)	USA	n/a (publicly traded)	51(n/a)	Annual report
(Bolat and Yilmaz 2009)	Turkey	n/a (hotels)	110 (53 %)	Self-reported
(Bustinza et al. 2010)	Spain	>20 emp	213 (21%)	Self-reported
(Kroes and Ghosh 2010)	USA	Mean 1000 emp	233 (22 %)	Self-reported
(Bhattacharya et al. 2013)	Australia	n/a	5 case study	Self-reported

This table gives a summary of the main references mentioned in the literature review with a special emphasis on sample characteristics in order to better position our research contribution (the lack of studies on small firms in Europe with reliable quantitative samples and indicators).

Based on the hypothesis that outsourcing is considered to be a value-added business Hayes et al. (2000) investigated how information systems (IS) outsourcing announcements impacted the market value of publicly traded contract-granting firms. Of special interest to this study is that they managed to find that outsourcing announcements had a significant positive effect on small firms, whereas the effect on large firms was not significant. One theoretical explanation for this difference in market reaction was that due to higher information asymmetries (see e.g. Healy, Palepu, 2001) surrounding smaller firms, the market reacted significantly more positive to value-added announcements than for larger firms. However, it is important to note that the categorization of small firms in this study is based on the median size (of sales) of a sample of publicly traded firms, and not on any generally accepted definition of small businesses.

Gilley and Rasheed (2000) examined the extent to which outsourcing of both peripheral and near-core tasks influences firms' financial and nonfinancial performance on a sample of 94 manufacturing firms in the U.S. They did not find any significant direct effect of outsourcing on firm performance. However, an indirect effect on performance was found when using strategy (cost leadership vs. differentiation) and environmental dynamism as a moderator. One argument behind the moderating effect of strategy was that firms that pursue a cost leadership strategy are, by outsourcing, able to heighten their focus on their core competencies, and improve the quality of their nonstrategic activities.

Using the same sample as in Gilley and Rasheed (2000), Gilley *et al.* (2004) analyzed the effect of outsourcing of human resource (HR) activities (payroll and training outsourcing) on firm performance. As in their previous study, no effect was found on financial performance, but there was a small positive effect on firm innovation performance (R&D outlays, process innovation and product innovations) and stakeholder performance (employment growth & morale, customer and supplier relations). Based on the argument that human resource outsourcing would have a larger effect on smaller firms (due to transaction costs) they also tested for a moderating effect of size. However, no support was found for the hypothesis that HR outsourcing would be contingent on the size of the organization – maybe due to a relatively small sample size. Jiang et al. (2006) examined the impact of outsourcing on a firm's performance based on a sample of 51 publicly traded firms. Contrary to most previous studies on outsourcing effects, they used annual report data to measure performance and tested for changes in operating performances as a result from outsourcing decisions. They provided some evidence that outsourcing improved firm's cost-efficiency (SG&A/sales and expenses/sales) but did not find any effect on firm's productivity (sales/assets and asset productivity) or profitability (ROA and profit margin).

Bolat and Yilmaz (2009) examined the relationship between the outsourcing process, and perceived organizational performance in 80 hotels in Turkey, and found support for the hypothesis that outsourcing have a positive effect on organizational performance (organizational effectiveness, productivity, profitability, quality, continuous improvement, quality of work life, and social responsibility levels). Bustinza et al. (2010) studied 213 service firms in Spain, and concluded that there is a relationship between outsourcing decisions and company performance, which is articulated via the impact of outsourcing decisions on the firm's competitive capabilities. They concluded that outsourcing encourages a development of resources that enables a sustainable competitive advantage. In another study of U.S. data, Kroes and Ghosh (2010) studied the degree of congruence (fit or alignment) between outsourcing drivers and competitive priorities, i.e., outsourcing decisions should be made in alignment with the competitive priorities of the firm. They also evaluated the impact of congruence on both supply chain performance and business performance. The main findings were that outsourcing congruence across all five competitive priorities was positively and significantly related to supply chain performance. Bhattacharya et al. (2013), using a qualitative research design, studied outsourcing in five organizations in Australia. Based on agency theory, they analyzed how the receiver and the provider of outsourcing services perceived outsourcing from different angles, e.g., areas of convergence and divergence. They found that the different parties often shared opinions regarding environmental uncertainty, conflict, information asymmetry and duration of contract, while differences were found regarding their view on degree of formality, opportunistic behavior, and mutual dependency of the parties involved, goal compatibility and switching costs.

DATA AND METHODOLOGY

The surveyed population consists of small Swedish manufacturing limited companies collected in April 2013. Companies with less than 2 or more than 49 employees, with a turnover of less than 1 or more than 80 million SEK, with a balance sheet total over 80 MSEK, those being part of a business group, with more than one registered location, and without public annual reports as from 2011 were filtered out. The sampling frame then consisted of 7 635 companies. A stratified sample was conducted in order to ensure that the sample would be representative of the population. Companies were approached randomly by phone until 200 companies with less than 10 employees (i.e., micro firms) and 200 companies with 10 or more employees (i.e., small firms) had answered the questionnaire. Furthermore, in order to further ensure the validity of the sample, all data collection regarding the questionnaire was made by phone using an external service. A total of 700 companies were asked to participate, resulting in a response rate of 57 percent. Financial performance data regarding 2013 from these 400 companies were later collected through their annual reports published in 2014. Financial performance was measured with the ratios Return on Assets (ROA) measured as income before interest expenses divided by total assets and Return on Equity (ROE) measured as net income divided by Shareholders' equity.

The questionnaire included, apart from the standard demographic and other items, a section where respondents were presented with a list of 16 activities, and were asked to indicate the firm's outsourcing intensity of each activity: (1) Bookkeeping, (2) Financial reporting, (3) Tax Processing, (4) Payroll, (5) Billing, (6) Order processing, (7) Payment processing, (8) Other administration, (9) Manufacturing, (10) Purchases, (11) Warehousing, (12) Shipping, (13) Sales force, (14) IT services/system, (15) Customer Service, and (16) Training. A scale from 1 (the activity is performed entirely within the firm) to 5 (the activity is entirely outsourced) was used for each activity. The set of 16 activities is based on Gilley and Rasheed (2000). The respondents were also asked to indicate whether the strategic orientation of the company preferably should be described as oriented towards differentiation or as cost oriented (based on Verhoef and Leeflang, 2009). For a more detailed description of the questionnaire design, see Isaksson (2013). The data were initially analyzed through a principal component analysis (PCA) in order to extract latent factors from the 16 manifest items. The latent factors can be interpreted as the basic outsourcing strategies of the companies. These factors were then used as explanatory variables in multiple regression analyses in order to explore the relation between outsourcing strategies and financial performance. The

strategic choice between differentiation or cost, as well as the logarithm of the number of employees, was used as control variables for the regressions.

RESULTS

Table 2 presents the descriptive statistics regarding the degree of outsourcing of the various administrative and other activities in the companies. On average, most activities are not outsourced to any great extent. The obvious exceptions are items #2 and #3, and, to some degree, items #14 and #16. Some activities are almost always conducted within the firm, such as items #6, #10, #11, and #15.

Table 2: Descriptive Statistics Regarding Outsourcing of Activities

	ITEM	N	MEAN	STD.DEV.	SKEWNESS	KURTOSIS
Administrative activities	1. Bookkeeping	400	2.07	1.57	1.04	-0.62
	2. Financial reporting	400	3.99	1.39	-1.05	-0.29
	3. Tax Processing	397	4.16	1.42	-1.39	0.37
	4. Payroll	397	1.64	1.34	1.83	1.65
	5. Billing	399	1.26	0.93	3.50	10.77
	6. Order processing	397	1.12	0.65	5.59	29.93
	7. Payment processing	400	1.40	1.13	2.64	5.32
	8. Other administration	394	1.36	0.92	2.76	7.07
Other activities	9. Manufacturing	381	1.85	1.25	1.31	0.58
	10. Purchases	400	1.10	0.53	6.03	37.77
	11. Warehousing	390	1.20	0.70	3.96	15.73
	12. Shipping	388	2.32	1.66	0.68	-1.28
	13. Sales force	396	1.33	0.91	2.93	7.75
	14. IT services/system	389	2.69	1.53	0.25	-1.35
	15. Customer Service	396	1.17	0.64	4.30	19.19
	16. Training	374	2.78	1.45	0.19	-1.21

This table shows descriptive statistics across the participating firms regarding outsourcing intensity for each activity. As a measure of outsourcing, respondents were asked to indicate how each of the above 16 items was handled in the company, from 1 (handled entirely internally) to 5 (operated by entirely by external party).

Barlett's test of sphericity was significant ($p < 0.001$) and the Kaiser-Meyer-Olkin measure of sampling adequacy was 0.829, indicating that the data is suitable for a PCA. The PCA was performed, and latent factors were built as averages of items. In our case, the one factor solution explains only 31.09 % of the total variance, and the analysis suggests a solution with four factors (considering eigenvalues above 1). Hence, the PCA indicates that there are four basic outsourcing strategies in these firms.

Table 4 presents the rotated component matrix from the PCA, where the 16 items are grouped into four principal components, reflecting four basic outsourcing strategies. For legibility, only the highest factor loading for each item is displayed here. The first component consists of six items with a Cronbach's alpha of 0.859. The component includes the items #1, #4, #5, #6, #7, and #8. We denote the component "Back office" since these items constitute the typical back office activities. The second component is denoted "Primary", as it includes the items #9, #10, #11, #13, and #15, that is, the activities directly related to the primary operations. Thirdly, the component "Accounting" includes items #2 and #3, which typically are performed by outside accountants. Finally, the fourth component is called "Support", as it includes activities necessary to support the primary operations in the firm, that is, items #12, #14, and #16.

Table 3: Total Variance Explained

Item	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of variance	Cumulative %	Total	% of variance	Cumulative %	Total	% of variance	Cumulative %
1	4.97	31.09	31.09	4.97	31.09	31.09	3.70	23.13	23.13
2	2.12	13.22	44.31	2.12	13.22	44.31	2.86	17.88	41.01
3	1.57	9.80	54.11	1.57	9.80	54.11	1.93	12.06	53.07
4	1.22	7.65	61.76	1.22	7.65	61.76	1.39	8.69	61.76
5	0.98	6.12	67.88						
6	0.88	5.48	73.36						
7	0.81	5.06	78.43						
8	0.71	4.42	82.84						
9	0.56	3.49	86.34						
10	0.44	2.73	89.06						
11	0.37	2.29	91.35						
12	0.35	2.19	93.55						
13	0.32	1.99	95.53						
14	0.30	1.85	97.38						
15	0.24	1.49	98.88						
16	0.18	1.12	100.00						

This table shows the explained total variance for different number of factors in the PCA. The one factor solution explains only 31.09 % of the total variance, and the analysis suggests a solution with four factors (considering eigenvalues above 1). Hence, the PCA indicates that there are four basic outsourcing strategies in these firms.

Table 4: Rotated Component Matrix and Factor Loadings

	Component			
Item	**Back Office**	**Primary**	**Accounting**	**Support**
1	0.634			
2			0.846	
3			0.849	
4	0.781			
5	0.833			
6	0.667			
7	0.855			
8	0.740			
9		0.543		
10		0.762		
11		0.813		
12				0.713
13		0.598		
14				0.537
15		0.809		
16				0.661
Cronbach's alpha	0.859	0.777	0.759	0.341

This table shows the rotated component matrix and factor loadings in the PCA. It reveals how four factors are constructed out of the 16 items. Extraction Method: Principal component analysis. Rotation method: Varimax with Kaiser normalization.

The next step was to test for relationship between the four outsourcing strategies and financial performance. Multiple regressions with return on assets (ROA) and return on equity (ROE) as dependent variables were conducted, with the four outsourcing strategies as explanatory variables while simultaneously controlling for company size and strategic company direction. Thus, the two tested regression models were

$$ROA = \beta_0 + \beta_1 BOF + \beta_2 PRI + \beta_3 ACC + \beta_4 SUP + \beta_5 SIZ + \beta_6 STR + \varepsilon \quad (1)$$

and

$$ROE = \beta_0 + \beta_1 BOF + \beta_2 PRI + \beta_3 ACC + \beta_4 SUP + \beta_5 SIZ + \beta_6 STR + \varepsilon \quad (2)$$

where

BOF is the average tendency to outsource back office activities
PRI is the average tendency to outsource primary activities
ACC is the average tendency to outsource accounting activities

SUP is the average tendency to outsource support activities
SIZ (control variable) is the logarithm of company size (measured as the number of employees)
STR (control variable) is a dummy variable describing whether the core company strategy should be described as oriented towards costs (value = 0) or differentiation (value = 1)

In both cases, the data set was first sorted by the dependent variable and trimmed so that the highest 5 % and the lowest 5 % were excluded. Hence, each regression was based on 360 observations. The results from the regressions are displayed in Table 5 and 6. Overall, the models explain very little. There are basically no relation between outsourcing strategies and financial performance measures. The only exception is that the average tendency to outsource back office activities is negatively related to ROA, although this relation is only marginally significant. Company size is also found to be positively related to ROE, but as SIZ is used solely as a control variable in these analyses, the relation is of little interest in the study itself.

Table 5: Relation between ROA and Outsourcing Strategies

	B	***SE***	***T***	***P-Value***
(Constant)	7.46	3.05	2.44	0.015
BOF	-1.32	0.72	-1.83*	0.069
PRI	0.18	1.08	0.17	0.868
ACC	-0.37	0.47	-0.79	0.433
SUP	-0.53	0.57	-0.92	0.359
SIZ	2.38	1.64	1.46	0.147
STR	0.88	1.16	0.76	0.451

The table shows the results from the multiple regression analysis with return on assets (ROA) as dependent variable and the outsourcing strategies as explanatory variables. F = 1.680 (p = 0.126), R^2 = 0.034. ***, **, and * indicate significance at the 1, 5, and 10 percent levels respectively.

Table 6: Relation between ROE and Outsourcing Strategies

	B	**SE**	**T**	**P-Value**
(Constant)	-20.76	25.26	-0.82	0.412
BOF	-5.24	5.98	-0.88	0.381
PRI	7.98	8.92	0.89	0.372
ACC	-4.04	3.88	-1.04	0.298
SUP	3.06	4.73	0.65	0.518
SIZ	24.61	13.53	1.82*	0.070
STR	15.37	9.63	1.60	0.112

The table shows the results from the multiple regression analysis with ROE as dependent variable and the outsourcing strategies as explanatory variables. F = 2.042 (p = 0.060), R^2 = 0.041. ***, **, and * indicate significance at the 1, 5, and 10 percent levels respectively.

CONCLUSION AND DISCUSSION

Decisions to outsource are usually assumed to be made in order to, directly or indirectly, improve financial performance. However, previous research in this field has essentially provided no evidence of a link between outsourcing and financial performance (Gilley and Rasheed, 2000; Gilley et al., 2004; Jiang et al., 2006). However, outsourcing as an explanatory variable has usually been treated on an entirely aggregate level (e.g. Jiang et al., 2006) or divided in outsourcing of peripheral activities and outsourcing if core activities (e.g. Gilley and Rasheed, 2000). In this paper, we have provided a more detailed typology of activities for which firms make strategic outsourcing decisions, and studied the relation between outsourcing intensities and firm performance.

Since we have been studying small firms and their actual financial performance, we have taken a step towards closing the previously identified research gap in the outsourcing literature. Furthermore, besides working with small firms and true financial performance measures, this study is also characterized by a relatively large sample size, a relatively high response rate, and a phone-based data collection – facts that indicate valid and reliable results in comparison with many similar studies. However, despite our relatively large sample, we were unable to find a significant relation between outsourcing intensity and financial

performance. The study has shown that small manufacturing firms have four basic outsourcing strategies; back office activities, primary activities, accounting activities, and support activities. However, as in previously related research, no significant relationship between outsourcing intensity and financial performance was found. This suggests that there may be other types of motives behind strategic outsourcing decisions than improved financial performance, perhaps especially among small firms. Hence, we believe that future research should explore the relation between outsourcing intensity and "soft" values like, for example, stress or work satisfaction. Another area of future research would be cross-country comparisons in order to better understand how management culture in different countries affects outsourcing behavior.

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BIOGRAPHY

Anders Isaksson is a senior lecturer at Chalmers University of Technology. His research is mainly focusing on small business finance, with a special emphasis on the venture capital process and the relationship between venture capital firms and entrepreneurs. He also has professional experience in the area as a special advisor on venture capital issues for the Swedish Ministry of Industry. Other areas of research has been firm growth, initial public offerings, corporate governance, ex-dividend stock price behavior. Anders's previous work has been published in *Venture capital*, *International Journal of Entrepreneurship and Small Business*, *Asian Journal of Finance & Accounting*, *Australasian Accounting Business and Finance Journal* among others journals. He can be reached at Chalmers University of Technology, Department of Technology Management and Economics, Division of Operations Management, SE-412 96, Sweden. anders.isaksson@chalmers.se

Björn Lantz is an associate professor at Chalmers University of Technology. The larger part of his previous research has been about exploring prerequisites for efficient management of different types of operations, for example e-commerce, freight transport, and health care. He has also worked with research in other areas such as pricing, corporate governance, and methodology. Björn's previous work has been published in *European Journal of Operational Research*, *International Business Review*, *International Journal of Physical Distribution and Logistics Management*, and many other journals. He is currently serving as an associate editor for the *Electronic Commerce Research Journal*. He can be reached at Chalmers University of Technology, Department of Technology Management and Economics, Division of Operations Management, SE-412 96, Sweden. bjorn.lantz@chalmers.se

International Journal of Business and Finance Research
Vol. 9, No. 4, 2015, pp. 21-35
ISSN: 1931-0269 (print)
ISSN: 2157-0698 (online)

IBFR
www.theIBFR.com

GOVERNANCE CHANGES FOR FIRMS ADDED TO THE S&P 500

Xin Li, University of South Florida – St. Petersburg
Tih Koon Tan, The University of Tampa

ABSTRACT

What happens to corporate governance after a firm is added to the S&P 500 index? Using firms added from 1994 to 2007, this paper examines how governance mechanisms change for these firms. Specifically, we look at both the overall governance and details on how each mechanism changes. We find that governance improves after being added to the index. Controlling for firm size, leverage, prior firm performance, and growth opportunities, the market reacts positively to governance improvements as a whole. In addition, changes in governance are positively associated with changes in operating performance.

JEL: G340, G390

KEYWORDS: Corporate Governance, S&P 500, Firm Performance

INTRODUCTION

What happens to corporate governance after a firm is added to the Standard & Poor's 500 Index (S&P 500)? Companies included in the S&P 500 index are selected by the Index Committee and a team of analysts and economists at Standard and Poor's. The potential companies have to distinguish themselves in order to gain membership; thus, membership in the S&P 500 index provides a certain level of prestige to its members. However, little is known about what happens after a firm is added. Much of research focuses on interim performance and reports that the market reacts favorably to firms following index inclusion (Harris and Gurel, 1986; Shleifer, 1986; Beneish and Whaley, 2002). Others have focused on long-term performance, where they provide evidence of a puzzling superior performance persistence post-addition (Lynch and Mendenhall, 1997; Kaul, Mehrotra, and Morck, 2000). While prestige and "certification" can be used to explain the transitory price effect (Jain, 1987), the justification for the permanent price effect is less clear. Chen, Noronha, and Singh (2004) suggest the price effect is attributable to an increase in investor awareness, while Platikanova (2008) asserts that it is likely related to an improvement in earnings quality.

However, being added to the index may lead to an improvement the firm's governance structure. These changes in monitoring mechanisms following index inclusion may (at least partially) explain the performance persistence in firm performance. Denis, McConnell, Ovtchinnikov, and Yu (2003) show that inclusion in the S&P 500 Index is associated with higher analyst estimates of operating performance and higher realized earnings. They argue that inclusion leads to greater scrutiny and monitoring of management. Gompers, Ishii, and Metrick (2003) provide evidence that a firm's governance structure does have a permanent performance effect. Thus, changes in governance mechanisms following index inclusion may help explain the persistence in firm operating performance.

Research has shown that institutional investors increase their holdings in firms that are being added to the index (Pruitt and Wei, 1989; Lynch and Mendenhall, 1997; Shankar and Miller, 2006). A similar trend is

found for analyst coverage as well (Yu, 2008). However, these studies focus on external monitoring that may exhibit pressure or scrutiny on management rather than on internal governance mechanisms.

In this study, we extend this literature by taking a more comprehensive look at how more traditional measures of governance change following additions. Specifically, we examine eight monitoring mechanisms both individually and in aggregate. The aggregate approach is designed to capture the notion that monitoring mechanisms may be substitutes or complements (Rediker and Seth, 1995). Thus, considering governance as a whole gives a more comprehensive picture of how governance changes. Mechanisms examined in this study include the Governance Index (G-Index), Entrenchment Index (E-Index), institutional ownership, managerial ownership, blockholders' ownership, duality, board size, and the proportion of outsiders on a board. To capture overall monitoring changes, we create an Improvement Index (I-Index), which is simply a collection of improvements in monitoring mechanisms.

We find that governance improves after firms are added to the S&P 500 index. For firms that alter their governance structures, we show a significant improvement in the G-Index, the E-Index, institutional ownership, duality, board size, and the percentage of outsiders on the board. We also find a significant overall improvement in governance, captured by our I-Index. This supports Denis et al. (2003), who suggest index inclusion is associated with improved monitoring. To see how the market reacts in response to changes in governance mechanisms, cumulative abnormal returns (CARs) are regressed on the various governance mechanisms. The results suggest that changes in institutional ownership have a significant impact. In addition, we find a positive and significant association between announcement returns and the I-Index, suggesting that the market anticipates and views aggregate governance improvements as good news. Finally, we find that governance improvements are positively related to operating performance improvements following inclusion.

This study contributes to the literature in several ways. First, prior research on governance focuses on subsets of mechanisms. This paper acknowledges the fact that firms have the ability to choose among different governance mechanisms and examines a collection of governance mechanisms. Using a novel measure, we offer a different perspective for examining governance issues at an aggregate level. Second, this paper provides an alternative explanation to the long-term performance persistence following inclusion. Improved governance is associated with better performance, consistent with Gompers et al. (2003). Third, we show that being added to the S&P 500 affects a firm's overall governance structure. Specifically, monitoring is increased, which is consistent with the increased public scrutiny and monitoring of firms in the index suggested by Denis et al. (2003). The remainder of the paper is organized as follows. The next section discusses the literature and hypotheses. The data and sample construction are then discussed, followed by a discussion of the results. The last section provides some concluding remarks.

LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

The S&P 500 index is considered a bellwether for the American economy and is often regarded as the best single gauge of the U.S. equities market (Standard and Poor's, 2009). In order to be included in this index, potential firms have to first meet seven eligibility criteria: (1) domicile, (2) market capitalization of $3.5 billion or more, (3) public float of at least 50%, (4) four consecutive quarters of positive as-reported earnings, (5) contribute to sector balance maintenance, (6) adequate liquidity and reasonable price, and (7) company type. Firms are selected for inclusion by the S&P Index Committee, a team of economists from S&P and index analysts. Being selected for inclusion conveys a level of prestige for firms as well as positive information about the prospects and longevity of that firm, and thus provides "certification" to potential investors (Jain, 1987; Dhillon and Johnson, 1991).

Numerous studies have found positive announcement returns for firms added to an index (Harris and Gurel, 1986; Shleifer, 1986; Dhillon and Johnson, 1991; Beneish and Whaley, 2002; Chen et al., 2004). In addition,

prior studies have demonstrated that firms exhibit superior long-term performance following index inclusion (Lynch and Mendenhall, 1997; Kaul et al., 2000; Madhavan, 2003; Chen et al., 2004; Platikanova, 2008). Using a simple model of demand curves for stocks, Wurgler and Zhuravskaya (2002) argue that since individual stocks do not have perfect substitutes, risk-averse arbitrageurs have to bear additional risk and thus will trade less aggressively. They show that mean cumulative abnormal returns for added stocks do not reverse within 20 trading days and their findings support the notion that demand curves for stocks slope downwards. Using realized earnings per share (EPS), Denis et al. (2003) show that firms added to the S&P 500 index outperform peer firms and argue that index inclusion is not an information-free event.

The performance improvement phenomenon is not only limited to the United States. Kaul et al. (2000) examine firms in the Toronto Stock Exchange (TSE) 300 index to test whether demand curves for stocks slope downwards. They argue that unlike using the S&P 500, the addition to the TSE 300 is information free and therefore allows them to segregate the price pressure effects. They show that stock prices do not reverse even as trading volume returns to normal. Thus, they find support for downward sloping demand curves for stocks. However, the explanation for the persistence is mixed. Chen et al. (2004) argue that the permanent price effect is due to an increase in investor awareness while Platikanova (2008) asserts that it is due to an improvement in earnings quality. Denis et al. (2003) suggest firms benefit from improved monitoring. Consistent with Denis et al. (2003), some studies have shown that firms encounter noticeable governance changes after being added to an index. Pruitt and Wei (1989) examine actual changes in institutional holdings and find that additions to the S&P 500 index are associated with increases in these holdings. Hegde and McDermott (2003) also find that institutional investors increase their holdings following S&P 500 index addition. In another S&P 500 study, Chen et al. (2004) report that both the number of institutions and institutional holdings increase after firms are added to the index. An increase in institutional holdings has also been observed in firms added to the Russell 2000 index (Biktimirov, Cowan, and Jordan, 2004) and S&P 600 index (Shankar and Miller, 2006).

While institutional investors may serve an important monitoring role, the literature has not taken a comprehensive examination of governance changes following inclusion to the S&P 500 Index. In our study, we also examine institutional ownership, but add to it the G-Index, E-Index, managerial ownership, blockholders' ownership, duality, board size, and outside directors. Gompers et al. (2003) construct a Governance Index to capture the extent of shareholder protection in a corporation using the incidence of twenty-four governance rules. The G-Index is constructed using charter provisions, bylaw provisions, other firm-level rules, and state takeover laws. As Gompers et al. (2003) note, the power-sharing relationship between shareholders and managers is defined by the rules of corporate governance. Firms with low index values have the strongest shareholder rights (or better governance) and firms with high index values have the weakest rights (or worse governance). The Entrenchment Index, constructed by Bebchuk, Cohen, and Ferrell (2009), is a subset of six provisions from the G-Index (staggered boards, limits to shareholder bylaw amendments, supermajority requirements for mergers, supermajority requirements for charter amendments, poison pills and golden parachutes). They contend that these elements of the G-Index drive the performance and governance link in Gompers et al. (2003). A high E-Index suggests an entrenched management team that may be difficult to monitor or essentially a firm with poor governance.

Low levels of managerial ownership are also associated with weak governance (Jensen and Meckling 1976). Ang, Cole, and Lin (2000) find that agency costs vary inversely with the manager's ownership share, providing support to the theoretical predictions of Jensen and Meckling (1976). Likewise, blockholders may serve a monitoring function. Park and Song (1995) compare the year-end performance between block firms and non-block firms and find that block firms outperform non-block firms, which they attribute to monitoring. Shome and Singh (1995) examine the relationship between firm value and blockholdings and find that the market reaction to the announcement of block formations is positive. Board characteristics also capture the monitoring potential. Agency theory suggests that it may not be in the firm's best interest to have the CEO holding the Chair of the Board position (Fama and Jensen, 1983; Rechner and Dalton, 1991;

Jensen, 1993; Pi and Timme, 1993). The rationale is that the CEO may become too powerful for the board to overcome since he/she is also heading the board. Thus, duality is associated with poor governance.

In addition, larger boards are less effective (Jensen 1993). Yermack (1996) and Eisenberg, Sundgren, and Wells (1998) provide evidence that smaller boards are associated with higher firm value. Thus, if governance improves following index inclusion, board size should decrease. However, when large institutions increase their holdings in a firm, they may want to secure a board seat, thereby increasing the board size. Prior studies provide evidence on the favorable impact of outside directors on firm decisions aimed at maximizing shareholder wealth. Beasley (1996) documents a negative relationship between outside directors and likelihood of financial fraud. Fama and Jensen (1983) indicate that outside directors, by providing expertise and monitoring services, add value to firms. Rosenstein and Wyatt (1990) provide evidence on the potential benefit of having an outsider on a board by showing that the appointment of an outside director is accompanied by significantly positively excess returns.

In addition to examining individual mechanisms, some studies suggest that mechanisms may be interrelated. Using young IPO firms, Berry, Fields, and Wilkins (2006) provide evidence that governance mechanisms may work positively to reduce the agency costs that arises from the decrease of managerial ownership. Examining multiple control mechanisms, Rediker and Seth (1995) also provide evidence supporting the substitution hypothesis. Using a large sample of firms, Agrawal and Knoeber (1996) provide empirical evidence of interdependence among various governance mechanisms. Thus, we combine the mechanisms to examine the aggregate effect. Specifically, we define governance-improving changes as an increase in institutional holdings, a decrease in the G-Index, a decrease in the E-index, an increase in managerial ownership, an increase in blockholders holdings, a reduction of duality, a reduction in board size, and an increase in the proportion of outside directors.

DATA AND METHODOLOGY

Firms added to the S&P 500 index are identified from the Standard and Poor's website. To ensure accuracy, firms are then verified through the *Wall Street Journal*, *New York Times*, *Los Angeles Times*, *Washington Post*, ProQuest, and *PR Newswire*. The sample period begins in 1994, which is the starting date for company filings at the Electronic Data Gathering, Analysis, and Retrieval (EDGAR) database of the U.S. Securities and Exchange Commission (SEC), and ends in 2007. This ending period (2007) was selected primarily because we wanted to exclude the recent financial crisis period. During a financial crisis (recession), firm performance and/or governance structure are erratic. This initial process yields a sample of 427 firms. Additional restrictions are imposed which reduce the sample size. Not all index additions convey valuable information for the current study. Firms that are added to the index due to mergers and acquisitions, corporate restructuring and/or name changes were excluded from the sample, reducing the sample size to 393. To be able to estimate the change in institutional ownership, information on institutional ownership must be available for 2 quarters prior and 2 quarters after the announcement date.

Firms with missing information are excluded (25 firms). In addition, we lose sample firms (11 firms) due to a lack of CRSP closing price information from 2 days prior to 2 days after the announcement date. We also lose firms because of missing Compustat data (5 firms) and missing proxy statements (5 firms). The final sample includes 347 firms.Cumulative Abnormal Returns (CARs) are used to measure the market reaction. A firm's cumulative return (CRTN) is calculated as the sum of the firm's holding period return over the 2-day period. We use three indices to proxy for the market, namely the S&P 500 index, the CRSP Value-Weighted index, and the CRSP Equal-Weighted index. The market cumulative return (CMKTRTN) is calculated as the sum of the market's holding period return over the same 2-day period. For robustness, we calculate CARs using two event windows, (0,2) and (-1,1). The CARs over a 2-day window are calculated as the difference between the firm's cumulative return and the market's cumulative return over a 2-day window, as shown below:

$$CAR_i = CRTN_{it} - CMKTRTN_t \quad (1)$$

Studies have shown that firms being added to an index exhibit positive announcement period abnormal returns (Beneish and Whaley, 2002). As shown in Table 1, the sample CAR over the (0,2) and (-1, 1) windows are 4.3% and 4.5%, with p-values less than 0.01.

Table 1: Cumulative Returns

	Event Window 0,2)	Event Window (-1,1)
Additions Sample	0.043	0.045
S&P 500 Index	-0.001	0.000
Difference	0.044	0.045
P-values	0.000	0.000

The cumulative return is calculated as the sum of the daily return within the event windows, (0,2) and (-1,1). The abnormal or excess return is simply the difference between the cumulative return of the sample and the cumulative return of the S&P 500. The sample size used in this study is 347 firms.

We use eight commonly used measures of governance, including the G-Index, E-Index, institutional ownership, managerial ownership, blockholders' ownership, duality, board size, and proportion of outsiders on a board. The G-Index, adopted from Gompers et al. (2003), tracks 24 unique provisions covered by the Investor Responsibility Research Center (IRRC). The E-Index, adopted from Bebchuk et al. (2009), is based on six of the 24 provisions tracked by the G-Index and attempts to capture the extent to which shareholders can impose their will on management. Both indexes are derived using a similar method: one point is added for every provision that restricts shareholder rights, i.e., a lower score implies stronger shareholder rights. To see the change in G-Index and E-Index after the firm's inclusion to the S&P 500 Index, we take the difference between the G-Index/E-Index values pre- and post-addition to the index. For example, S&P announced on May 25, 2000, that Agilent Technologies would be added to the S&P 500 index. In this case, we take the G-Index in 1998 (pre-addition) and 2002 (post-addition) to calculate the difference. Note that information on the G-Index and E-Index are not available every year. Data on the G-Index and the E-Index are obtained from Andrew Metrick's and Lucian Bebchuk's websites, respectively.

Institutional ownership (*IO*) is defined as the ratio of total shares owned by all institutions to the total shares outstanding (*TSO*). Quarterly institutional holdings data and total shares outstanding are obtained from the CDA/Spectrum Institutional Investors' (13-F) database and Standard and Poor's Compustat (COMPUSTAT) database, respectively. The change in institutional ownership (ΔIO) in response to addition to the S&P 500 index is calculated as the difference between institutional ownership in the quarter before and the quarter after the announcement quarter:

$$\Delta IO = \frac{IO_{q+1}}{TSO_{q+1}} - \frac{IO_{q-1}}{TSO_{q-1}} \quad (2)$$

Since institutional ownership data are only available quarterly, the institutional ownership before and after each quarter are used to allow more time for changes to materialize. For example, the announcement that Maxim Integrated Products was to be included in the S&P 500 index was made on May 2, 2000. In this case, the post-institutional ownership information and pre-institutional ownership information are obtained from the quarter ending September 30, 2000 and March 31, 2000, respectively. For completeness, we also calculate change in institutional ownership using two quarters before and two quarters after the announcement quarter. The results are qualitatively similar.Management ownership is defined as the total shareholdings of all senior management and directors and is obtained from the proxy statements. To calculate the change in management ownership, we take the difference between the pre- and post-inclusion management ownership. Blockholders are individuals or institutions that hold a substantial stake in a

corporation. A blockholder is defined as an individual or institution holding at least 5% of the firm's total outstanding shares. Blockholder ownership is defined as the ratio of sum of all shares owned by all blockholders to the total shares outstanding. Information on blockholders' holdings is obtained from proxy statements. To measure the change in blockholders' ownership, we subtract the pre-addition blockholders' ownership from the post-addition blockholders' ownership.

We also examine board characteristics. Board size is the number of directors on a corporate board. Larger boards, which may be less efficient, are generally viewed as having a negative effect on firm value. To calculate the change in board size, we obtain the board size in the year before the inclusion and the board size in the year after the inclusion and take the difference. The proportion of outside directors on a board is the fraction of outside/independent directors as a percentage of the board size. Directors are classified as independent/outsiders if they are not employees of the firm, do not have substantial business relations with the firm, are not related to employees, or are not former employees. For the change in the proportion of outside directors on a board, we obtain the proportion of outside directors on a board from prior the inclusion and post-inclusion and subtract the prior from the post. Duality is defined as a firm having the same person holding the Chief Executive Officer (CEO) and Chair of the Board (Chair) positions. Duality takes the value 1 if the same person holds the CEO/Chair posts, and zero otherwise. To see the change in duality, we examine the duality situation pre- and post-addition and take the difference between them. Data on board-related information are hand-collected from proxy statements.

To measure the overall governance effect, we construct an Improvement Index (I-Index). For each governance mechanism, we compare the pre- and post-addition values and determine whether it has improved or not. Similar to the G-Index and E-Index, we simply add one for each improvement to the I-Index. An improvement is defined as (1) a decrease in the G-Index, (2) a decrease in the E-Index, (3) an increase in institutional ownership, (4) an increase in management ownership, (5) an increase in blockholders' ownership. (6) a decrease in duality, (7) a decrease in the board size, (8) an increase in the proportion of outside directors on a board.

The control variables used are firm size, prior performance, growth opportunities, and leverage. Smaller firms typically outperform larger firms (Keim, 1983; Perez-Quiros and Timmermann, 2000). We use the natural logarithm of total assets to proxy for size. We control for prior performance using industry-adjusted Return on Assets (ROA) from the prior year. Firms that perform well tend to have better governance characteristics. Gompers et al. (2003) show a positive relation between firm performance and governance. Firms are classified into industries based on their 2-digit Standard Industrial Classification (SIC) codes. Industry-adjusted ROA is the firm's ROA in excess of the median firm's ROA in that same 2-digit SIC industry. Tobin's Q is used to control for growth opportunities. A firm's growth opportunities are likely to affect its governance, as evidenced by Smith and Watts (1992) and Lehn, Patro, and Zhao (2009). Tobin's Q is calculated using Chung and Pruitt's (1994) methodology:

$$Tobin's\ Q = \frac{(MVE + PS + DEBT)}{TA}$$, where *MVE* is the product of a firm's share price and the number of

common shares outstanding; *PS* is the liquidating value of the firm's outstanding preferred stock; *DEBT* is the value of the firm's short-term liabilities net of its short-term assets, plus the firm's long-term debt; *TA* is the total assets of the firm. Finally, we control for leverage. The level of debt may impact the firm's future cash flows and the market's expectations (Campello, 2006; George and Hwang, 2010). Leverage is the ratio of long-term debt to total assets. Variables used to obtain and calculate the control variables are obtained from COMPUSTAT.

Table 2 shows the summary statistics for the sample. A typical corporate board of firms added to the S&P 500 consists of about nine members (median), of which around 70% are independent directors. On average, blockholders hold about one-fifth of total shares outstanding while insiders own approximately 6.3% of total outstanding shares. The mean (median) G-Index and E-Index for the sample is 8.89 (9.00) and 2.48 (3.00), respectively. More than 70% of the sample firms have one person serving both the CEO and Chair posts. Institutional investors own approximately two-thirds of total shares outstanding. The average number of governance improvements, as shown by the I-Index, is around three, with a maximum of eight. Sales for the sample average about $1.26 billion. Market capitalization for the average firm in the sample is $9.64 billion, consistent with the S&P 500 focus on large cap stocks. On average, a firm has about 16.8% of long-term debt. Industry-adjusted ROA and Tobin's Q average at around 1.5% and 2.679, respectively. A typical firm added to the S&P 500 is outperforming its industry peers.

Table 2: Summary Statistics

Variables	Mean	Median	St. Deviation
G-Index	8.890	9.000	2.604
E-Index	2.484	3.000	1.417
Duality	0.706	1.000	0.456
Institutional Ownership	0.655	0.683	0.213
Blockholders' Ownership	0.196	0.140	0.192
Management Ownership	0.063	0.000	0.086
Board Size	10.02	9.000	3.500
Percent Outsiders	0.674	0.714	0.188
Improvement Index	3.012	3.000	0.075
Industry-Adjusted ROA	0.015	0.011	0.035
Tobin's Q	2.679	1.782	2.556
Leverage	0.168	0.125	0.164
Sales ($ millions)	1,260.0	679.0	1,700.0
Market Capitalization ($ millions)	9,640.0	6,780.0	11,600

This table shows the descriptive statistics for the variables used in this study. Institutional ownership is the total institutional holdings as a percentage of total shares outstanding. Blockholder ownership is the combined holdings of all blockholders. Management ownership is the combined holdings of all senior management. Board size is the total number of directors on a corporate board. Percent outsiders is the proportion of outside directors as a percentage of board size. A director is classified as independent/outsiders if they are not employees of the firm, do not have substantial business relations with the firms, are not related to employees, or are not former employees. The Improvement Index compares governance mechanisms before and after being added to the S&P 500 Index. We add one for each improvement, where an improvement is defined as a decrease in the G-Index, a decrease in the E-Index, an increase in institutional ownership, an increase in management ownership, an increase in blockholders' ownership. a decrease in duality, a decrease in the board size, and an increase in the proportion of outside directors on the board. Industry-adjusted ROA is the difference between the firm's ROA and the ROA of the median firm in the same industry. Tobin's Q is calculated using Chung and Pruitt (1994)'s methodology, as the sum of the market value of equity, preferred equity, short-term liabilities net of short-term assets, and long term debt over total assets. Leverage is the ratio of long term debt over total assets. Sales is net sales revenue. Market capitalization is the market value of equity. The sample size used in this study is 347 firms.

RESULTS

To explore how governance changes after being added to the S&P 500 index, we compare each mechanism before and after the addition using paired t-tests. The results are summarized in Table 3. Institutional ownership increases significantly over the event, averaging a 4.2% increase. This result reaffirms the findings by Pruitt and Wei (1989) and Biktimirov et al. (2004). We also find statistically significant changes in the percentage of outsiders on the board and duality, both changing in the direction suggesting better governance. Changes in other variables are not statistically significant. However, mean levels of managerial ownership and blockholders increase, board sizes decrease as do the G-Index and E-Index means.

Table 3: Governance Variables before and after Being Added to the S&P 500 Index

Variables	Before Being Added	After Being Added	Difference	P-Value
G-Index	8.890	8.830	-0.061	0.270
E-Index	2.484	2.427	-0.058	0.103
Institutional Ownership	0.655	0.697	0.042	0.000***
Management Ownership	0.063	0.070	0.006	0.128
Blockholders' Ownership	0.196	0.201	0.005	0.657
Duality	0.706	0.663	-0.043	0.063*
Board Size	10.023	9.931	-0.092	0.376
Percent Outsiders	0.663	0.674	0.011	0.067*

*For every firm, each governance variable is collected pre- and post- being added to the S&P 500 index. Then, the pre- and post- variables are paired up and their means are compared. The sample consists of 347 firms. *** and * denotes statistical significance at the 1% and 10% levels, respectively.*

In addition, a t-test and a Wilcoxon signed-rank test are conducted on the I-Index. The results are summarized in Table 4. On average, each firm exhibits three governance improvements over the event. Both tests conclude that the mean and median of the I-Index are positive and significantly different from zero. This provides support to our hypothesis that firms improve governance following addition to the Index. To further investigate whether the governance mechanisms improve, we examine each mechanism in greater detail. The G-Index, E-Index, and board-related mechanisms for quite a number of firms in the sample exhibit no change. For example, 282 out of 347 firms show no change in duality, while 240 and 205 firms have no change in the E-Index and the G-Index, respectively. To address this, we perform a one-sample test of proportions on each mechanism. For each mechanism, we compare the firms that improve to those which deteriorate, excluding the firms with no change. Table 5 summarizes the results. With the exception of managerial and blockholders' ownership, all other mechanisms show evidence of statistically significant improvements. For example, 62.0% (G-Index) and 63.6% (E-Index) of the firms that change governance indexes show improvements. Approximately 66% of the firms that see changes in institutional ownership experience an increase. Firms that change also seem to significantly reduce duality, shrink board size, and increase the proportion of outside directors. In addition, we find no evidence of governance getting significantly worse. In general, Table 4 suggests that when firms make changes following their inclusion on the S&P 500 Index, they generally improve monitoring.

Table 4: Changes in the Improvement Index following S&P 500 Index Addition

Variable	# Observations	Mean	Standard Error	P-Value	
Improvement Index	347	3.012***	0.0753	0.000	
Variable	**# Observations**	**# Positive**	**# Negative**	**# Zero**	**Z**
Improvement Index	347	329	0	18	16.224***

*The Improvement Index compares governance mechanisms before and after being added to the S&P 500 Index. We add one for each improvement, where an improvement is defined as a decrease in the G-Index, a decrease in the E-Index, an increase in institutional ownership, an increase in management ownership, an increase in blockholders' ownership. a decrease in duality, a decrease in the board size, and an increase in the proportion of outside directors on the board. The t-test tests whether the mean is significantly different from zero. *** denotes statistical significance at the 1% level.*

Next, we examine whether the market reacts to changes in governance mechanisms. In other words, we explore whether at least part of the favorable reaction to index inclusion is a result of anticipated governance changes. Specifically, we regress the CARs on binary variables that take the value one if there is an improvement in governance. An improvement is defined as a decrease in the G-Index, E-Index, duality, and board size or an increase in institutional ownership, management ownership, blockholders' ownership, and the proportion of outside directors on the board. The control variables include proxies for firm size, prior profitability, growth opportunities, and leverage.

The regression results are presented in Table 6. Only the institutional ownership dummy variable is statistically significant. The positive coefficient for institutional ownership suggests that the market reacts

positively to an improvement in institutional ownership. All the other governance variables are not statistically significant. We also take a more aggregate look at governance improvements, essentially considering that governance mechanisms work in cohesion (rather than in isolation). In Table 6, we report results from CARs regressed on our I-Index and control variables. Consistent with the importance of governance, the market reacts more positively to firms that make governance improvements. The coefficient on the change in the I-Index is positive and significant. This suggests the market reaction is at least partially based on anticipated improvements in the overall governance or monitoring of the firm. Since prior literature has documented the importance of institutional ownership changes following index inclusion, we also verify that our results are not solely driven by institutional holdings. Specifically, we modify the I-Index to exclude improvements in institutional ownership and re-run the regression. As shown in model (2), the coefficient for I-Index is still positive and statistically significant.

Table 5: Proportions Test

Variables	# Observations	Mean	Z-Statistic	P-Value
Improvement in G-Index	142	0.620***	2.853	0.004
Improvement in E-Index	107	0.636***	2.804	0.005
Improvement in Institutional Ownership	347	0.660***	5.959	0.000
Improvement in Management Ownership	347	0.542	1.557	0.120
Improvement in Blockholders' Ownership	323	0.536	1.280	0.201
Improvement in Duality	65	0.615*	1.861	0.063
Improvement in Board Size	178	0.573*	1.949	0.051
Improvement in Percent Outsiders	234	0.573**	2.223	0.026

*For every firm, we capture whether each governance variable has improved or deteriorated. We denote an improvement with a 1 and 0 for a deterioration. An improvement is defined as a decrease in the G-Index, a decrease in the E-Index, an increase in institutional ownership, an increase in management ownership, an increase in blockholders' ownership. a decrease in duality, a decrease in the board size, and an increase in the proportion of outside directors on the board. Governance variables that do not change are excluded. A proportions test is conducted on each governance variable. ***, **, and * denotes statistical significance at the 1%, 5%, and 10% levels, respectively.*

Table 6: CAR Regression on Governance Changes

Variables	Coefficient	P-Value
Constant	0.2132***	0.006
G-Index Improvement Dummy	-0.0058	0.418
E-Index Improvement Dummy	0.0120	0.123
Management Ownership Improvement Dummy	0.0062	0.305
Blockholders' Ownership Improvement Dummy	0.0004	0.947
Institutional Ownership Improvement Dummy	0.0316***	0.000
Duality Improvement Dummy	-0.0087	0.358
Board Size Improvement Dummy	0.0058	0.349
Percent Outsiders Improvement Dummy	-0.0042	0.524
Growth Opportunities	-0.0016	0.338
Firm Size	-0.0083**	0.010
Prior Performance	-0.0877	0.341
Leverage	-0.0113	0.559

*The dependent variable is the Cumulative Abnormal Returns (CARs) associated with the announcement of addition into the S&P 500 Index. The independent variables are binary variables that take the value 1 if an improvement occurs, and zero otherwise as well as control variables. An improvement is defined as a decrease in the G-Index, a decrease in the E-Index, an increase in institutional ownership, an increase in management ownership, an increase in blockholders' ownership. a decrease in duality, a decrease in the board size, and an increase in the proportion of outside directors on the board. P-values are reported in parenthesis. *** and ** denotes statistical significance at the 1% and 5% levels, respectively. Sample size and R-square are 347 and 0.0992, respectively.*

The results from Table 7 suggest that improvements in overall governance are viewed favorably by the market. To see whether operating performance improvement is associated with governance mechanisms improvements, we regress changes in ROA on governance improvement dummy variables. We calculate changes in ROA from year t+1 to years t+2, t+3, t+4 and t+5. The results are summarized in Table 8. In all of the specifications, the improvement in the G-Index is associated with performance improvement. Also, in three of the four specifications, the duality improvement dummy variable is positive and statistically significant. As expected, the separation of the CEO/Chair position is associated with performance improvements. We also see that an increase in managerial ownership is positively related to

an improvement in performance for ROA changes from year one to year two and year three. In model specification (1), a decrease in the board size is significantly associated with an improvement in operating performance, consistent with Jensen (1993) and Yermack (1996).

Table 7: CAR Regression on Governance Improvement

Variables	Model (1)	Model (2)
Constant	0.2047***	0.2186***
	(0.008)	(0.005)
Improvement Index (with Institutional Ownership)	0.0067***	-
	(0.002)	
Improvement Index (without Institutional Ownership)	-	0.0045*
		(0.075)
Growth Opportunities	-0.0016	-0.0018
	(0.341)	(0.281)
Firm Size	-0.0077**	-0.0078**
	(0.019)	(0.018)
Prior Performance	-0.0748	0.0793
	(0.422)	(0.399)
Leverage	-0.0238	-0.0253
	(0.220)	(0.196)
R-square	0.0493	0.0310
# Observations	347	347

*The dependent variable is the Cumulative Abnormal Returns (CARs) associated with the announcement of addition into the S&P 500 Index. The Improvement Index compares governance mechanisms before and after being added to the S&P 500 Index. We add one for each improvement, where an improvement is defined as a decrease in the G-Index, a decrease in the E-Index, an increase in institutional ownership, an increase in management ownership, an increase in blockholders' ownership. a decrease in duality, a decrease in the board size, and an increase in the proportion of outside directors on the board.. We calculate the I-Index with and without institutional ownership.. P-values are reported in parenthesis. ***, **, and * denotes statistical significance at the 1%, 5%, and 10% levels, respectively.*

Table 8: Performance Regression on Governance Changes

Variables	ΔROA (Yr2-Yr1)	ΔROA (Yr3-Yr1)	ΔROA (Yr4-Yr1)	ΔROA (Yr5-Yr1)
Constant	-0.1047	-0.0494	-0.0761	-0.1003
	(0.540)	(0.800)	(0.701)	(0.635)
G-Index Improvement	0.0609***	0.0502***	0.0565***	0.0497**
Dummy	(0.000)	(0.010)	(0.005)	(0.016)
E-Index Improvement	0.0132	0.0280	0.0201	0.0273
Dummy	(0.459)	(0.194)	(0.389)	(0.265)
Management Ownership	0.0239*	0.0340**	0.0209	-0.0007
Improvement Dummy	(0.087)	(0.038)	(0.211)	(0.968)
Blockholders' Ownership	0.0151	0.0246	0.0186	0.0205
Improvement Dummy	(0.279)	(0.129)	(0.260)	(0.230)
Institutional Ownership	0.0137	0.0291	0.0286	0.0155
Improvement Dummy	(0.395)	(0.116)	(0.138)	(0.426)
Duality Improvement	0.0443*	0.0728***	0.0555**	0.0448
Dummy	(0.054)	(0.006)	(0.048)	(0.114)
Board Size Improvement	0.0328**	0.0274	0.0264	0.0240
Dummy	(0.023)	(0.101)	(0.122)	(0.180)
Percent Outsiders	0.0163	0.0275	0.0208	0.0208
Improvement Dummy	(0.284)	(0.117)	(0.244)	(0.257)
Growth Opportunities	-0.0019	-0.0020	0.0025	-0.0006
	(0.601)	(0.626)	(0.544)	(0.905)
Firm Size	0.0009	-0.0026	-0.0019	-0.0008
	(0.904)	(0.757)	(0.823)	(0.929)
Prior Performance	0.0147	0.0759	0.0086	0.0810
	(0.941)	(0.742)	(0.973)	(0.747)
Leverage	-0.0219	-0.0663	-0.0128	0.0149
	(0.633)	(0.224)	(0.819)	(0.793)
R-square	0.1196	0.1500	0.1195	0.0917
# Observations	294	257	237	215

*The dependent variable is the change in ROA. Changes in ROA from year t+1 to years t+2, t+3, t+4 and t+5. The independent variables are binary variables that take the value 1 if an improvement occurs, and zero otherwise. An improvement is defined as a decrease in the G-Index, a decrease in the E-Index, an increase in institutional ownership, an increase in management ownership, an increase in blockholders' ownership. a decrease in duality, a decrease in the board size, and an increase in the proportion of outside directors on the board. P-values are reported in parenthesis. ***, **, and * denotes statistical significance at the 1%, 5%, and 10% levels.*

Table 9: Performance Regression on Governance Improvements

Variables	ΔROA (Yr2-Yr1)	ΔROA (Yr3-Yr1)	ΔROA (Yr4-Yr1)	ΔROA (Yr5-Yr1)
Constant	-0.1191	-0.0549	-0.0822	-0.0832
	(0.478)	(0.773)	(0.672)	(0.684)
Improvement Index	0.0256***	0.0349***	0.0294***	0.0230***
	(0.000)	(0.000)	(0.000)	(0.000)
Growth Opportunities	-0.0016	-0.0020	0.0025	-0.0016
	(0.650)	(0.627)	(0.544)	(0.723)
Firm Size	0.0011	-0.0028	-0.0021	-0.0021
	(0.878)	(0.726)	(0.794)	(0.807)
Prior Performance	-0.0213	0.0459	0.0225	0.1174
	(0.914)	(0.839)	(0.927)	(0.635)
Leverage	-0.0068	-0.0476	0.0115	0.0338
	(0.881)	(0.367)	(0.831)	(0.537)
R-square	0.0951	0.1378	0.1030	0.0697
# Observations	294	257	237	215

*The dependent variable is the change in ROA. Changes in ROA from year t+1 to years t+2, t+3, t+4 and t+5. The Improvement Index compares governance mechanisms before and after being added to the S&P 500 Index. We add one for each improvement, where an improvement is defined as a decrease in the G-Index, a decrease in the E-Index, an increase in institutional ownership, an increase in management ownership, an increase in blockholders' ownership. a decrease in duality, a decrease in the board size, and an increase in the proportion of outside directors on the board. P-values are reported in parenthesis. *** denotes statistical significance at the 1% level.*

The regression results in Table 9 account for governance interdependencies by using our I-Index. In all four specifications, the coefficient for the I-Index is positive and statistically significant. An improvement in governance is associated with an improvement in operating performance. This result suggests that governance improvements following index inclusion are associated with better operating performance. Our results also emphasize the need to consider governance as a whole. Mechanisms may be working in cohesion rather than in isolation. Firms need not improve all governance mechanisms to improve monitoring.

Robustness of Results

We explore the robustness of our results in several ways. For the CARs, we examine results for other windows, (-2,2) and (0,1). The results are qualitatively similar to the (0,2) and (-1,1) windows reported. In addition, our results are robust to using two other market indices (CRSP value-weighted index and CRSP equal-weighted index) to calculate CARs. All results are also robust to using either sales or market capitalization to proxy for firm size (Kaul et al., 2000; Hartzell and Starks, 2003; Madhavan, 2003; Yu, 2008). In addition, in most model specifications we use dummy variables for governance mechanism improvements following the addition to the S&P 500 Index. Our results are robust to using levels of changes. Finally, two components of the I-Index, the G-index and E-index, are highly correlated (correlation coefficient > 0.60), and are potentially capturing the same aspect of governance. To make sure the results are not biased due to this relation, we perform additional analyses by (1) excluding E-Index and (2) by excluding G-index in the I-Index computation. All results are qualitatively similar.

CONCLUSIONS

We examine what happens to the governance structures of firms added to the S&P 500 index. With a sample of 347 firms, we compare the pre- and post-addition governance mechanisms and find that firm governance improves after being added to the index. In particular, for firms that change their governance structures, G-Index, E-Index, institutional holdings, duality, board size and the proportion of outside directors all exhibit significant improvements. This finding is reinforced by the fact that a typical firm exhibits three governance improvements post-addition. We also explore whether the positive stock market reaction at the announcement of the addition is related to the anticipated governance changes. We show

that the market reacts positively to an increase in institutional ownership. Using governance improvements in aggregate, the relationship between the market reaction and the I-Index is positive and significant. Hence, the market reacts more favorably to firms making governance improvements following index inclusion. This suggests these anticipated changes are viewed favorably.

Finally, we examine the relationship between governance improvements and operating firm performance. We find that improvements in governance are positively related to operating performance improvement. While our results are strongest using our aggregate measure of governance improvements (I-Index), we find improvements in operating performance are also significantly associated with improvements in the G-Index, managerial ownership, duality, and board size. This may shed light on the documented puzzle of performance persistence following index inclusion. We show that operating performance improvements are positively related to governance improvements. Limitations exist due to various reasons. First, endogeneity issues exist between performance and governance, which we did not address in this paper due to resource restrictions. Given more resources, this issue could be moderated. Second, this paper examines only U.S. large firms. It could be extended to mid-sized (S&P400) or even small-sized (S&P600) firms. Alternatively, one could explore firms from other economies (TSX Composite [Canada], FTSE 100 [London], Nikkei 225 [Tokyo], etc.) to see if the results hold across borders. In summary, our results support the notion that for firms added to the S&P 500 index, governance shows improvement and that this improvement leads to better operating performance. Our findings also highlight the necessity to consider governance collectively.

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ACKNOWLEDGEMENT

We would like to thank the journal editors, Terrance Jalbert and Mercedes Jalbert, and two anonymous referees for their insightful comments. Any errors are our own.

BIOGRAPHY

Dr. Xin Li is an instructor of Information Systems Management in the Kate Tiedemann College of Business at the University of South Florida, St. Petersburg. She can be contacted at 140 7th Avenue South, St. Petersburg, Florida 33701. Phone 727-873-4734. Email: lix1@usfsp.edu.

Dr. Tih Koon Tan is an Assistant Professor of Finance in the John H. Sykes College of Business at The University of Tampa. He can be contacted at Sykes Building 317B, The University of Tampa, 401 W. Kennedy Blvd., Box O, Tampa, Florida 33606. Phone: 813-257-6304. Email: ttan@ut.edu.

International Journal of Business and Finance Research
Vol. 9, No. 4, 2015, pp. 37-49
ISSN: 1931-0269 (print)
ISSN: 2157-0698 (online)

IBFR
www.theIBFR.com

THE IMPACT OF EXCHANGE RATE VOLATILITY ON COMMODITY TRADE BETWEEN THE UNITED STATES AND SPAIN

Carlos Moslares, Universitat Ramon Llull, Spain
E. M. Ekanayake, Bethune-Cookman University

ABSTRACT

In this paper we analyze the effects of the real exchange rate volatility on disaggregated sectoral data on the trade flows between the United States and Spain. This study uses monthly trade flows on United States exports to and imports from Spain over the period from January 1993 to December 2012 and the method of bounds testing or the Autoregressive Distributed Lag (ARDL) approach to cointegration analysis. Our results reveal that exports depend positively on the levels of foreign economic activity but negatively on relative prices. However, the exchange rate volatility tends to provide mixed effects. In addition, imports depend positively on the levels of domestic economic activity but negatively on relative prices. As in the case of exports, the exchange rate volatility tends to provide mixed effects. Furthermore, in the case of both exports and imports, the effects of exchange volatility are found to yield mixed effects in the short-run and in the long-run.

JEL: F14, F31

KEYWORDS: Spain, Imports, Exports, Exchange Rate Volatility

INTRODUCTION

There are a large number of studies in the area of exchange volatility and trade. Despite the sizeable number of studies conducted, no real consensus about the impact of exchange rate volatility on trade has emerged. While a large number of studies find that exchange rate volatility tends to reduce the level of trade, others find either weak or insignificant or positive relationships. For example, Onafowara and Owoye (2008), Byrne, Darby, and MacDonald (2008), Choudhry (2005), Bahmanee-Oskooee (2002), Arize, *et al.* (2000), Arize (1995), Chowdhury (1993), Pozo (1992), and Bahmani-Oskooee and Ltaifa (1992), find evidence for negative effects. According to these scholars, exchange rate volatility may affect exports directly through uncertainty and adjustment costs for risk-averse exporting investors. Further, it may have an indirect effect through its impact on the structure of output, investment and government policy. On the other hand, Doyle (2001), Chou (2000), McKenzie and Brooks (1997), Qian and Varangis (1994), Kroner and Lastrapes (1993), and Asseery and Peel (1991) find evidence for a positive effect for volatility on export volumes of some developed countries because exchange rate volatility makes exporting more attractive to risk-tolerant exporting firms. However, other scholars such as Aristotelous (2001), Bahmani-Oskooee and Payestch (1993), Bahmani-Oskooee (1991), and Hooper and Kohlhagen (1978) have reported no significant relationship between exchange rate volatility and exports.

Reasons for contradictory results by different studies may be due to a variety of factors, among them: different methods used to measure exchange rate volatility; the use of different price deflators; the differential use of sample data, for example, the use of aggregate export data versus sectoral export data; different time-frames; ignoring import dependency on intermediate and capital goods of the receiving

country, as is the case with many developing countries; and the absence of complex econometric methods for studying these variations. As a result, scholars stopped investigating the exchange rate volatility-export nexus by the late 1990's. However, with better access to sectoral data and the development of more sophisticated econometric models, recent studies have begun evaluating the exchange rate volatility-export connection from a sectoral perspective. The rationale behind this is that different trade sectors would be impacted differentially by exchange rate volatility, and therefore may be more revealing than aggregate studies. This study focuses on disaggregated trade flows between the United States and Spain to uncover the nature and sensitivity of the relationship between exchange rate volatility and trade flows. We use the method of bounds testing or the Autoregressive Distributed Lag (ARDL) approach to cointegration analysis for this purpose. Using this approach we investigate the effects of exchange rate volatility on United States sectoral exports to and sectoral imports from Spain over a period of 20 years using monthly data from January 1993 to December 2012.

We provide a brief review of the literature in the next section. Thereafter, we lay the empirical framework of our study by specifying our model. In the section following that we discuss variable definitions and outline our data sources. Empirical results from the bounds testing approach to cointegration, and error-correction model estimates are presented in the penultimate section. The final section presents a summary and conclusion of the results obtained in this study.

LITERATURE REVIEW

In this section we present a brief overview of studies that examine the exchange rate volatility-trade nexus. We begin by discussing the most recent and sophisticated studies, employing cointegration techniques and error-correction models, to older, less complex studies. Bahmani-Oskooee and Harvey (2011) investigate the effects of exchange rate fluctuations on trade flows between the U.S. and Malaysia using disaggregated, industry-level annual export and import data for 17 export industries and 101 importing industries from 1971 to 2006. They conclude that while exchange rate volatility exerts short-run effects in trade flows of almost two-thirds of the industries, these effects last into the long-run in 38 U.S. exporting industries and in 10 U.S. importing industries.

Bahmani-Oskooee and Hegerty (2009) investigate the effects of exchange rate fluctuations on trade flows between the U.S. and Mexico using disaggregated, industry-level annual export and import data for 102 industries from 1962 to 2004. They analyze both the short- and long-term effects of volatility in the peso/dollar real exchange rate on Mexican-United States trade. They conclude that in the short-term increased volatility negatively affects trade flows in most industries. Long-term effects however, are significant for only one-third of the industries studied, and of this, only two-thirds are negative. They speculate that increased Mexican integration and liberalization of economic policies allow for greater adjustments in the long-term so that volatility is less of a problem in the long-term than in the short-term.

Byrne, Darby, and MacDonald (2008) analyze the impact of exchange rate volatility on the volume of bilateral U.S. trade flows using homogenized and differentiated sectoral annual data over the period 1989-2001 for a cross-section of 6 EU countries and 22 industries. Their study finds that clustering all industries together provides evidence of a negative effect on trade from exchange rate volatility, which confirms findings of other studies using aggregate data. However, when investigating sectoral trade differences, the effects of exchange rate volatility on trade is negative and significant for differentiated goods and insignificant for homogeneous goods, confirming recent studies that sectoral differences are in fact crucial to explaining the differential impact of volatility on trade. They suggest that a greater degree of disaggregation at the industry level may provide more worthwhile results, which is what we do in this study. Bahmani-Oskooee and Kovyryalova (2008) investigate the effect of exchange rate fluctuations on trade flows between the U.S. and the United Kingdom using disaggregrated annual export and import data for 177 commodities industries from 1971 to 2003. They analyze both the short- and long-term effects of

real exchange rate volatility on trade between the U.S. and the UK. Their results reveal that the volatility of the real dollar–pound rate has a short-term significant effect on imports of 109 industries and on exports of 99 industries. In most cases, such effects are unfavorable. In the long run, however, the number of significant cases is somewhat reduced: only 62 import and 86 export industries are significantly and adversely affected by exchange rate volatility. The industries affected involve both durable and non-durable goods, and include small as well as large industries, supporting findings by aggregate studies.

In another study, Bahmani-Oskooee and Mitra (2008), investigate the effects of exchange rate volatility on trade flows between the U.S. and India, an emerging economy. Using annual data from 40 industries from 1962–2004, their results demonstrate that exchange rate volatility has more short-run than long-run effects. In the short-run, 17 industries were affected on the import side and 15 on the export side. The industries affected show India's increasing ability to produce import substitutable goods. However, in the long run, only a few industries are affected because the increasing dependence on trade between India and the US cause industries to respond inelastically to exchange rate volatility.

Using both the nominal and the real exchange rate between the United States dollar and the currencies of Canada and Japan, Choudhury (2005) investigates the influence of exchange rate volatility on U.S. real exports to Canada and Japan using aggregate monthly data ranging from January 1974 to December 1998. The study uses conditional variance from the GARCH (1, 1) model as a measure of exchange rate volatility, and finds significant and mostly negative effects of exchange rate volatility on real exports.

As in the above studies, Sukar and Hassan (2001) investigate the relationship between U.S. trade volume and exchange rate volatility using cointegration and error-correction models. Their study uses quarterly aggregate data covering the period 1975Q1 – 1993Q2 and a GARCH model to measure the exchange rate volatility. Paralleling other studies, the authors find evidence for a significantly negative relationship between U.S. export volume and exchange rate volatility. However, unlike other findings, they reveal that the short-run dynamics of the exchange rate volatility -trade relationship is insignificant. They argue that this result may be due to the existence of avenues for hedging against exchange risks so as to neutralize the negative impact of exchange rate volatility. Other scholars argue that this short-run insignificant relationship may be because of the investigators' use of aggregate data, which ignores sectoral differences. For example, while one sector may exhibit a negative relationship, another may exhibit an equal but opposite effect so that they offset each other.

Arize (1995), using monthly series from February 1978 to June 1986 analyzes the effects of real exchange rate volatility on the proportions of bilateral exports of nine categories of goods from the U.S. to seven major industrial countries. The volatility measure employed is the standard deviation of the monthly percentage change in the bilateral exchange rate between the U.S. and the importing country from t to $t-12$. The study reveals differential effects of exchange rate volatility across different categories of exports. The study also concludes that exchange rate uncertainty has a negative effect on U.S. real exports, and that it may have a major impact on the allocation of resources to different industries depending on trade elasticities. Lastrapes and Koray (1990) analyze the interrelationships among exchange rate volatility, international trade, and macroeconomic variables using the vector autoregression (VAR) model. The model estimates U.S. multilateral trade from 1973 to 1990 and includes a moving standard deviation measure of real exchange rate volatility. While the results reveal some evidence of a statistically significant relationship between volatility and trade, the moving average representation of the model implies a rather small quantitative effect. The study concludes that exchange rate volatility is influenced by the state of the economy, a factor ignored in a variety of other studies.

Finally, Klein (1990) is one of the first few scholars to analyze the effects of exchange rate volatility on the proportion of disaggregated bilateral exports of nine categories of goods from the U.S. to seven major industrial countries using fixed effects framework. Using monthly series data from February 1978 to June

1986, the study reveals that in six categories of exports exchange rate volatility significantly affects the volume of exports and in five of these categories the effect is positive, suggesting that real exchange rate volatility may in fact increase exports by risk-taking firms.

One major problem with most of the studies above is that the sample period includes the period prior to the end of the fixed exchange regime, so results may include the lag effects of fixed exchange rates on trade before 1973 lingering on during the transition period after the implementation of the floating exchange rate regime. The current study corrects for this potential bias by using United States monthly industry trade data covering a 20-year period from January 1993 to December 2012. The methodology used in this study incorporates the recent developments in the literature, namely, the ARDL approach to cointegration analysis, which may uncover the nature and sensitivity of the exchange rate volatility-trade nexus.

METHODOLOGY

Model Specification

The objective of this study is to assess the effects of exchange rate volatility on the trade flows disaggregated at the 2-digit Harmonized System (HS) industry level. The study uses trade data on U.S. exports to and imports from Spain. Drawing on the existing empirical literature in this area, we specify that a standard long-run export demand function for commodity i to take the following form (see, for example, Ozturk and Kalyonku, 2009; Choudhry, 2005; Arize, 1998, 1996, 1995; and Asseery and Peel, 1991):

$$\ln X_{it} = \beta_0 + \beta_1 \ln Y_t + \beta_2 \ln P_{it} + \beta_3 \ln VOL_t + \varepsilon_t \qquad (1)$$

Where X_{it} is the real export volume of commodity i in period t, Y_t is the real income of Spain in period t, P_{it} is the relative price of exports of commodity i in period t, VOL_t is a measure of exchange rate volatility, and ε_t is a white-noise disturbance term.

Economic theory posits that the real income level of the domestic country's trading partners would have a positive effect on the demand for its exports. Therefore, *a priori*, we would expect that $\beta_1 > 0$. On the other hand, if the relative price of exports rise (fall), domestic goods become less (more) competitive than foreign goods, causing the demand for exports to fall (rise). Therefore, *a priori*, one would expect that β_2, which measures the competitiveness of U.S. exports relative to Spanish domestic production, is negative. The last explanatory variable is a measure of exchange rate volatility. Various measures of real VOL have been proposed in the literature. Some of these measures include (1) the averages of absolute changes, (2) the standard deviations of the series, (3) the deviations from the trend, (4) the squared residuals from the ARIMA or ARCH or GARCH processes, and (5) the moving sample standard deviation of the growth rate of the real exchange rate. Since the effects of VOL on exports have been found to be empirically and theoretically ambiguous (Bredin, *et al.* 2003), β_3 could be either positive or negative.

Equation (1) shows the long-run relationships among the dependent and independent variables in our model. Given the recent advances in time-series analysis, in estimating the long-run model outlined by equation (1), it is now a common practice to distinguish the short-run effects from the long-run effects. For this purpose, equation (1) should be specified in an error-correction modeling (ECM) format. This method had been used in many recent studies including Bahmani-Oskooee and Hegerty (2009), Bahmani-Oskooee and Wang (2008, 2009), Bahmani-Oskooee and Mitra (2008), Bahmani-Oskooee and Kovyryalova (2008), and Bahmani-Oskooee and Ardalani (2006). According to Bahmani-Oskooee and

Wang (2008), such an approach is warranted given that the measure of exchange rate volatility is a stationary variable (see, for example, De Vita and Abbot, 2004; Bahmani-Oskooee & Payesteh, 1993; and Doyle, 2001), whereas the other variables in equation (1) are non-stationary. Therefore, following Pesaran, Shin, and Smith (2001) and their method of bounds testing or the Autoregressive Distributed Lag (ARDL) approach to cointegration analysis, we rewrite equation (1) as an error-correction model in equation (2) below.

$$\Delta \ln X_t = \alpha_0 + \sum_{i=1}^{n} \beta_i \Delta \ln X_{t-i} + \sum_{i=0}^{n} \gamma_i \Delta \ln Y_{t-i} + \sum_{i=0}^{n} \delta_i \Delta \ln P_{t-i} + \sum_{i=0}^{n} \varphi_i \Delta \ln VOL_{t-i} + \lambda_0 \ln X_{t-1} + \lambda_1 \ln Y_{t-1} + \lambda_2 \ln P_{t-1} + \lambda_3 \ln VOL_{t-1} + \omega_t \quad (2)$$

Where Δ is the difference operator and the other variables are as defined earlier. Pesaran, Shin, and Smith's (2001) bounds testing approach to cointegration is based on two procedural steps. The first step involves using an F-test or Wald test to test for joint significance of the no cointegration hypothesis $H_0 : \lambda_0 = \lambda_1 = \lambda_2 = \lambda_3 = 0$ against an alternative hypothesis of cointegration, $H_1 : \lambda_0 \neq 0$, $\lambda_1 \neq 0$, $\lambda_2 \neq 0$, $\lambda_3 \neq 0$. This test is performed using equation (2). The advantage of this approach is that there is no need to test for unit roots, as is commonly done in cointegration analysis. Pesaran, Shin, and Smith (2001) provide two sets of critical values for a given significance level with and without time trend. One assumes that the variables are stationary at the levels or I(0), and the other assumes that the variables are stationary at the first difference or I(1). If the computed F-values exceed the upper critical bounds value, then H_0 is rejected signaling cointegration among the independent variables. If the computed F-value is below the critical bounds values, we fail to reject H_0. Finally, if the computed F-statistic falls within the boundary, the result is inconclusive. After establishing cointegration, the second step involves estimation of the long-term elasticities and the error-correction model. Similar to the export model, the import model is also specified drawing on the existing empirical literature in this area. We specify that a standard long-run import demand function for commodity i to take the following form (see, for example, Ozturk and Kalyonku, 2009; Choudhry, 2005; Arize, 1998, 1996, 1995; and Asseery and Peel, 1991):

$$\ln M_{it} = \theta_0 + \theta_1 \ln Y_t + \theta_2 \ln P_{it} + \theta_3 \ln VOL_t + \varepsilon_t \quad (3)$$

Where M_{it} is the real import volume of commodity i in period t, Y_t is the real income of the United States in period t, P_{it} is the relative price of exports of commodity i in period t, VOL_t is a measure of exchange rate volatility, and ε_t is a white-noise disturbance term.

Economic theory posits that the real income level of the domestic (importing) country would have a positive effect on the demand for its imports. Therefore, *a priori*, we would expect that $\theta_1 > 0$. On the other hand, if the relative price of imports rise (fall), foreign goods become less (more) competitive than domestic goods, causing the demand for imports to fall (rise). Therefore, *a priori*, one would expect that θ_2, which measures the competitiveness of Spanish exports relative to the U.S. domestic production, is negative. The last explanatory variable is a measure of exchange rate volatility. Since the effects of VOL on imports have been found to be empirically and theoretically ambiguous (Bredin, *et al.* 2003), θ_3 could be either positive or negative. Equation (3) shows the long-run relationships among the dependent and independent variables in our model. As it was done in the case of the export model, in estimating the long-run model outlined by equation (3), in order to distinguish the short-run effects from the long-run effects, equation (3) should also be specified in an error-correction modeling (ECM) format. Therefore, following Pesaran, Shin, and Smith (2001) and their method of bounds testing or the Autoregressive

Distributed Lag (ARDL) approach to cointegration analysis, we rewrite equation (3) as an error-correction model in equation (4) below.

$$\Delta \ln M_t = \psi_0 + \sum_{i=1}^{n} \theta_i \Delta \ln M_{t-i} + \sum_{i=0}^{n} \rho_i \Delta \ln Y_{t-i} + \sum_{i=0}^{n} \sigma_i \Delta \ln P_{t-i} + \sum_{i=0}^{n} \omega_i \Delta \ln VOL_{t-i} + \mu_0 \ln M_{t-1} + \mu_1 \ln Y_{t-1} + \mu_2 \ln P_{t-1} + \mu_3 \ln VOL_{t-1} + \omega_t \quad (4)$$

Where Δ is the difference operator and the other variables are as defined earlier. Pesaran, Shin, and Smith's (2001) bounds testing approach to cointegration is based on two procedural steps. The first step involves using an F-test or Wald test to test for joint significance of the no cointegration hypothesis $H_0 : \mu_0 = \mu_1 = \mu_2 = \mu_3 = 0$ against an alternative hypothesis of cointegration, $H_1 : \mu_0 \neq 0$, $\mu_1 \neq 0$, $\mu_2 \neq 0$, $\mu_3 \neq 0$. This test is performed using equation (2). The advantage of this approach is that there is no need to test for unit roots, as is commonly done in cointegration analysis. Pesaran, Shin, and Smith (2001) provide two sets of critical values for a given significance level with and without time trend. One assumes that the variables are stationary at the levels or I(0), and the other assumes that the variables are stationary at the first difference or I(1). If the computed F-values exceed the upper critical bounds value, then H_0 is rejected signaling cointegration among the independent variables. If the computed F-value is below the critical bounds values, we fail to reject H_0. Finally, if the computed F-statistic falls within the boundary, the result is inconclusive. After establishing cointegration, the second step involves estimation of the long-term elasticities and the error-correction model.

DATA SOURCES AND VARIABLES

Our export and import data series span a 20-year period from January 1993 through December 2012, leading to 240 monthly observations. Monthly data on real export volume and prices are taken from the Global Trade Information Services, *World Trade Atlas Database*. Monthly data on real export and import volumes and prices have been converted into export volume indices and export price indices with 2005 serving as the base (=100). The study focuses on the top twenty export commodities and top twenty import commodities defined at the 2-digit Harmonized System (HS) codes level, and selected based on their average export and import values between 1993 and 2012. The top 20 export products from the U.S. to Spain are: Pharmaceutical Products (HS30); Miscellaneous Grain, Seed, Fruit (HS12); Mineral Fuel and Oil (HS27); Machinery (HS84); Organic Chemicals (HS29); Edible Fruit and Nuts (HS08); Aircraft and Spacecraft (HS88); Electrical Machinery (HS85); Optical and Medical Instruments (HS90); Passenger Vehicles (HS87); Iron and Steel Products (HS73); Paper and Paperboard (HS48); Plastic (HS39); Miscellaneous Chemical Products (HS38); Woodpulp Etc. (HS47); Food Waste and Animal Feed (HS23); Perfumery, Cosmetic, Etc. (HS33); Iron and Steel (HS72); Copper and Articles Thereof (HS74); and Rubber (HS40).

These 20 export products accounted for 83.1% of total U.S. exports to Spain in 2012. The top 20 import products of the U.S. from Spain are: Mineral Fuel and Oil (HS27); Machinery (HS84); Pharmaceutical Products (HS30); Organic Chemicals (HS29); Electrical Machinery (HS85); Beverages (HS22); Iron and Steel Products (HS73); Rubber (HS40); Preserved Food (HS20); Plastic (HS39); Passenger Vehicles (HS87); Optical and Medical Instruments (HS90); Edible Fruit and Nuts (HS08); Iron and Steel (HS72); Footwear (HS64); Aircraft and Spacecraft (HS88); Miscellaneous Art of Base Metal (HS83); Ceramic Products (HS69); Precious Stones and Metals (HS71); and Leather Art, Saddlery, and Bags (HS42). These 20 import products accounted for 72.8% of total U.S. imports from Spain in 2012. The real income variable for Spain is proxied by the industrial production index (2005=100) of Spain while the real income variable for the U.S. is proxied by the industrial production index (2005=100) of the U.S. The

underlying series are obtained from the International Monetary Fund's *International Financial Statistics database* and from the Organization for Economic Cooperation and Development's online database.

The relative price ratio for U.S. exports is calculated as the ratio of the export price index of each commodity to the price level, proxied by the consumer price index (2005=100) of Spain. The export price index for each of the export products is computed using the unit prices taken from the Global Trade Information Services, *World Trade Atlas Database*, while the consumer price index is also obtained from the International Monetary Fund's *International Financial Statistics database*. Following Bahmani-Oskooee and Wang (2008, 2009), and Sekkat and Varoudakis (2000), the real exchange rate, RER_t, is constructed as:

$$RER_t = \left(\frac{ER_t^{US-SP} \times P_t^{SP}}{P_t^{US}} \right) \tag{3}$$

where RER_t is the real exchange rate, ER_t^{US-SA} is the bilateral nominal exchange rate between the United States and Spain at time t, P_t^{SP} is the consumer price index (2005=100) of Spain at time t, and P_t^{US} is the consumer price index (2005=100) of the U.S. at time t. The monthly data on nominal exchange rates are taken from the IMF, *International Financial Statistics database*. Finally, our measure of volatility is constructed following Bredin, Fountas, and Murphy (2003), Weliwita, Ekanayake, and Tsujii (1999), Chowdhury (1993), Lastrapes and Koray (1990), and Koray and Lastrapes (1989). Following these authors the real exchange rate volatility measure is constructed as:

$$VOL_t = \left[\frac{1}{m} \sum_{i=1}^{m} (\ln RER_{t+i-1} - \ln RER_{t+i-2})^2 \right]^{1/2} \tag{6}$$

where VOL_t is the volatility of real exchange rate, RER_t is the real exchange rate and $m = 4$ is the order of the moving average. According to Koray and Lastrapes (1989), this measure can capture general movements in real exchange rate volatility and exchange rate risk over time.

EMPIRICAL RESULTS

Applying the ARDL approach to cointegration to monthly data from January 1993 to December 2012, we assess the top twenty U.S. export products to and the top twenty U.S. import products from Spain. First, we estimate equations (2) and (4). Following Bahmani-Oskooee and Mitra (2008) we impose a maximum of four lags on each first differenced variable and employ Akaike's Information Criterion (AIC) to select the optimum lag length. Choosing a combination of lags that minimizes the AIC, we then test whether the variables for each industry are cointegrated. The results of the exports model are shown in Table 1 while the results of the imports model are presented in Table 2. Table 1 reveals that fifteen of the twenty industries encompass an F-statistic above the upper bound of 4.35, implying that these industries' four variables are cointegrated. The other five industries reveal an F-statistic below the lower bound of 3.23, indicating no cointegration among variables. Therefore, only those fifteen industries that exhibit cointegrating relationships among variables are used to analyze the effects of volatility on exports.

Table 1: Cointegration Test Results of Top Twenty Export Commodities from the U.S. to Spain

HS	Industry	F-Statistic	ECM	Cointegrated?
30	Pharmaceutical Products	1.07	-0.024 (0.55)	No
12	Miscellaneous Grain, Seed, and Fruit	8.28	-0.708 (9.44)	Yes
27	Mineral Fuel and Oil, etc.	20.47	-0.749 (9.09)	Yes
84	Machinery	17.27	-0.600 (8.15)	Yes
29	Organic Chemicals	4.80	-0.288 (3.91)	Yes
08	Edible Fruit and Nuts	5.54	-0.199 (4.58)	Yes
88	Aircraft and Spacecraft	10.09	-0.911 (9.09)	Yes
85	Electrical Machinery	5.62	-0.311 (4.64)	Yes
90	Optical and Medical Instruments	10.07	-0.442 (6.35)	Yes
87	Passenger Vehicles	2.73	-0.227 (3.11)	No
73	Iron and Steel Products	19.56	-0.693 (8.88)	Yes
48	Paper and Paperboard	5.62	-0.309 (4.89)	Yes
39	Plastic	2.92	-0.182 (3.25)	No
38	Miscellaneous Chemical Products	13.19	-0.452 (7.15)	Yes
47	Woodpulp, etc.	8.86	-0.579 (5.78)	Yes
23	Food Waste and Animal Feed	5.06	-0.372 (4.36)	Yes
33	Perfumery, Cosmetic, etc.	2.45	-0.253 (3.12)	No
72	Iron and Steel	5.31	-0.381 (4.18)	Yes
74	Copper and Articles Thereof	2.04	-0.155 (2.72)	No
40	Rubber	5.67	-0.328 (4.50)	Yes

Note: This table summarizes the results of the bounds testing approach to cointegration. The figures in parentheses are absolute value of the t-statistic. ECM represents the error-correction term. The upper bound critical value for the F-statistic with unrestricted intercept and no trend at the 5% level of significance is 4.35. The lower bound critical value is 3.23. These values are taken from Pesaran, Shin, and Smith (2001, Table CI(iii) Case III, p. 300).

Similarly, Table 2 reveals that fourteen of the twenty industries encompass an F-statistic above the upper bound of 4.35, implying that these industries' four variables are cointegrated. The other six industries reveal an F-statistic below the lower bound of 3.23, indicating no cointegration among variables. Therefore, only those fourteen industries that exhibit cointegrating relationships among variables are used to analyze the effects of volatility on imports. The estimated coefficients for the fifteen cointegrated export industries are presented in Table 3. Following the studies by Bahmani-Oskooee and Harvey (2011), Bahmani-Oskooee and Hegerty (2009), Bahmani-Oskooee and Wang (2008, 2009), Bahmani-Oskooee and Mitra (2008), Bahmani-Oskooee and Kovyryalova (2008), and Bahmani-Oskooee and Ardalani (2006), we report only the short-run volatility coefficients and all the long-run coefficients.

Short-Run Effects of Exchange Rate Volatility on Exports: The short-run estimated coefficients on exchange rate volatility presented on the left panel in Table 3 reveal a mixture of negative and positive signs. There is also a significance variation of the exchange rate volatility on exports among industries in the short-run. Some of the coefficients are positive and statistically significant. These industries include miscellaneous grain, seed and fruit, mineral fuel and oil, etc., machinery, electrical machinery, iron and steel products, and paper and paperboard. The products that have negative coefficients show that these coefficients are statistically insignificant in the short-run.

Long-Run Effects of Exchange Rate Volatility on Exports: The long-run coefficient estimates are shown in the right panel of Table 3. As economic theory postulates, the real income variable renders a positive sign in all cases. This coefficient is statistically significant at the 1% level in ten of the industries and significant at the 5% level in one industry. The relative price variable displays the expected negative sign in all industries and is statistically significant at the 1% level in eight of the fifteen industries, and at the 5% level in three industries. This result is similar to those of Bahmani-Oskooee and Harvey (2011), Bahmani-Oskooee and Mitra (2008), Bahmani-Oskooee and Kovyryalova (2008), and Bahmani-Oskooee and Ardalani (2006). Finally, the estimated coefficients on VOL show a mixture of negative and positive signs and only seven of the fifteen are statistically significant. Our findings are somewhat similar to those of Bahmani-Oskooee and Hegerty (2009) and Bahmani-Oskooee and Wang (2008, 2009). In general, in the long-run, exchange rate volatility appears to have mixed effect on the U.S. exports to Spain.

Table 2: Cointegration Test Results of Top Twenty Import Commodities from Spain to the U.S.

HS	Industry	F-Statistic	ECM	Cointegrated?
27	Mineral Fuel and Oil, etc.	12.73	-0.695 (7.11)	Yes
84	Machinery	4.70	-0.314 (3.44)	Yes
30	Pharmaceutical Products	1.75	-0.072 (1.70)	No
29	Organic Chemicals	4.56	-0.218 (3.42)	Yes
85	Electrical Machinery	4.93	-0.219 (3.64)	Yes
22	Beverages	21.51	-0.637 (9.33)	Yes
73	Iron and Steel Products	17.26	-0.891 (9.83)	Yes
40	Rubber	8.75	-0.354 (5.79)	Yes
20	Preserved Food	19.40	-0.480 (8.81)	Yes
39	Plastic	4.88	-0.272 (3.56)	Yes
87	Vehicles, Not Railway	2.88	-0.159 (3.41)	No
90	Optical and Medical Instruments	4.89	-0.166 (3.93)	Yes
08	Edible Fruit and Nuts	19.30	-0.702 (8.80)	Yes
72	Iron and Steel	2.60	-0.187 (2.79)	No
64	Footwear	6.18	-0.341 (4.95)	Yes
88	Aircraft and Spacecraft	2.82	-0.259 (3.29)	No
83	Miscellaneous Art of Base Metal	9.84	-0.395 (6.16)	Yes
69	Ceramic Products	2.09	-0.099 (2.87)	No
42	Leather Art, Saddlery and Bags	2.61	-0.157 (3.12)	No
71	Precious Stones and Metals	5.99	-0.405 (4.81)	Yes

Note: This table summarizes the results of the bounds testing approach to cointegration. The figures in parentheses are absolute value of the t-statistic. ECM represents the error-correction term. The upper bound critical value for the F-statistic with unrestricted intercept and no trend at the 5% level of significance is 4.35. The lower bound critical value is 3.23. These values are taken from Pesaran, Shin, and Smith (2001, Table CI(iii) Case III, p. 300).

Table 3: Short-Run and Long-Run Coefficient Estimates: Exports Model

Industry	Short-Run Coefficient Estimates					Long-Run Coefficient Estimates			
	$\Delta \ln V_t$	$\Delta \ln V_{t-1}$	$\Delta \ln V_{t-2}$	$\Delta \ln V_{t-3}$	$\Delta \ln V_{t-4}$	Constant	$\ln Y_t$	$\ln P_t$	$\ln V_t$
Misc. Grain,					0.362*	9.916	2.940**	-1.753**	-0.252*
Seed & Fruit					(2.09)		(4.14)	(5.34)	(2.06)
Mineral Fuel		0.203*				6.514	3.132**	-0.508**	-0.134*
and Oil, etc.		(2.23)					(9.55)	(5.27)	(1.93)
Machinery		0.101*			0.094*	-1.713	1.622**	-0.170	-0.036
		(2.48)			(2.35)		(5.78)	(0.91)	(0.73)
Organic		-0.127				2.749	0.549	-0.222	0.181
Chemicals		(1.43)					(1.63)	(0.97)	(1.07)
Edible Fruit				-0.103		2.673	2.035*	-2.821**	-0.055
and Nuts				(1.10)			(2.21)	(3.70)	(1.27)
Aircraft and			-0.238			4.406	1.927**	-3.020**	0.292**
Spacecraft			(1.58)				(3.60)	(3.10)	(3.11)
Electrical	0.110*					1.734	0.437	-0.406*	0.079
Machinery	(2.44)						(0.98)	(2.24)	(0.97)
Optical and			-0.027			2.250	0.964**	-1.168**	0.091*
Medical Inst.			(1.46)				(4.67)	(8.09)	(2.32)
Iron & Steel				0.137*		-10.524	2.601**	-2.975**	0.051
Products				(2.15)			(9.17)	(8.71)	(1.31)
Paper and	0.117*					2.635	1.213	-0.621	0.031
Paperboard	(2.25)						(1.50)	(1.48)	(1.42)
Misc.	0.118					-9.695	3.385**	-2.051*	0.175*
Chemicals	(1.62)						(4.11)	(2.04)	(2.16)
Woodpulp,		-0.051				2.370	0.787**	-0.258	0.038
etc.		(1.19)					(4.16)	(1.21)	(1.10)
Food Waste				0.292		22.295	1.245**	-4.902**	-0.451*
& Ani. Feed				(1.43)			(4.19)	(5.74)	(1.99)
Iron & Steel			-0.296			-8.756	1.819	-2.498**	-0.503*
			(1.38)				(1.40)	(3.44)	(1.91)
Rubber			0.072			-6.089	2.503**	-0.805*	-0.063
			(1.43)				(6.99)	(2.07)	(1.84)

*Note: This table summarizes the results obtained using the ARDL model defined in Equation (2). The figures in parentheses are absolute value of t-statistic. ** and * indicate the statistical significance at the 1% and 5% levels, respectively.*

The estimated coefficients for the fourteen cointegrated import industries are presented in Table 4. As in the case of exports, we report only the short-run volatility coefficients and all the long-run coefficients.

Short-Run Effects of Exchange Rate Volatility on Imports: The short-run estimated coefficients on exchange rate volatility presented on the left panel in Table 4 reveal a mixture of negative and positive signs. There is also a significance variation of the exchange rate volatility on imports among industries in the short-run. Some of the coefficients are positive but only two of the coefficients are statistically significant. These industries include optical and medical instruments and footwear. The products that have negative coefficients show that these coefficients are statistically insignificant in the short-run. However, precious metal and stones industry shows a negative and statistically significant effect in the short-run.

Long-Run Effects of Exchange Rate Volatility on Imports: The long-run coefficient estimates are shown in the right panel of Table 4. As economic theory postulates, the real income variable renders a positive sign in all cases. This coefficient is statistically significant at the 1% level in seven of the industries and significant at the 5% level in two industries. The relative price variable displays the expected negative sign in all industries and is statistically significant at the 1% level in eight of the fifteen industries, and at the 5% level in two industries. This result is similar to those of Bahmani-Oskooee and Harvey (2011), Bahmani-Oskooee and Mitra (2008), Bahmani-Oskooee and Kovyryalova (2008), and Bahmani-Oskooee and Ardalani (2006). Finally, the estimated coefficients on exchange rate volatility show a mixture of negative and positive signs and only three of the fourteen are statistically significant. Our findings are somewhat similar to those of Bahmani-Oskooee and Hegerty (2009) and Bahmani-Oskooee and Wang (2008, 2009). In general, in the long-run, exchange rate volatility appears to have mixed effect on the U.S. imports from Spain.

Table 4: Short-Run and Long-Run Coefficient Estimates: Imports Model

Industry	**Short-Run Coefficient Estimates**					**Long-Run Coefficient Estimates**			
	$\Delta \ln V_t$	$\Delta \ln V_{t-1}$	$\Delta \ln V_{t-2}$	$\Delta \ln V_{t-3}$	$\Delta \ln V_{t-4}$	Constant	$\ln Y_t$	$\ln P_t$	$\ln V_t$
Mineral Fuel				0.245		1.663	1.586	-1.645**	-0.044
and Oil, etc.				(1.54)			(1.77)	(3.57)	(1.33)
Machinery					0.056	1.835	1.562*	-1.614**	-0.050
					(1.48)		(2.36)	(5.19)	(1.67)
Organic					0.074	2.084	2.404**	-2.594*	0.107
Chemicals					(1.69)		(3.99)	(2.16)	(0.89)
Electrical					-0.066	1.001	2.071*	-1.595**	0.206
Machinery					(1.21)		(2.13)	(3.52)	(1.77)
Beverages					-0.070		1.237	-2.360**	0.018
					(1.56)	18.532	(1.65)	(9.47)	(1.46)
Iron & Steel			-0.096			-9.870	3.864**	-1.809**	0.066
Products			(1.48)				(9.37)	(6.86)	(1.51)
Rubber			-0.018			-1.485	1.314**	-1.053	-0.060
			(1.49)				(3.97)	(1.17)	(1.01)
Preserved			0.016			3.896	1.093	-1.240**	-0.084**
Food			(1.56)				(1.55)	(8.04)	(2.64)
Plastic				0.080		-11.613	2.983**	-1.248	-0.148*
				(1.34)			(8.27)	(1.24)	(1.99)
Optical and		0.092*				7.106	1.593	-1.596	-0.145
Medical Inst.		(2.14)					(1.06)	(1.38)	(1.65)
Edible Fruit	-0.317					-4.993	3.997**	-1.331	-0.101
and Nuts	(1.54)						(3.70)	(1.39)	(1.57)
Footwear		0.073*				-13.336	2.112**	-1.959**	-0.218**
		(1.99)					(4.20)	(8.44)	(3.54)
Misc. Art of					-0.044	-7.710	1.952**	-2.295*	0.083
Base Metal					(1.49)		(4.72)	(2.09)	(1.30)
Precious	-0.092*					5.744	1.601	-3.179**	-0.063
Stones&Met.	(2.20)						(1.36)	(6.82)	(1.09)

*Note: This table summarizes the results obtained using the ARDL model defined in Equation (2). The figures in parentheses are absolute value of t-statistic. ** and * indicate the statistical significance at the 1% and 5% levels, respectively.*

SUMMARY AND CONCLUSIONS

In this paper we have examined the dynamic relationship between exports, imports, and exchange rate volatility in United States' trade with Spain, in the context of a multivariate error-correction model. Estimates of the long-run export and import demand functions were obtained by employing the bounds

testing approach to cointegration using monthly data for the period January 1993 - December 2012. The cointegration results clearly show that there exists a long-run equilibrium relationship between real exports, real foreign economic activity, relative prices, and real exchange rate volatility, in fifteen of the twenty commodities selected. Similarly, the cointegration results clearly show that there exists a long-run equilibrium relationship between real imports, real domestic economic activity, relative prices, and real exchange rate volatility, in fourteen of the twenty commodities selected. In the long-run, all the specifications yielded expected signs for the coefficients. Most of our estimated coefficients are statistically significant either at the 1% or 5% levels. There is also a significance variation of the exchange rate volatility on exports among industries in the short-run. Some of the coefficients are positive and statistically significant. These industries include miscellaneous grain, seed and fruit, mineral fuel and oil, etc., machinery, electrical machinery, iron and steel products, and paper and paperboard. The products that have negative coefficients show that these coefficients are statistically insignificant in the short-run. There is also a significance variation of the exchange rate volatility on imports among industries in the short-run. Some of the coefficients are positive but only two of the coefficients are statistically significant. These industries include optical and medical instruments and footwear.

The products that have negative coefficients show that these coefficients are statistically insignificant in the short-run. However, precious metal and stones industry shows a negative and statistically significant effect in the short-run. These results point out to the decreasing competitiveness of U.S. exports in the global economy despite the depreciating value of the dollar over time. It underscores the degree to which a developed country such as Spain has succeeded in finding alternative markets in Europe and especially in Asia in the last decade. One of the limitations of the present study is the limited number of products included in the study. While the current study considered only top 20 export and import products, more meaningful conclusions would have been attained if the number of products are increased. Future research on the topic will cover all export and import products. Future research will also carry out the analysis by breaking the time period into two separate periods: first covering the period from January 1993 to December 1998 and the second covering the period from January 1999 to December 2013. The second period corresponds to the adoption of Euro by Spain in 1999.

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BIOGRAPHIES

Dr. Carlos Moslares is the Vice Dean of the IQS School of Management, Universitat Ramon Llull, Spain. He earned his Ph.D. at the Florida International University. Contact information: Universidad Ramon Llull, IQS School of Management, Via Augusta, 390, 08017, Barcelona, Spain. Phone: +34 932 672 000 or +34 932 056 266. E-mail: carles.moslares@iqs.edu.

Dr. E. M. Ekanayake is an Associate Professor of Economics at Bethune-Cookman University, Daytona Beach, Florida, USA. He earned his Ph.D. in Economics at the Florida International University, Miami in 1996. He has many publications to his credit. Contact information: School of Business, Bethune-Cookman University, 640 Dr. Mary McLeod Bethune Blvd., Daytona Beach, FL 32114, USA. Phone: (386) 481-2819. E-mail: ekanayakee@cookman.edu.

International Journal of Business and Finance Research
Vol. 9, No. 4, 2015, pp. 51-66
ISSN: 1931-0269 (print)
ISSN: 2157-0698 (online)

IBFR
www.theIBFR.com

SERVICE QUALITY, SIZE, AND PERFORMANCE OF AUDIT FIRMS: CONSIDERATION OF MARKET SEGMENTS AND BUSINESS STRATEGIES

Yi-Fang Yang, Chang Jung Christian University
Lee-Wen Yang, Chaoyang University of Technology
Min-Ning Lee, Asia-Pacific Institute of Creativity

ABSTRACT

This study investigates the relative importance between service quality and firm size in the performance determinants of audit firms under different market segments and business strategies. This study extracts a human capital-based service quality by the principal component analysis technique. In terms of market segment, total samples are divided into national, regional, and local audit firms. Further, based on the business strategies audit firms take, regional and local firms are classified into two categories: stability and expansion type firms. Empirical results indicate that service quality is a more important performance determinant than firm size in the national firms. However, firm size is more important in the regional and local firms. Next, operating performance of expansion regional firms is better than that of stability regional firms. The extent of performance effects of service quality and firm size differs between audit firms taking varied business strategies.

JEL: M42

KEYWORDS: Service Quality, Firm Size, Performance, Market Segment, Business Strategy

INTRODUCTION

In the aftermath of Enron and other major financial reporting scandals, the US Congress passed the Sarbanes-Oxley Act of 2002. The Act established the Public Company Accounting Oversight Board (PCAOB) to oversee the auditors of public companies. The PCAOB establishes auditing and quality control standards for public company audits, and performs inspections of the quality controls at audit firms performing those audits. Through regular inspections, the PCAOB evaluates the quality of auditing tasks on a specific engagement and reviews the practices of auditors, operating policies, and auditing procedures related to audit quality. In addition, PCAOB inspections focus on the assessment of the professional competency of auditors, the assignment of responsibility, and continuing professional education programs. These inspections are a clear indication that human resource management is an important determinant of service quality in audit firms.

Audit firms are typically a professional service organization, a labour and expertise-intensive industry. To investigate the service quality from inside of audit firms appears warranted. Human capital, especially the auditors' technical competencies, plays a key role in the determination of service quality. The technical competencies refer to auditors' experience, education, professionalism, employment history, and organization structure of audit firms (Deis and Giroux, 1992). Prior studies document the existence of market segmentation in auditing industry (DeFond, Francis and Wong, 2000; Ghosh and Lustgaten, 2006). Audit firms in different market segments are regulated differently. Under the varied regulation environment, audit firms take different responding mechanisms to enhance their operating performance. Prior studies note that both audit quality and audit fees are higher in a stricter legal liability regime (Venkataraman, Weber and Willenborg, 2008). In other words, audit firms in different market segments have different performance determinants. In addition to the service quality, audit firm size is a critical performance

determinant identified by prior studies (Collins-Dodd, Gordon and Smart, 2004; Chen, Chang and Lee, 2008). Whether the performance determinants differ for audit firms in different market segments and under varied legal liability regime? To investigate the relative importance between service quality and firm size in the performance determinants of audit firms frames our first purpose. In order to satisfy diverse demands of customers, audit firms need different professional skill and expertise to provide different services, resulting in varied business strategies taken by audit firms. What are the effects of different business strategies on operating performance? Our next purpose is to investigate the differences in performance and in relative importance between service quality and firm size in the performance determinants for audit firms taking different business strategies.

Empirical data are from the 1995 to 2009 Survey Report of Audit Firms in Taiwan. From the perspective of market segment, total samples are divided into three categories including national, regional and local audit firms. Next, based on the business strategies audit firms take, both regional and local audit firms are further classified into stability and expansion type firms and name them as stability regional firms or expansion local firms etc. Empirical results report that service quality is more important than firm size in the performance determinants of national firms. However, firm size is more important than service quality in both regional and local firms. Next, the extent of performance effects of firm size in the national firms is lower than that of in the regional and local firms. The extent of performance effects of firm size in the local firms is higher than that of in the regional firms. Finally, expansion regional firms are superior in performance to stability regional firms. Stability regional firms possess higher extent of performance effects of service quality than expansion regional firms. In contrast, stability local firms have higher extent of performance effects of firm size than expansion local firms. Equipped with unique dataset not available elsewhere, we are the first to extracts audit firm service quality from the perspective of human capital. With findings, this study contributes knowledge to total quality management related literatures and provides managerial implications to the practitioners. The remainder of this study proceeds as follows. Section 2 reviews related literatures and develops the hypotheses. We describe research design in section 3 and report empirical results in section 4. We conclude in section 5.

LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

Around the world, authoritative agencies set varied legal regulations over audit firms in different market segments. For example, under the legal environment in the US, companies register for their IPO pursuant to the Securities Act of 1933. After going public, they file under the Securities Act of 1934. As litigation risk exposure is higher under the 1933 Act than the 1934 Act, auditors should provide higher quality service and receive higher fees for IPO audits (Venkataraman et al., 2008). Practically, large public companies are more complicated in organization structure and have higher internal agency conflicts. These companies engage larger audit firms to audit their financial statements to mitigate agency cost (Simunic and Stein, 1987; Francis, Maydew and Sparks, 1999). In contrast, small and medium-sized private companies are simpler in organization structure and are served by smaller audit firms to seek low-priced audit services. In accordance with Taiwanese Civil Code and Criminal Code, auditors in either large or small audit firms assume the same civil, criminal, and administrative liabilities.

However, the Securities and Exchange Act imposes more civil and criminal liabilities on auditors rendering services to public companies to protect investors. In addition, the Taiwanese Institute of Certified Public Accountant (TICPA) establishes more requirements on auditors serving public companies. For example, auditors must take at least 12-hour continuing professional education annually, 24 hours for two years, and 50 hours for three years running. The required hours double for auditors rendering attestation services to public companies. To safeguard investors, regulations over auditors in public company audit firms are relatively stringent. For example, the Certified Public Accountant Act empowers regulatory agencies to inspect businesses and related affairs of public company audit firms to protect public interests. In contrast, services provided to private companies by smaller audit firms primarily include the compliance of related laws and rules and hence their audit service quality is highly homogeneous. For example, tax laws allow small audit firms to provide accounting and bookkeeping services; preparation of corporate and individual tax returns. Regulation on financial reporting of private companies and their audit firms is relatively loose.

Prior studies relate audit fees with auditor exposure to losses from legal liability. Audit fees are a linear combination of the marginal cost of auditing plus expected losses from litigation (Simunic, 1980). When the expected losses from imposition of legal liability increase, the audit fees increase (Beatty, 1993). Audit firms increase their fees as their insurance exposure increases (Willenborg 1999). Further, both audit quality and audit fees are higher in a stricter legal liability regime (Venkataraman et al., 2008). A number of studies show that the long-term success of a corporation is closely related to its ability to adapt to customer needs and changing preferences (Eklof and Selivanova, 2008). High quality products/services allow companies to avoid profit-damaging competition based on price (Gale and Swire, 1977) and enable the companies to charge premium prices and generate superior margins (Porter, 1980; Klein and Leffler, 1981; Shapiro, 1983). Service quality aims to know customers needs, meet their expectations, and satisfy them by fulfilling their requirements, especially critical requirements (Chen and Kuo, 2011). From the perspective of consumer behavior, service quality perceived by customers has an impact on customer satisfaction which has a positive influence on a customer's loyalty (Wu and Chan, 2011). Customers are becoming increasingly demanding in their search for suppliers who can supply quality products, provide excellent service, and continuously improve their offerings (Yang, 2011).

Higher quality is positively associated with financial performance (Craig and Douglas, 1982; Phillips, Chang and Buzzell, 1983; Schoeffler, Buzzell and Heany, 1974; Zakuan, Yusof, Laosirihongthong and Shaharoun, 2010). Further, implementation of total quality management (TQM) practices has a positive effect on non-financial performance and this direct effect mediates the indirect effect of TQM on financial performance (Duh, Hsu and Huang, 2012). In this study, national firms provide services to public companies and assume stricter legal liabilities but regional and local firms rendering services to private companies situate in a loose legal liability regime. This study expects that service quality is a more important determinant of performance in the national firms, but firm size is more important in the regional and local firms. To articulate the above expectations, this study develops the following hypotheses.

H1a: Service quality is a more important performance determinant than firm size in the national firms.

H1b: Firm size is a more important performance determinant than service quality in the regional firms.

H1c: Firm size is a more important performance determinant than service quality in the local firms.

A corporation should seek to respond to the external environment effectively to gain competitive advantages, or competitive forces (Porter, 1990). Business strategies serve to exploit a corporation's capability as a competitive weapon to achieve its mission and objectives. Business strategies link external market requirement and internal organizational and technological resources, capability, and competitive advantage. The environment-strategy-performance (ESP) perspective posits that specific environmental conditions have a corresponding preferred strategic response (Volberda and Lewin, 2003; Tan and Tan, 2005). Previous study documents that audit firms take different strategies as a means of organizational adaptation, and a strong relationship exists between strategy types and performance (Rescho, 1987).

Audit firms may provide different practices, including audits of financial statements, tax planning, tax appeal and tax litigations, business administration consultation, accounting and bookkeeping. Of the practices offered, audits and accounting and bookkeeping have been provided for years and thus are often referred to as traditional services. In contrast, tax planning, tax appeal and tax litigations, and business administration consultation are referred to as non-traditional services (Banker, Chang and Natarajan, 2005). Different service provisions need different professional skill and expertise, thereby leading to different strategic types adopted by audit firms. Based on Miles and Snows (1978) and Jauch and Glueck (1989) and considering the audit market peculiarity, this study establishes business strategy typologies. We define audit firms only providing traditional services as the stability firms because their business strategy is to continuously operate in the existing market. For audit firms simultaneously offering both traditional and non-traditional services, their business strategy is to transcend the scope of businesses from traditional into non-traditional services. They are defined as expansion firms. As national firms always provide both traditional and non-traditional services, they only take the expansion business strategy. Both regional and

local firms offer either traditional services only or both services at the same time. They take expansion or stability business strategy. Hence, we have expansion national firms, expansion regional firms, expansion local firms, stability regional firms, and stability local firms.

Taiwanese auditing industry experienced three significant regulatory changes in the past two decades. Beginning in 1988, the Examination Yuan has raised the passing rate of the Certified Public Accountant uniform examination, resulting in substantial increases in the number of qualified practitioners and in market competition. In 1998, the Fair Trade Commission abolished the long-standing audit fee standards, established by the TICPA, to ensure fair audit market competition. Cancelling the audit fee standards adversely affects the traditional service market. Moreover, the Ministry of Finance established the tax agent system and legalized the provisions of corporate registration and accounting and bookkeeping services by tax agents to small and medium-sized entities (SMEs) in 2004. Both regional and local audit firms have provided the same traditional services to the SMEs for years.

Tax agent legalization negatively influences both firms because of the competitive advantages the tax agents possess for a relatively lower service fee and easy access by clients. Many companies facing recent worldwide competition and business globalization have consulted with a professional management advisor about business administration and information technology to advance their international competitiveness. In practice, audit firms have provided services to the same clients for years and are familiar with the clients' daily operation and financial condition. Equipped with a long-term partnership and close client relations, audit firms gain a more favorable position in providing non-traditional services than an ordinary professional consulting firm, such as McKinsey and Company. Providing non-traditional services normally requires greater involvement and communication between audit firms and clients to meet specific service demands. Unlike traditional services, non-traditional services are not regulated and their provisions are more flexible in formats, timing, and places. These services are tailor-made with no service fee standard, making them more profitable than traditional ones.

Consequently, non-traditional services create unlimited business opportunities for audit firms to expand their scope of businesses. Beginning in the 1990s, auditors began shifting their human resources from traditional, low-margin revenue product areas of auditing and accounting into relatively new, high-margin revenue product areas of non-traditional services (Banker et al., 2005). As defined earlier, expansion firms offer both traditional and non-traditional services but stability firms render traditional services only. The joint provisions of these two services theoretically create synergy and knowledge spillover effects for audit firms (Simunic, 1984; Beck, Frecka and Somomon, 1988). Consequently, we expect that operating performance of expansion firms is better than that of stability firms and hypothesize:

H2a: Performance of expansion regional firms is better than that of stability regional firms.

H2b: Performance of expansion local firms is better than that of stability local firms. Given varied business strategies taken by audit firms, whether the extent of performance effects of service quality and firm size differs? To the best of our knowledge, no prior study exists for these issues. To acquire further evidences, we establish the following non-directional hypotheses.

H3a: The extent of performance effects of service quality differs between stability regional firms and expansion regional firms.

H3b: The extent of performance effects of firm size differs between stability regional firms and expansion regional firms.

H3c: The extent of performance effects of service quality differs between stability local firms and expansion local firms.

H3d: The extent of performance effects of firm size differs between stability local firms and expansion local firms.

Previously, we expect that service quality is a more important determinant of performance in the national firms, but firm size is a more important determinant in the regional and local firms. This study asserts that the extent of performance effects of service quality in the national firms is higher than that of in the regional and local firms. In contrast, the extent of performance effects of firm size in the national firms is lower than that of in the regional and local firms. This study hypothesizes:

H4a: The extent of performance effects of service quality in national firms is higher than that of in regional firms.

H4b: The extent of performance effects of service quality in the national firms is higher than that of in local firms.

H4c: The extent of performance effects of firm size in national firms is lower than that of in regional firms.

H4d: The extent of performance effects of firm size in national firms is lower than that of in local firms.

In the local firms, both operating and administrative responsibilities fall on the sole proprietors. In regional firms, a partnership firm, two or more partners share the management functions and are personally responsible for all of the firm's actions and liabilities. Thus it is advantageous for each partner to specialize in a different area of the firm's practices. The varied specialization among partners establishes a complimentary network to offer diversified services for clients. High heterogeneity of partner specialization facilitates client solicitation and enhances the competitive advantage of partnership firms (Hitt, Ireland, Camp and Sexton, 2001; Pennings, Lee and Witteloostuijn, 1998). Whether the extent of performance effects of service quality and firm size differs between regional and local firms? Because no prior study examines this issue, we establish the following non-directional hypotheses to acquire further evidences.

H4e: The extent of performance effects of service quality differs between regional and local firms.

H4f: The extent of performance effects of firm size differs between regional and local firms.

DATA AND METHODOLOGY

Data

Empirical data are from the 1995-2009 Survey Report of Audit Firms in Taiwan, published by the Financial Supervisory Commission (FSC). To collect business information on the public accounting profession for macro-economic analysis and industrial policy formation, the FSC administers the survey over all registered audit firms annually. Because the FSC administers the survey pursuant to the Statistics Act, the Survey Report reveals an annual response rate of over eighty percent. As the sample period of this study is 15 years, this study deflates all monetary variables by the yearly Consumer Price Index to account for inflation. Original number of observation is 10,985 during sample period. This study deletes firm-year observations that newly established in the survey year and that with dependent variables having values more or less than three standard deviations away from their means. The final number of observations is 10,087. The number (percentage) of observations for national firms is 852 (8.45%) and that of regional and local firms is 2,338 (23.17%) and 6,897 (68.38%), respectively. Further, the number of stability regional and local firms is 1,691 and 3,128. The number of expansion regional and local firms is 647 and 3,769.

Empirical Model

The empirical data of this study come from registered audit firms in Taiwan, an industrial data. From the perspective of industrial economics and based on the Structure-Conduct-Performance (S-C-P) theoretical framework (Cowling and Waterson, 1976), this study establishes the following linear regression equation to test our hypotheses.

$$PERFORM = \alpha_0 + \alpha_1 HC\_QUALITY + \alpha_2 MKS + \alpha_3 DUMMY + \alpha_4 HC\_QUALITY*DUMMY + \alpha_5 MKS*DUMMY + \alpha_6 DIV + \alpha_7 AGE + \alpha_8 LEV + \alpha_9 TAIEX + \varepsilon$$

where:

Perform	=	Performance of Audit Firms;
HC_QUALITY	=	human capital-based service quality;
MKS	=	firm size;
DUMMY	=	DV_STRATEGY, dummy variable of business strategies;
	=	DV_ PATTERN, dummy variable of market segments;
DIV	=	degree of business diversification of audit firms;
AGE	=	age of audit firms;
LEV	=	human capital leverage of audit firms; and
TAIEX	=	economic indicator.

Variable Definitions

This study defines performance as profit ratio, net income divided by total revenues. In accounting, net income equals total revenues deduct total expenses. Partners or sole proprietors are the owners and residual interest claimants of an audit firm. Their annual income comprises salaries received from and share of profit of the firm. Their salaries are a part of total expenses of the firm. The more the salaries, the less the net income of the firm is. It makes no difference for them to receive salaries or not in terms of their total annual income. In addition, the criteria for salary payments to them vary across firms. Based on prior studies (Chen et al., 2008), their salaries are added back to net income to reduce such an artificial noise. This study thus defines profit ratio (*PERFORM*) as follows.

PERFORM = (total revenues – total expenses + partners' salaries) / total revenues

Our first research variable is the human capital-based service quality (*HC_QUALITY*) extracted by a principal component analysis technique from human capital related factors suggested in prior studies. Meinhardt, Moraglio and Steinberg (1987) indicate that education of auditors is an important area affecting the quality of auditors' work. Aldhizer, Miller and Moraglio (1996) report some human capital attributes that are strongly associated with audit service quality, including that senior auditors are a certified public accountant (CPA), a symbol of professionalism, and general knowledge and experience of auditors. The British Financial Reporting Council (2006) identifies some principal drivers of audit quality such as the skill base (experience) of partners and staff, and the training given to audit personnel. Lee, Liu and Wang (1999) evaluate the effects of the 150-rule on audit market and incorporate auditor education and auditor effort as joint inputs of audit quality. On the basis of preceding studies, we extract an audit firm service quality from four factors related to human capital of an audit firm, including the academic educational level of auditors (Lee et al. 1999), the work experience of auditors (Aldhizer et al., 1996; FRC, 2006), professionalism (Aldhizer et al., 1996), and the continuing professional education of auditors (Meinhardt et al., 1987; FRC, 2006). The eigenvalue-greater-than-one rule indicates that the component obtained explains 76.86% of the total variance. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy value of our dataset is 0.653 and Bartlett's test of sphericity reaches statistical significance ($\chi^2 = 4{,}218$; $p < 0.000$). This indicates that our empirical data are suitable for principal component analysis.

Another variable of interest in this study is the firm size (*MKS*), assessed by market share of audit firms. Moreover, this study sets a dummy variable of organizational pattern (*DV_PATTERN*) to compare the performance among the three sub-samples, national, regional, and local firms. Next, this study establishes dummy variable of business strategy (*DV_STRATEGY*) to distinguish audit firms taking stability strategy from expansion strategy. In addition to the variables of interest, some other factors affecting performance are included as control variables. Diversity in service lines will enhance the firms' efficiencies due to the

existence of economies of scope arising from the sharing or joint utilization of inputs (Baumol, Panzar and Willig, 1982). We measure the degree of business diversification of audit firms (*DIV*) by an Entropy index and expect a positive effect on performance. In practice, audit firms accumulate human resources and clients over time. Based on prior studies (Chen et al., 2008; Collins-Dodd et al., 2004), this study expects a positive association between age of audit firms (*AGE*) and performance. Audit firms render services by a team composed of a partner (leader) and some assistants. The number of assistants working with a partner affects the performance. Based on Hitt et al. (2001), this study defines human capital leverage of audit firms (*LEV*) as the number of assistants working with a partner. This study uses it to depict the human capital structure of audit firms and expects it to be negatively related to performance. Research period of this study is 15 years and spans over two centuries. As a professional organization, audit firms are affected by local economy or environment factors (e.g., Reynolds and Francis, 2001). Economic indicator (*TAIEX*), Taiwan Stock Exchange Market-Value Weighted Index, is included to control the effects from external environment factors. However, auditors provide services to the same clients for years and most of their practices are statutory, making the effects of environment factors on performance limited. Accordingly, this study does not specify a directional prediction on the relationship between economic indicator and performance.

RESULTS

Descriptive Statistics

Table 1 lists the descriptive statistics for our dependent and research variables. National firms have mean profit ratio (*PERFORM*) of 24.24%, higher than that of regional firms (21.48%) and local firms (18.39%). Human capital-based service quality (*HC_QUALITY*) of national firms is 0.5738, and that of regional and local firms is -0.0321 and -0.0338, respectively. The negative human capital-based service quality results from the standardization of coefficients. Firm size (*MKS*) indicates that, on average, national firms have higher market share (1.19%) compared to regional (0.09%) and local firms (0.03%). Dummy variable of business strategy (*DV_STRATEGY*) reveals 28% of the regional firms and 55% of the local firms take expansion type strategy. Finally, dummy variable of organizational pattern (*DV_PATTERN*) shows that the number of regional firms is about one third that of local firms.

Table 1: Descriptive Statistics

		Sub-samples			
Variables		**National**	**Regional**	**Local**	**Regional/Local**
PERFORM	Mean	0.2424	0.2148	0.1839	—
	S.D.	0.1039	0.1578	0.2125	
HC_QUALITY	Mean	0.5738	-0.0321	-0.0338	—
	S.D.	0.7586	0.7409	0.6145	
MKS	Mean	0.0119	0.0009	0.0003	—
	S.D.	0.0293	0.0010	0.0003	
DV_STRATEGY	Mean	—	0.28	0.55	—
	S.D.		0.45	0.50	
DV_PATTERN	Mean	—	—	—	0.33
	S.D.				0.44
DIV	Mean	0.6064	0.4472	0.4054	—
	S.D.	0.1236	0.1442	0.1545	
AGE	Mean	17	10	10	—
	S.D.	11	8	9	
LEV	Mean	10	7	7	—
	S.D.	6	4	5	
TAIEX	Mean	6,189	6,287	6,223	—
	S.D.	1,385	1,312	1,347	

Table 1 shows the descriptive statistics for variables used in regression model. PERFORM is equal to profit ratio of audit firms. HC_QUALITY is human capital-based service quality. MKS represents the audit firm size. DV_STRATEGY is a dummy variable of business strategy. DV_PATTERN is a dummy variable of organizational pattern. DIV is the degree of business diversification of audit firms. AGE represents the age of audit firms. LEV stands for the human capital leverage of audit firms. TAIEX is an economic indicator.

Regression Results

Association between service quality, firm size and performance (H1a, H1b, and H1c) Table 2 reports the empirical results for the effects of human capital-based service quality and firm size on performance in the national, regional, and local firms. Panel A lists the regression results and Panel B Wald test results. The explanatory power of models (adjusted R^2) ranges between 0.315 and 0.595, implying that the three models are well specified. All t-statistics of variable coefficient are calculated using White (1980) robust standard errors to correct for heteroscedasticity. As a check on the multi-collinearity among independent variables, we estimate the variance inflation factors (VIFs). In addition, we estimate the standardized regression coefficients (*Beta*) for each independent variable to ease comparisons between variables. The preceding three econometric treatments apply to all regression models in this study.

For national firms, the coefficient on human capital-based service quality (*HC_QUALITY*) is significantly positive ($t = 3.107$, $p < 0.01$) but that of firm size (*MKS*) is insignificantly positive. Panel B displays that the value of standardized coefficient on service quality (α_1) (0.196) is higher than that of firm size (α_2) (0.038) ($F = 57.610$, $p < 0.01$). This represents that service quality is a more important performance determinant than firm size in the national firms. H1a receives a support. Empirical results for regional firms indicate that the relation between human capital-based service quality (*HC_QUALITY*) and performance is insignificantly positive but the relation between firm size (*MKS*) and performance is significantly positive ($t = 9.879$, $p < 0.01$).

Table 2: Results of the Performance Effects of Service Quality and Firm Size

Panel A: Regression Results			
	National Firms	**Regional Firms**	**Local Firms**
Research Variables (Predicted Sign)			
HC_QUALITY(+)	0.196***	0.022	-0.024
	(3.107)	(0.661)	(-1.444)
MKS(+)	0.038	0.231***	0.342***
	(0.698)	(9.879)	(20.983)
Control Variables (Predicted Sign)			
DIV(+)	0.083**	0.082***	0.043***
	(2.367)	(4.041)	(3.655)
AGE(+)	0.007	-0.041	-0.026
	(0.210)	(-1.037)	(-1.212)
LEV(-)	-0.412***	-0.346***	-0.345***
	(-9.409)	(-9.929)	(-16.803)
TAIEX(?)	0.044	0.032	0.034***
	(1.346)	(1.646)	(2.974)
Adjusted-R^2	0.595	0.315	0.404
F-statistic	115.84**	74.90***	106.50***
Number of observations	852	2,338	6,897
Panel B: Test of Difference in Coefficients			
	α_1-α_2 (F-statistic)	α_1-α_2 (F-statistic)	α_1-α_2 (F-statistic)
α_1-α_2=0 +/-	0.158***	-0.209***	-0.366***
	(57.610)	(82.410)	(254.503)

*Panel A of this table represents the empirical results for the effects of human capital-based service quality and firm size on performance in the national, regional, and local firms. Empirical results for national firms demonstrate that the performance effect of the human capital-based service quality is significantly positive but that of firm size is insignificantly positive. Empirical results for regional and local firms indicate that the relation between human capital-based service quality and performance is insignificantly positive but the relation between firm size and performance is significantly positive. Panel B represents the Wald test results. The value of standardized coefficient on service quality is higher than that of firm size in the national firms. The value of standardized coefficient on service quality is less than that of firm size in the regional and local firms. *, **, *** Denote one-tailed significance at the 10 %, 5 % and 1 % levels. Variables are defined in Table 1.*

Furthermore, Panel B shows that the value of standardized coefficient on service quality (α_1) (0.022) is less than that of firm size (α_2) (0.231) ($F = 82.410$, $p < 0.01$). This means that firm size is a more important performance determinant than service quality in the regional firms and lends a support to H1b. Empirical results of local firms resemble that of regional firms. The relation between human capital-based service quality (*HC_QUALITY*) and performance is insignificantly positive but the relation between firm size (*MKS*)

and performance is significantly positive ($t = 20.983$, $p < 0.01$). The value of standardized coefficient on firms size (α_2) (0.342) is significantly greater than that of human capital-based service quality (α_1) (-0.024) ($F = 254.503$, $p < 0.01$). H1c is supported.

Effects of Business Strategies on Performance (H2a and H2b)

This section examines the effects of business strategies on performance. Because national firms take expansion type strategy only, Table 3 displays regression results for regional and local firms. As indicated, the adjusted R^2 ranging between 0.355 and 0.481 implies a moderate model specification. Column (A) displays the results for regional firms. The coefficient on dummy variable of business strategy (*DV_STRATEGY*) is significantly negative ($t = -1.756$, $p < 0.10$). This indicates that the performance of expansion regional firms is better than that of stability regional firms and lends a support to H2a. For the local firms, column (C) reports that the coefficient on dummy variable of business strategy (*DV_STRATEGY*) is negative but insignificant. This means no significant differences in the performance between expansion and stability local firms. Accordingly, H2b is not supported.

Results of the Performance Effects of Service Quality and Firm Size under Varied Business Strategies (H3a, H3b, H3c and H3d)

Previously stated in Table 2, firm size is a more important performance determinant than service quality in both regional and local firms. Further, columns (A) and (C) in Table 3 indicate that the performance of expansion regional firms is better than that of stability regional firms, but no significant differences in performance exist between expansion and stability local firms.

Table 3: Regression Results for the Effects of Business Strategy on Performance

	Regional Firms		**Local Firms**	
	(a)	**(b)**	**(c)**	**(d)**
Research Variables (Predicted Sign)				
hc_quality(+)	0.018	-0.009	-0.026	-0.016
	(0.533)	(-0.240)	(-1.455)	(-0.815)
mks(+)	0.227***	0.233***	0.335***	0.325***
	(9.682)	(9.799)	(20.881)	(19.306)
dv_strategy(-)	-0.039*	—	-0.024	—
	(-1.756)		(-1.352)	
*hc_quality *dv_strategy*(?)	—	0.058**	—	-0.010
		(2.428)		(-0.628)
*mks*dv_strategy*(?)	—	0.033	—	0.060***
		(1.524)		(4.389)
Control Variables (Predicted Sign)				
div(+)	0.066***	0.085***	0.041***	0.056***
	(2.956)	(3.957)	(3.217)	(4.589)
age(+)	-0.043	-0.040	-0.022	-0.026
	(-1.133)	(-1.154)	(-1.194)	(-1.230)
lev(-)	-0.343***	-0.350***	-0.343***	-0.355***
	(-9.807)	(-9.969)	(-16.760)	(-17.221)
taiex(?)	0.032	0.034	0.033***	0.035***
	(1.619)	(1.642)	(2.968)	(3.051)
adjusted-r^2	0.355	0.397	0.404	0.481
f-statistic	79.384***	73.788***	101.292***	92.597***
number of observations	2,338	2,338	6,897	6,897

Table 3 displays the OLS regression results of the relationship between business strategy and financial performance in the regional and local firms. Column (A) indicates that the performance of expansion regional firms is better than that of stability regional firms. Column (B) shows that the extent of performance effects of service quality in stability regional firms is higher than that in expansion regional firms. Column (C) reports that no significant differences in the performance between expansion and stability local firms. Column (D) represents that the extent of performance effects of firm size in stability local firms is higher than that in expansion local firms., **, *** Denote one-tailed significance at the 10 %, 5 % and 1 % levels. Variables are defined in Table 1.*

Whether the extent of performance effects of service quality and firm size differs for audit firms taking different business strategies? To this, we conduct analyses over regional and local firms and display empirical results in columns (B) and (D) of Table 3, respectively. Column (B) lists the results for regional firms. First, the coefficient on the interaction term between human capital-based service quality and dummy variable of business strategy (*HC_QUALITY* DV_STRATEGY*) is positive significantly ($t = 2.428$, $p < 0.05$). This represents that the extent of performance effects of service quality in stability regional firms is higher than that in expansion regional firms. H3a is supported. Next, the coefficient on the interaction term between firm size and dummy variable of business strategy (*MKS*DV_STRATEGY*) is positive but insignificant.

This indicates no differences in the extent of performance effects of firm size between stability and expansion regional firms. Thus, H3b receives no support. For the local firms, column (D) reports a negative but insignificant coefficient on the interaction term between human capital-based service quality and dummy variable of business strategy (*HC_QUALITY*DV_STRATEGY*). This means no significant differences in the extent of performance effects of service quality between stability and expansion local firms. H3c is not supported. Further, column (D) displays a significantly positive coefficient on the interaction term between firm size and dummy variable of business strategy (*MKS* DV_STRATEGY*) ($t = 4.389$, $p < 0.01$). This represents that the extent of performance effects of firm size in stability local firms is higher than that in expansion local firms and lends a support to H3d.

Effects of Service Quality and Firm Size on Performance for Different Subsamples (H4a, H4b, H4c, H4d, H4e and H4f)

This section investigates whether the extent of performance effects of service quality and firm size differs among national, regional, and local firms. Table 4 displays the empirical results. As shown, the explanatory power of models (adjusted R^2) lies between 0.165 and 0.544, indicating a moderate model specification. In the Column (A), coefficient on the interaction term between human capital-based service quality and dummy variable of organizational pattern (*HC_QUALITY*DV_PATTERN*) is positive but insignificant. This represents no significant differences in the extent of performance effects of service quality between national and regional firms. H4a is not supported. However, the coefficient on the interaction term between firm size and dummy variable of organizational pattern (*MKS*DV_PATTERN*) is significantly negative ($t = -6.119$, $p < 0.01$). This stands for that the extent of performance effects of firm size in the national firms is lower than that of in the regional firms, lending a support to the H4c. Column (B) shows that coefficient on the interaction term between human capital-based service quality and dummy variable of organizational pattern (*HC_QUALITY*DV_PATTERN*) is negative but insignificant.

As no significant differences in the extent of performance effects of service quality exist between national and local firms, H4b receives no support. The coefficient on the interaction term between firm size and dummy variable of organizational pattern (*MKS*DV_PATTERN*), however, is significantly negative ($t = -15.651$, $p < 0.01$). This denotes that the extent of performance effects of firm size in the national firms is lower than that of in the local firms, lending a support to the H4d. In the column (C), coefficient on the interaction term between human capital-based service quality and dummy variable of organizational pattern (*HC_QUALITY*DV_PATTERN*) is negative but insignificant. This represents no significant difference in the extent of performance effects of service quality between regional and local firms. H4e is not supported. However, the coefficient on the interaction term between firm size and dummy variable of organizational pattern (*MKS*DV_PATTERN*) is significantly negative ($t = -16.586$, $p < 0.01$). This means that the extent of performance effects of firm size in the local firms is higher than that of in the regional firms, lending a support to the H4f.

Table 4: Results of the Performance Effects of Service Quality and Firm Size under Different Subsamples

	National-Regional (A)	National-Local (B)	Regional-Local (C)
Research Variables (Predicted Sign)			
hc_quality (+)	-0.108*** (-3.993)	-0.094*** (-5.791)	-0.021 (-1.226)
mks(+)	2.083*** (6.377)	7.654*** (15.781)	0.650*** (21.103)
*hc_quality *dv_pattern*(?)	0.038 (1.332)	-0.012 (-0.673)	-0.009 (-0.688)
*mks*dv_pattern*(?)	-1.989*** (-6.119)	-7.549*** (-15.651)	-0.476*** (-16.586)
Control Variables (Predicted Sign)			
div(+)	0.170*** (9.322)	0.115*** (9.961)	0.064*** (6.227)
age(+)	0.004 (0.195)	0.001 (0.112)	-0.029 (-1.196)
lev(-)	-0.211*** (-8.585)	-0.208*** (-12.097)	-0.323*** (-18.416)
taiex(?)	0.031* (1.815)	0.027** (2.422)	0.033*** (3.292)
adjusted-r^2	0.165	0.334	0.544
f-statistic	31.796***	64.368***	104.724***
number of observations	3,190	7,749	9,235

*Column (A) of Table 3 reports the empirical results of the performance effects of service quality and firm size between national and regional firms. It demonstrates that the extent of performance effects of firm size in the national firms is lower than that of in the regional firms. Column (B) shows that the empirical results of the performance effects of service quality and firm size between national and local firms. It denotes that the extent of performance effects of firm size in the national firms is lower than that of in the local firms. Column (C) indicates the empirical results of the performance effects of service quality and firm size between regional and local firms. It demonstrates that the extent of performance effects of firm size in the local firms is higher than that of in the regional firms. *, **, *** Denote one-tailed significance at the 10 %, 5 % and 1 % levels. Variables are defined in Table 1.*

Additional Tests

Critical events: The sampling period of this study experiences two critical events that probably impact the performance of audit firms. One is the 1997 Asian financial crisis storm and the other is the 2002 contagious accounting scandal in the US. To examine the effects of the two events on audit firms, this study set two yearly dummy variables for additional tests, *Y1997* and *Y2002*. First, this study conducts uni-variate tests to compare the differences in performance between event years and other years for national, regional, and local firms. The 1997 profit ratio of national firms is 25.98%, which is insignificantly different from that of other years, 24.19%（t = 1.264）. Similarly, the differences in profit ratio of national firms between 2002 and other years are insignificant（t = -0.717）. The 1997 and 2002 profit ratios of regional firms are 23.41% and 21.01%, respectively. As the situation in the national firms, the event year profit ratios of regional firms are insignificantly different from that of other years (t = 1.550 and -0.286). Finally, local firms had profit ratios of 18.80% in 1997 and 14.39% in 2002. Although the differences in profit ratio between 1997 and other years are insignificant（t = 0.119）, the differences reach significance between 2002 and other years (t = -3.815).

Because uni-variate tests do not control other factors affecting performance, this study includes the two yearly dummy variables into the regression model and re-runs the same analyses as those reported in Tables 3 to 6. Empirical results (not reported here for brevity) indicate that the coefficients on yearly dummy variables (*Y1997* and *Y2002*) are positive but insignificant and other results do not change substantially. Taking the results from uni-variate test and regression analyses together, both the 1997 Asian financial

crisis storm and the 2002 contagious accounting scandal seem to have immaterial effects on performance of Taiwanese audit firms. For long, audit firms have provided traditional services which are statutory and required businesses by related laws and regulations. In addition, audit firms render services to the same clients for years and thereby establish long term partnership between them. As a result, changes in external environment have minimal impact on audit firms.

International audit firms: In this study, national firms include big international audit firms, also referred to as Big N firms. They are much larger in size compared to other national firms. Big firms invest resources to create a brand name reputation and provide services with high quality. Several prior studies document the existence of a Big N audit fee premium (Francis, 1984; Palmrose, 1986; Johnson et al., 1995; Craswell et al., 1996). Whether the audit firms with audit fee premium result in better performance than others? To this, we first compare the performance between Big N firms and non-Big N firms. Uni-variate test results indicate no significant difference in profit ratio between Big N firms (24.37%) and non-Big N firms (24.22%) ($t = 0.12$).

Next, this study sets a Big N dummy variable and includes it into the empirical models containing national firms. After re-running the regression analysis, empirical results (not reported here for brevity) show that the performance of Big N firms is not significantly better than that of non-Big N firms ($t = 0.409$). Manpower is the major assets of audit firms and salaries expenses account for 69.9% of total expenses in an audit firm during the sampling period. Practitioners argue that the salary expenses of Big N firms are higher than that of non-Big N firms. More revenues earned due to audit fee premium are offset by the higher salary expenses incurred, resulting in profit ratio of Big N firms not higher than non-Big N firms.

CONCLUSION

This study investigates the effects of service quality and firm size on performance of audit firms in Taiwan. Empirical data are from the 1995-2009 Survey Report of Audit Firms in Taiwan, published by the Financial Supervisory Commission (FSC). Empirical results indicate that service quality is more important than firm size in the performance determinant of national firms. However, firm size is a more important performance determinant in the regional and local firms. Next, performance of expansion regional firms is better than that of stability regional firms. The extent of performance effects of service quality of stability regional firms is higher than that of expansion regional firms. The extent of performance effects of firm size of stability local firms is higher than that of expansion local firms.

Finally, the extent of performance effects of firm size in the national firms is lower than that of in the regional and local firms. The extent of performance effects of firm size in the local firms is higher than that of in the regional firms. With the findings, this study contributes the following knowledge to literature of quality management. When audit firms situate in a stricter legal liability market, their competitive weapons are service quality. If audit firms locate in a less regulated market in which homogeneous services are provided, their survival measures are market share enlargement. National firms are larger in size than regional and local firms. Our empirical results of national firms demonstrate that big is not necessarily beauty. Instead, the enhancement of service quality is warranted. The findings of regional and local firms, however, reveal that big is beauty given the threshold of service quality is attained. In addition, our findings that expansion regional firms outperform stability regional ones suggest practitioners of regional audit firms to offer both traditional and non-traditional services to acquire the spill-over effects and audit cost savings from joint provisions of both services. Audit firms are a professional service organization and render services with expertise.

This study uses the technical competencies of employees in audit firm to measure the service quality. Other factors, such as audit job hours and culture in an audit firm, also determine the service quality but are not incorporated into the regression model due to data availability, resulting in a limitation of this study. Knowledge management is a critical factor for the survival and continuing development of audit firms. Few prior studies on knowledge management are conducted in the auditing industry. This constitutes a promising avenue for future study.

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BIOGRAPHY

Yi-Fang Yang is an Assistant Professor of the Department of Accounting and Information System at the Chang Jung Christian University in Taiwan. She focuses her research interests on the human capital and service quality issues of the CPA firms. She has published scholarly articles in The International Journal of Human Resources Management, Human Systems Management and The International Journal of Business and Finance Research. She can be reached at No.1, Changda Rd., Gueiren Dist., Tainan City 71101, Taiwan (R.O.C.), yifang@mail.cjcu.edu.tw.

Lee-Wen Yang, corresponding author, is an Assistant Professor of the Department of Accounting at the Chaoyang University of Technology in Taiwan. She focuses her research interests on the competitive and business strategy of small and medium-sized enterprises. She has published scholarly articles in Human Systems Management, The International Journal of Human Resources Management and The International Journal of Business and Finance Research. She can be reached at No. 168, Jifong E. Rd., Wufong Dist., Taichung City 41349, Taiwan (R.O.C.), lwyang@cyut.edu.tw.

Min-Ning Lee is a Lecturer of the Department of Hospitality Marketing Management at the Asia-Pacific Institute of Creativity in Taiwan. Her research interests are operating performance and gender. She has published scholarly articles in Auditing Review of China and Indian Journal of Economics and Business. She can be reached at No. 110, XueFu Rd., Toufen, Miaoli County 35153, Taiwan (R.O.C.), minning@ms.apic.edu.tw.

International Journal of Business and Finance Research
Vol. 9, No. 4, 2015, pp. 67-80
ISSN: 1931-0269 (print)
ISSN: 2157-0698 (online)

IBFR
www.theIBFR.com

FINANCIAL PERFORMANCE OF MICRO, SMALL AND MEDIUM ENTERPRISES (MSMES) IN THE PHILIPPINES

Rufo R. Mendoza, Asian Institute of Management

ABSTRACT

The study analyzed the financial performance of selected micro, small, and medium enterprises using secondary data from financial statements for the past three years. Results showed the enterprises performed favorably in liquidity, activity and leverage but suffered from a low-level profitability. Using correlation analysis, the results show a significant linear relationship between liquidity and activity, liquidity and leverage, and activity and leverage. However, each of these measures has no significant relationship with profitability. Using t-tests, the results show no significant difference in the liquidity, profitability, and inventory turnover of the enterprises when grouped according to organizational form, business type, and asset size. However, a significant difference exists in receivable turnover, asset turnover, and debt ratios. The study recommends the MSMEs should revisit their strategies for improving profitability and use financial performance information in making critical decisions. Firms should connect financial performance to the larger external environment of the business so they will continue to play an important role in the growth of the economy.

JEL: M00, M400

KEYWORDS: Financial Performance, Organizational Form, Business Type, Asset Size

INTRODUCTION

This study assessed the financial performance of selected micro, small, and medium enterprises (MSMEs) in liquidity, activity, leverage, and profitability and explored the relationship among these measures. It also tested if there is a significant difference in the financial performance of MSMEs grouped according to three categories: organizational form, business type, and asset size. This study contributes to the existing literature in several ways. First, it provides empirical evidence on the financial performance of MSMEs whose capacity and needs are different from large enterprises, multinational corporations, and publicly listed companies. The study showed MSMEs had satisfactory performance in liquidity, activity, and leverage but experienced low profitability. As a result, MSMEs need strategic actions and directions that focus on improving profitability.

Second, the study provides an empirical basis to infer that a significant linear relationship exists between liquidity and activity, liquidity and leverage, and activity and leverage. However, these three measures of financial performance did not show any significant relationship with profitability. This finding contradicts several previous studies. For instance, Ayodele & Oke (2013, p.52) found a direct correlation between the liquidity and profitability of banks in Nigeria. Bolek & Wilinski (2012, p. 51) concluded that financial liquidity influences profitability of construction companies listed in the Warsaw Stock Exchange from 2000 to 2010. Kaya (2014, p. 66) found that firm leverage is an important factor in explaining profitability and liquidity of both retailers and wholesalers in the U.S. Meanwhile, in Pakistan, Akhtar et al. (2012, p. 15) shows that a positive relationship prevails between financial leverage and financial performance. Such finding includes profitability measures such as return on sales, return on assets, return on equity, earnings

per share, and dividend ratios. They investigated 20 publicly listed limited companies from the fuel and energy sector at Karachi Stock Exchange. Nonetheless, the results of this study agree with Niresh (2012, p. 39) who revealed no significant relationship between liquidity and profitability when he analyzed 31 listed manufacturing firms in Sri Lanka from 2007 to 2011.

Third, the study provided evidence on the differences of financial performance of MSMEs when grouped according to organizational form, business type, and asset size. Such grouping is an area that researchers seldom explore. This research found no significant difference in the liquidity, profitability, and inventory turnover of the enterprises when grouped according to these three categories. However, a significant difference exists in receivables turnover, asset turnover, and debt ratios. Specifically, single proprietorships have significantly higher receivable turnovers than corporations and small enterprises have significantly higher receivable turnovers than both the micro and medium enterprises. Comparatively, both manufacturing and trading businesses have significantly higher asset turnover than those rendering services while small enterprises have significantly higher asset turnover than both the micro and medium enterprises. Corporations have significantly higher debt ratios compared with sole proprietorships; manufacturing business, compared with trading; and medium enterprises, compared with both micro and small enterprises.

Finally, the study provided the MSMEs some bases to benchmark their performance. In doing so, they will be able to maximize value and better contribute to the social and economic well-being of a country. Studies focused on the characteristics of entrepreneurs (Morales et al., 2013) and dynamics of the entrepreneurial processes (Baltar & Coulon, 2014) are best combined with financial performance benchmarks to achieve greater entrepreneurial results. Since MSMEs are recognized as an important vehicle for the economic growth of most nations, mainstreaming their financial management concerns is paramount in any economy. The succeeding part of this paper contains the related literature, data and methodology, results of the empirical investigation, and conclusions.

LITERATURE REVIEW

Researchers have written much about the financial concerns of MSMEs. Typically, studies focus more on the critical reasons that prevented MSMEs from using available financial packages. The Philippine Senate (2012) identified access to finance as the most serious constraints to MSME growth and development. Aldaba (2012) underscored that SMEs had been unable to access funds because of their limited track record, limited acceptable collateral, and inadequate financial statements and business plans. Banks turn down financial requests of SMEs because of poor credit history; insufficient collateral; inadequate sales, income or cash flow; unstable business type; and poor business plans.

By the same token, the ASEAN Strategic Action Plan for SME Development (2010–2015) identified access to finance as the primary goal, with four additional dimensions: market and internationalization, human resource development, information and advisory services, and technology and innovation. This means that lack of access to finance makes it more crucial for MSMEs to manage funds efficiently and effectively. Indeed, Jasra et al. (2011) stressed that financial resources are the most important factors that affect the success of SMEs and on which the whole business depends. They cited that SMEs have to endure the problem of modest capital compared with the large multinational corporations. Piet (2010) proved most entrepreneurs need financial skills and motivational and entrepreneurial skills to develop their businesses. At the same time, Piet (2010) noted there is a need for support in financial management among MSMEs to improve their financial health. These findings point to the importance of managing financial resources among these enterprises. Still, MSMEs face the challenge of putting in place an effectively functioning system on managing a broad range of financial activities that would enable achieving business goals.

Thus, it is important for MSMEs to capture financial information and measure performance in the use of financial resources. Mendoza (2014) cited that MSMEs need the services of practicing Certified Public

Accountants in most of these financial management areas, specifically taxation, accounting and financial reporting, and audit. In addition, micro and small enterprises differ from medium enterprises in complexity of accountancy services. Micro enterprises have simpler ways of doing their tasks and are not bent on exploring complex methods and processes.

There is a plethora of literature on financial performance of businesses. Previous researches tackled two major themes: performance measurement approach and measures of performance. On the first theme, the goal approach of Chong (2008) became clear for MSMEs. In this approach, owners and managers set their target internally based on their interest and capacity of their business. The approach enables owners and managers to identify if they have achieved their goals by looking at both financial and nonfinancial measures. Thus, its simplicity makes it popular. Shahbaz et al. (2014) described the system resource approach as a way to measure performance by appraising the capacity to get resources or inputs. They also explained the stakeholder approach as something related to meeting the needs and expectations of the entity's stakeholders. Chen & Huang (2013) used the organizational life cycle stages in analyzing the financial performance of audit firms in Taiwan. They found that financial performance continues to increase as the firms grows, resulting in best performance at an old stage. Dalrymple (2004) forwarded the benchmark index as another approach in measuring performance. In this approach, financial measures fall under the category of resource management. In essence, MSMEs have to take time to measure their financial performance and gauge it against standards or benchmarks.

On the measures of financial performance, Chong (2008) identified profit and asset turnover to assess short-term duration but steady revenue growth rate and growth in the employment size to measure long-term capacity. The Kennas Chartered Accountants (2014) considered profitability and return on assets as the key performance indicators that are critical in understanding the state of financial health of a business. The four commonly used measures are liquidity, activity, leverage, and profitability (Levy, 1998; Melicher & Norton, 2000; Statistics Canada, 2014). The Statistics Canada (2014) used solvency in lieu of liquidity and efficiency in lieu of activity. Melicher & Norton (2000) used asset management synonymously with activity and included market value for entities listed in the stock exchange.

DATA AND METHODOLOGY

This research used secondary data from 99 annual financial statements of 33 enterprises, all located in the CALABARZON Region in the Philippines. The enterprises used these financial statements in filing their annual income tax returns for the last three years (2011-2013). A great majority (60.61%) of the enterprises are single proprietorships, while the remaining 39.39 percent are corporations. More than half (51.52%) of the enterprises are into trading and the rest are service (27.27%) and manufacturing (21.21%). When grouped according to asset size, 45.45 percent are micro, 27.27 percent are small, and 27.27 percent are medium enterprises. In assessing the performance of the entities, the qualitative rating scale in Table 1 was used. The research also examined two types of hypothesis: (a) relationship between and among the four measures of financial performance using the respective indicators under each measure and (b) significant difference in the financial performance when the MSMEs are grouped according to their profile. Specifically, the study has the following null hypotheses (Ho):

Ho1(a): There is no significant relationship between the liquidity and activity of MSMEs in the Philippines.
Ho1(b): There is no significant relationship between the liquidity and leverage of MSMEs in the Philippines.
Ho1(c): There is no significant relationship between the liquidity and profitability of MSMEs in the Philippines.
Ho2(a): There is no significant relationship between the activity and leverage of MSMEs in the Philippines.
Ho2(b): There is no significant relationship between the activity and profitability of MSMEs in the Philippines.

Ho3: There is no significant relationship between the leverage and profitability of MSMEs in the Philippines.

Ho4: There is no significant difference in the financial performance of the MSMEs when they are grouped according to (a) organizational form, (b) business type, and (c) asset size.

Table 1: Qualitative Rating Scale

	Low	Medium	High
Liquidity			
Current ratio	Below 2	2 to 10	Over 10
Quick ratio	Below 1	1 to 5	Over 5
Activity			
Collection days	After the credit terms	Within the credit terms	Before the credit terms
Inventory days	Over 20	10 - 20	Below 10
Asset turnover	Below 5	5-10	Over 10
Leverage			
Debt ratio (%)	Above 60	40-60	Below 40
Profitability			
Return on sales (%)	Below 5	5-10	Over 10
Return on assets (%)	Below 5	5-10	Over 10
Return on equity (%)	Below 5	5-10	Over 10

This table shows the qualitative rating scale used in assessing the financial performance of the business enterprises, classified into low, medium, and high for each measure. The ideal current ratio of 2:1 and quick ratio of 1:1 was used as the equivalent of low performance; the credit term was used for collecting receivables. Other criteria were based on the experience of most enterprises.

Pearson Product Correlation Coefficient was computed to describe the strength of the linear relationship that exists between the levels of two performance measures. Meanwhile, the Spearman Rank Order Correlation Coefficient was used for sample sizes lesser than 30 which were not normally distributed. Also, if a scatter diagram shows a nonlinear relationship, a transformation of one of the variables was performed, with such transformation depending upon the appearance of the scatter diagram. As an alternative approach, a regression analysis using the Pooled Ordinary Least Square Model was applied. The t-test was used for the significance of the correlation. One-way analysis of variance using an F-ratio was performed to determine whether the financial performance differs among three or more independent groups of enterprises classified according to the type (trading, manufacturing and service), and size of business (micro, small and medium). We concluded that at least one group has a significantly different performance whenever the probability value or significance associated with the computed F-ratio is less than 0.05. A post hoc comparison test (Tukey HSD) was performed whenever statistically significant differences resulted from each one-way analysis of variance. This enabled the determination of which independent group had significantly different performance.

RESULTS AND DISCUSSION

The results are presented in three parts: overall financial performance of the MSMEs, relationship of the financial performance measures, and test of differences when the MSMEs are grouped. The first finding of the study is the high score of MSMEs on liquidity and leverage, low score on profitability, and an erratic level in activity (Table 2).

Both current and quick ratios are far above the ideal measures, an indication that MSMEs have the ability to meet short-term obligations as they mature. Melicher & Norton (2000, p. 461) opined that "a low current ratio may indicate that a company may face difficulty in paying its bills." However, they cautioned that "a high value for the current ratio does not necessarily imply greater liquidity." Nonetheless, a business has to remain liquid so as not to incur the cost associated with a deteriorating credit rating, a potential forced liquidation of assets, and possible bankruptcy (Moyer, McGuigan, & Kretlow, 1990, p. 587). Additionally, Van Horne (1992) concurred that the liquidity of the individual components of the current assets must be taken into account. Furthermore, a ratio lower than ideal would be acceptable in the more difficult liquidity

conditions as cited by Samuels, Wilkes, & Brayshaw (1999, p.45). Bolek & Wilinski (2012, pp. 39-41) proposed a deep-seated observation when they thought the use of current and quick ratios is a static measurement of liquidity. This is so because they rely on data included in the balance sheet. So, they proposed the use of measurement data that is dynamic, specifically those coming from the cash flow account, such as the cash conversion cycle.

Table 2: Overall Financial Performance

	2011	2012	2013	3-Year Mean	Qualitative Rating
Liquidity					
Current ratio	9.77	13.74	14.14	12.55	High
Quick ratio	6.38	10.08	11.13	9.20	High
Activity					
Receivable turnover	65.72	68.90	53.93	62.85	
Collection days	5	4	6	5	High
Inventory turnover	12.57	10.86	10.22	11.22	
Inventory days	24	28	29	27	Medium
Asset turnover	3.01	2.59	1.96	2.52	Low
Leverage					
Debt ratio	39.96	35.69	38.60	37.09	High
Profitability					
Return on sales	1.16	-11.95	-5.44	-5.41	Low
Return on assets	3.47	0.34	1.12	1.64	Low
Return on equity	6.25	0.47	0.72	2.45	Low

This table shows all the measures and indicators used for assessing the financial performance for three years. Both indicators for liquidity had high ratings. The indicators for receivables had high scores also while those for inventories had medium rating. Debt ratio was high. Asset turnover and all the profitability indicators were low.

The activity level was high in the collection of receivables, moderate in the inventory turnover, and low in the overall asset turnover. The fast collection of receivables was illustrated in the ability to collect even earlier than the usual credit terms of 15 days. Similarly, the debt ratio, an indication of how the businesses use borrowing as a source of fund, has been below 40 percent each year. This could indicate safeguarding of the debt service payment at a satisfactory level and keeping borrowing at an acceptable level. Samuels, Wilkes, & Brayshaw (1999) opined that the acceptable level of inventory turnover should be linked to the type of industry or business. Likewise, they illustrated the rule of thumb in the United Kingdom for an acceptable debt ratio of 50 percent or 1:2. Similarly, Melicher & Norton (2000) stated that asset turnover is significantly influenced by characteristics of the industry within which the enterprise operates. They also underscored the financial leverage ratio indicates the extent to which borrowed funds are used to finance assets. Incidentally, the profitability level has been low, based on all aspects: sales, assets, and equity, even resulting in negative profit percentage on sales. Studies conducted by Bejaoui & Bouzgarrou (2013) showed that capital is important in explaining profitability.

The second finding of the study is that using correlation, several relationships exist between and among the different financial performance indicators (Table 3). First, liquidity and activity correlate as shown in the significant linear relationship between current ratio and inventory turnover ($r = 0.238$) as well as quick ratio and receivable ($r = -0.267$) and inventory ($r = 0.372$) turnovers. There is a significant relationship between liquidity and leverage as shown in the coefficient between both the current ratio ($r = -0.650$) and quick ratio ($r = -0.670$) with debt ratio. However, there is no relationship between liquidity and profitability.

Table 3: Summary of Relationships of Financial Performance Measures

	RT	IT	AT	Debt Ratio	ROS	ROA	ROE
Current ratio	-0.050	0.238**	-0.059	-0.650*	0.068	0.170	0.096
Quick ratio	-0.267*	0.372*	-0.125	-0.670*	0.102	0.163	0.104
Receivable turnover (RT)				0.027	-0.216**	0.071	0.058
Inventory turnover (IT)				-0.056	-0.436*	-0.188	-0.206**
Asset turnover (AT)				0.208*	-0.567*	0.045	0.053
Debt ratio					-0.236**	-0.088	0.144

*This table summarizes the correlation between liquidity (current ratio and quick ratio) and activity (receivable turnover, inventory turnover, and asset turnover). It also shows the correlation of activity and leverage (debt ratio). Finally, it shows leverage correlation with profitability (return on sales, return on assets, and return on equity). **correlation is significant at p-value less than 0.05; *correlation is significant at p-value less than 0.10*

Second, activity correlates with leverage as shown in the significant and positive relationship between asset turnover and debt ratio (r = 0.208). Also, activity correlates with profitability as the negative reciprocal of return on sales is also significantly but negatively related to all activity measures (r = -0.216, -0.436, -0.567). The negative reciprocal of the return on equity significantly correlates with inventory turnover (r = -0.206). Third, leverage correlates with profitability as shown in the linear relationship between debt ratio and return on sales (r = 0.236). In summary, the correlation has resulted in the varied decisions taken on the hypotheses (Table 4).

Table 4: Summary of Decisions on Hypotheses Tested

Hypothesis Number	Statement	Decision
Ho1(a)	There is no significant relationship between the liquidity and activity of MSMEs in the Philippines.	Reject
Ho1(b)	There is no significant relationship between the liquidity and leverage of MSMEs in the Philippines.	Reject
Ho1(c)	There is no relationship between the liquidity and profitability of MSMEs in the Philippines.	Accept
Ho2(a)	There is no relationship between the activity and leverage of MSMEs in the Philippines.	Reject
Ho2(b)	There is no relationship between the activity and profitability of MSMEs in the Philippines.	Accept
Ho3	There is no relationship between the leverage and profitability of MSMEs in the Philippines.	Accept

This table summarizes the decision about rejection or acceptance of the null hypotheses. The hypotheses that there is no significant relationship between liquidity and activity, liquidity and leverage, and activity and leverage were rejected. However, the hypotheses that there is no relationship between liquidity and profitability, activity and profitability, and leverage and profitability were accepted.

Next, a regression analysis using the Pooled Ordinary Least Square Model was applied with the following regression equation:

$$Y_{i,t} = \beta_0 + \beta_1 X_{i,t} + \varepsilon_{i,t} \quad (1)$$

To test the relationship between liquidity and activity, three simple regression results were generated (Table 5). The first model had quick ratio as the independent variable and accounts receivable turnover as the dependent variable. This model is statistically significant since the F value of 10.503 is significant at a probability value less than 0.01. This indicates a statistically significant relationship between quick ratio and accounts receivable turnover. Here, 9.8% of the variance of log accounts receivable turnover is explained by the variance in log quick ratio since $R^2 = 0.098$. A unit change in log quick ratio results in a decrease in log accounts receivable turnover as indicated by the negative sign of the unstandardized coefficient (-0.247). The second model used inventory turnover as the dependent variable. This model is statistically significant since the F-value of 15.411 is significant at a probability value less than 0.01. This indicates a statistically significant relationship between quick ratio and inventory turnover. Here, 13.96% of the variance of log inventory turnover is explained by the variance in log quick ratio since $R^2 = 0.1396$. A unit change in log quick ratio results in a decrease in log inventory turnover as indicated by unstandardized coefficient (0.311). For the third model, the dependent variable is assets turnover. This model is statistically insignificant since the probability value associated with F = 0.791 is greater than 0.05.

This implies that there is no significant relationship between log quick ratio, as a measure of liquidity, and log assets turnover, as a measure of activity.

Table 5: Regression Results for Various Financial Performance Measures

Independent Variable	Dependent Variable	R^2	Adj. R^2	F	Unstandardized Coefficients			
					Constant	Std. Error	Independent Variable	Std. Error
Quick Ratio	RT	0.098	0.088	10.503**	1.168**	0.068	-0.247**	0.076
	IT	0.1396	0.131	15.411**	0.606**	0.0687	0.311**	0.0791
	AT	0.0081	-.0021	0.791	0.0500	0.0652	0.0652	0.0733
	ROS	0.0794	0.0676	6.728*	0.2711**	0.0702	0.1910*	0.0736
	ROA	0.1529	0.1421	14.082**	0.4732**	0.0550	0.2166**	0.0577
	ROE	0.0030	-0.0103	0.222	0.7754	0.0550	0.0267	0.0567
AT	ROS	0.378	0.370	47.316**	0.430**	0.062	-0.743**	0.108
	ROA	0.068	0.056	5.689*	0.430**	0.062	0.257**	0.108
RT	ROE	0.051	0.038	4.020*	0.572**	0.115	0.163*	0.081
Debt Ratio	ROS	0.1015	0.090	8.809**	0.5484**	0.114	-0.0064**	0.0022
	ROA	0.2125	0.2025	21.053**	0.8008**	0.114	-0.0076**	0.0022
	ROE	0.0003	-0.0135	0.0209	0.7659**	0.0927	0.0003	0.0019

*This table shows the results of the regression analysis to test the relationship between liquidity and activity, liquidity and profitability, activity and profitability, and leverage and profitability. The relationship is * significant at $p < 0.05$, **significant at $p < 0.01$*

Regarding the relationship between liquidity and profitability, three simple results were obtained. For the first model, the dependent variable is return on sales. This model is statistically significant since the F-value of 6.728 is significant at a probability value less than 0.05. This indicates a statistically significant relationship between quick ratio and return on sales. Here, 7.94% of the variance of log return on sales is explained by the variance in log quick ratio since $R^2 = 0.0794$. Liquidity, as measured by log quick ratio has a positive effect on log return on sales, as indicated by the positive sign of the coefficient (0.1910). For the second model, the dependent variable is return on assets. This model is statistically significant since the F-value of 14.082 is significant at a probability value less than 0.01. This indicates a statistically significant relationship between quick ratio and return on assets. Here, 15.29% of the variance of log return on sales is explained by the variance in log quick ratio since $R^2 = 0.1529$. Liquidity, as measured by log quick ratio has a positive effect on log return on assets, as indicated by the positive sign of the coefficient (0.2166). For the third model, the dependent variable is return on equity. This model is statistically insignificant since the probability value associated with $F = 0.222$ is greater than 0.05. This also implies that there is no significant relationship between log quick ratio, as a measure of liquidity, and log return on equity, as a measure of profitability.

To test the relationship between activity and profitability, three simple regression results were similarly generated. For the first model, the independent variable is asset turnover (the lone significant predictor) and the dependent variable is return on sales. This model is statistically significant since the F-value of 47.316 is significant at a probability value less than 0.01. Here, 37.8% of the variance of log return on sales is explained by variance in log assets turnover since $R^2 = 0.378$. Activity, as measured by log assets turnover has a negative effect on log return on sales, as indicated by the negative sign of the coefficient (-0.743). For the second model, the dependent variable is return on assets. This model is statistically significant since the F-value of 5.689 is significant at a probability value less than 0.05. Here, 6.8% of the variance of log return on assets is explained by the variance in log assets turnover since $R^2 = 0.068$. Activity, as measured by log assets turnover has a positive effect on log return on sales, as indicated by the positive sign of the coefficient (0.257). For the third model, the dependent variable is return on equity. This model is statistically significant since that F-value of 4.020 is significant at a probability value less than 0.01. Here, 5.1% of the variance of log return on equity is explained by the variance in log accounts receivable turnover since $R^2 = 0.051$. Activity, as measured by log accounts receivable turnover (the lone significant predictor) has a positive effect on log return on sales, as indicated by the positive sign of the coefficient (0.163). The

relationship between leverage and profitability was illustrated in three simple regression results generated. For the first model, the dependent variable is return on sales.

This model is statistically significant since the F-value of 8.809 is significant at a probability value less than 0.01. This also indicates a statistically significant relationship between debt ratio and return on sales. Here, 10.15% of the variance of log return on sales is explained by the variance in debt ratio since $R^2 = 0.1015$. Leverage, as measured by debt ratio has a negative effect on log return on sales, as indicated by the negative sign of the coefficient (-.0064). For the second model, the dependent variable is return on assets. This model is statistically significant since the F-value of 21.053 is significant at a probability value less than 0.01. This also indicates a statistically significant relationship between these two measures. Here, 21.25% of the variance of log return on sales is explained by the variance in dent ratio since $R^2 = 0.2125$. Leverage, as measured by debt ratio has a positive effect on log return on assets, as indicated by the negative sign of the coefficient (-.0076). For the third model, the dependent variable is return on equity. This model is statistically insignificant since the probability value associated with F = 0.0209 is greater than 0.05. This also implies that there is no significant relationship between debt ratio, as a measure of leverage, and log return on equity, as a measure of profitability.

To test the relationship between liquidity and leverage, the model in Table 6 was generated. This model is statistically significant since the F-value of 78.9186 is significant at a probability value less than 0.01. This indicates a statistically significant relationship between liquidity, as measured by quick ratio, and leverage. Here, almost 50% or 44.86% of the variance of debt ratio is explained by the variance in log quick ratio since $R^2 = 0.4486$. A unit change in log quick ratio results to a decrease in log accounts receivable turnover as indicated by the negative sign of the unstandardized coefficient (-24.014).

Table 6: Regression Results for Liquidity and Leverage

	Unstandardized Coefficients		**T**	**P-Value Or Significance**
	B	Std. Error		
Model 1				
Constant	40.4566	2.4019	16.843	0.000**
Quick Ratio	-24.0140	2.7032	-8.884	0.000**
Model 2				
Constant	33.0950	6.156	5.376	0.000**
RT	11.0347	4.684	2.356	0.021*
IT	-9.7964	4.578	-2.140	0.035*

*Notes: The dependent variable for Model 1 is debt ratio, pairwise missing values were excluded, $R^2 = 0.4486$, adjusted $R^2 = 0.4429$, the over-all fit of this model, F = 78.9186 is significant at p-value 0f 0.000. The dependent variable for Model 2 is debt ratio, pairwise missing values were excluded, $R^2 = 0.0761$, adjusted $R^2 = 0.056$, the over-all fit of this model, F = 3.8701 is significant at p-value of 0.024. This table shows the results of the regression analysis to test the relationship between liquidity and leverage and leverage and profitability. *coefficient is significant at p < 0.05, **coefficient is significant at p < 0.01*

In testing the relationship between leverage and profitability, the prediction model generated was found to be statistically significant since the F-value of 3.8701 is significant at a probability value less than 0.01. This model accounted for 7.61% of the variance of debt ratio since R2 = 0.0761 and adjusted R2 = 0.056. Using this model, leverage is primarily predicted by two measures of activity, log accounts receivable turnover and log inventory turnover since these coefficients are significant at the 0.01 level (as indicated by p-values less than 0.05 for the test statistic t). Log accounts receivable turnover has a positive effect on debt ratio while log inventory turnover has otherwise as indicated by the signs of the coefficients. The third finding of the study is that using the t-test for differences in means, there is a significant difference in some financial performance measures when the enterprises are grouped according to business profile. Results of the t-test showed no significant difference in the liquidity of the MSMEs when grouped according to form of organization. This is so, because the probability values associated with the computed value of t for both ratios are greater than 0.05 (Table 7).

Table 7: Differences in Financial Performance of the MSMEs Grouped According to Organizational Form

		N	Mean	Std. Deviation	Computed Value of T, Df	Significance
Liquidity						
Current Ratio	Corporation	39	14.465	39.526	0.518	p > 0.05
	Proprietorship	60	11.305	20.951	97	
Quick	Corporation	39	10.446	31.284	0.401	p > 0.05
Ratio	Proprietorship	60	8.387	19.806	97	
Activity						
Receivable turnover	Corporation	39	29.673	57.108	-2.271**	p < 0.05
	Proprietorship	60	86.360	190.872	74.185	
Inventory turnover	Corporation	39	13.618	17.794	1.171	p > 0.05
	Proprietorship	60	9.655	15.532	97	
Asset	Corporation	39	2.444	2.544	-.179	p > 0.05
Turn-over	Proprietorship	60	2.567	3.751	97	
Leverage						
Debt Ratio	Corporation	39	60.624	32.364	5.949***	p < 0.01
	Proprietorship	60	25.177	22.771	62.239	
Profitability						
Return on sales	Corporation	39	-0.367	16.290	1.149	p > 0.05
	Proprietorship	60	-8.686	52.356	75.301	
Return on assets	Corporation	39	1.800	2.608	0.077	p > 0.05
	Proprietorship	60	1.541	26.028	60.814	
Return on equity	Corporation	39	1.821	12.912	-0.255	p > 0.05
	Proprietorship	60	2.908	28.824	88.026	

*The table shows the results of the t-test on the differences of financial performance of the enterprises when they were grouped according to form of organization. Based on the test, there is no significant difference in the liquidity of the enterprises, but there exists a significant difference in the accounts receivable turnover. There are also no significant differences for inventory turnover and asset turnover but there exists a highly significant difference in the debt ratio. There is also no significant difference in profitability in terms of return on sales, return on assets, and return on equity. Notation *** means the difference is significant at p < 0.01 while ** means the difference is significant at p < 0.05.*

On activity, we note that when enterprises are grouped according to form of organization, there exists a significant difference in the accounts receivable turnover of MSMEs ($t=-2.271$, $p<0.05$). Further, it can be inferred that accounts receivable turnover of the single proprietorships are significantly higher than corporations. Inventory and asset turnovers showed no significant differences. On leverage, results revealed that when enterprises are grouped according to form of organization, there exists a highly significant difference in the debt ratio of the MSMEs ($t=5.949$, $p<0.01$). Further, it can be concluded that leverage of the corporations are significantly higher than the single proprietorships.

Finally, there is no significant difference in the profitability of the MSMEs in terms of return on sales, return on assets, and return on equity. Results of the one-way analysis of variance on Table 8 show no significant difference in the liquidity of the MSMEs when grouped according to type of business. The current and quick ratios reflect this finding. In terms of activity, results showed at least one business type has a high significantly different asset turnover ($F=6.483$, with p-value less than 0.01). Consequently, the post hoc comparison test revealed the asset turnover of both manufacturing and trading businesses are significantly higher than those engaged in services (mean difference of 2.810, p-value less than .008 and mean difference of 2.416, p-value less than .005, respectively).

Table 8: Difference in Financial Performance of the MSMEs Grouped According to Type of Business

		N	Mean	Std. Deviation	Computed Value of F
Liquidity					
Current ratio	Manufacturing	21	22.487	52.521	2.154
	Trading	51	7.217	12.799	
	Service	27	14.894	26.653	
Quick ratio	Manufacturing	21	17.220	41.629	2.018
	Trading	51	4.823	10.353	
	Service	27	11.224	26.295	
Activity					
Account receivable turnover	Manufacturing	21	13.379	8.785	2.078
	Trading	51	91.038	202.80	
	Service	27	62.847	155.105	
Inventory turnover	Manufacturing	21	16.615	19.387	1.592
	Trading	51	10.492	16.903	
	Service	27	8.387	12.371	
Asset turnover	Manufacturing	21	3.488	2.714	6.483***
	Trading	51	3.094	3.973	
	Service	27	0.678	0.676	
Leverage					
Debt ratio	Manufacturing	21	53.764	34.312	4.148**
	Trading	51	31.286	23.335	
	Service	27	42.605	39.885	
Profitability					
Return on sales	Manufacturing	21	1.049	0.784	1.869
	Trading	51	-13.192	52.629	
	Service	27	4.271	33.004	
Return on assets	Manufacturing	21	2.823	3.084	1.155
	Trading	51	-1.157	23.508	
	Service	27	6.015	20.996	
Return on equity	Manufacturing	21	2.447	6.285	0.531
	Trading	51	0.461	26.824	
	Service	27	6.319	26.317	

*The table shows the results of the one-way variance analysis when the enterprises are grouped according to type of business. There is no significant difference in liquidity as reflected in the current and quick ratios. However, at least one business type has a high significantly different asset turnover and debt ratio. There is also no significant difference in the return on sales, assets and equity. Notation *** means the difference is significant at $p < 0.01$while ** means that the difference is significant at $p < 0.05$.*

On leverage, results of the one-way analysis of variance show that at least one business type has a significantly different debt ratio (F=4.148, with p-value less than 0.05). Moreover, the post hoc comparison test disclosed that the debt ratio of manufacturing business is significantly higher than those engaged in trading (mean difference of 22.478, p-value less than 0.05, sig. 0.019). With respect to profitability, the one-way analysis of variance shows that when grouped according to type of business, there is no significant difference in financial performance of MSMEs in terms of return on sales, assets and equity.

Using one-way analysis of variance, the study found that when the enterprises are grouped according to total assets, there is no significant difference in liquidity as manifested in the current and quick ratios (Table 9). In the aspect of activity, results showed that at least one MSME group has significantly different accounts receivable turnover (F=8.102, with p-value less than 0.01) and asset turnover (F=6.327, with p-value less than 0.01). Also, the post hoc comparison test for accounts receivable turnover shows that the mean ratio of small enterprises is significantly higher than the micro enterprises as well as medium enterprises (mean difference of 119.785, p-value less than 0.01 and mean difference of 145.638, p-value less than 0.01, respectively).

Table 9: Differences in Financial Performance of the MSMEs Grouped According to Asset Size

		N	Mean	Std. Deviation	Computed Value of F
Liquidity					
Current ratio	Micro	45	18.997	40.647	2.387
	Small	27	10.092	17.108	
	Medium	27	4.263	7.091	
Quick ratio	Micro	45	15.115	34.332	2.598
	Small	27	6.261	13.906	
	Medium	27	2.275	4.125	
Activity					
Account receivable turnover	Micro	45	37.229	72.854	8.102***
	Small	27	157.014	261.788	
	Medium	27	11.376	8.208	
Inventory turnover	Micro	45	11.333	17.041	0.467
	Small	27	13.294	18.963	
	Medium	27	8.944	12.791	
Asset turnover	Micro	45	2.011	2.360	6.327***
	Small	27	4.330	5.077	
	Medium	27	1.553	1.172	
Leverage					
Debt ratio	Micro	45	26.312	31.478	10.478***
	Small	27	40.850	28.728	
	Medium	27	58.813	25.649	
Profitability					
Return on sales	Micro	45	-1.436	27.329	1.120
	Small	27	-15.723	69.834	
	Medium	27	-1.716	19.327	
Return on assets	Micro	45	0.878	29.942	0.128
	Small	27	3.324	4.882	
	Medium	27	1.237	1.441	
Return on equity	Micro	45	1.058	33.084	0.268
	Small	27	5.276	7.157	
	Medium	27	2.054	14.653	

*This table shows the results of the one-way variance analysis when the enterprises are grouped according to total assets. There is no significant difference in liquidity as manifested in the current and quick ratios. At least one group has a significantly different accounts receivable turnover, asset turnover, and debt ratio. There is no significant difference in the return on sales, assets, and equity. Notation *** means that the difference is significant at $p < 0.01$.*

Likewise, the post hoc comparison test for asset turnover shows the mean ratio of small enterprises is significantly higher than micro enterprises as well as medium enterprises (mean difference of 2.319, p-value less than 0.05 and mean difference of 2.777, p-value less than 0.01, respectively). When grouped according to size of business, at least one MSME group has a highly significantly different leverage based on the debt ratio (F=10.478, with p-value less than 0.01). Moreover, the post hoc comparison test shows the debt ratio of medium-sized enterprises is significantly higher than micro enterprises (mean difference of 32.502, p-value less than 0.01, sig. 0.000). Finally, the results show that when grouped according to size of business, there is no significant difference in the profitability of MSMEs as reflected in the return on sales, assets, and equity. Table 10 summarizes the results of the test of difference in financial performance denoted as either significant (S) or not significant (NS).

CONCLUDING COMMENTS

This paper sought to assess the financial performance of selected MSMEs using data from the annual financial statements for the three years (2011-2013). It also sought to determine if there is a significant difference in the financial performance of the MSMEs grouped according to organizational form, business type, and asset size. The study used correlation, regression, and t-test as tools for analyzing the data. Because of the relatively small sample size and the limited geographical area covered, the study used the results of correlation analysis in testing the hypotheses. The study concluded that subject MSMEs are of sound financial health in terms of liquidity, activity, and leverage. Overall, they are in a better position to

meet currently maturing obligations, convert efficiently receivable and inventories into cash, and use credit to finance their business operations. On the contrary, the said enterprises are wanting in producing the returns necessary to maximize profit.

Table 10: Summary of the Test of Difference in Financial Performance

	Form of Organization	Type of Business	Asset Size
Current ratio	NS	NS	NS
Quick ratio	NS	NS	NS
Receivable turnover	S Single proprietorships have significantly higher receivable turn-over than corporations	NS	S At least one group has a significantly different financial performance; small enterprises have significantly higher receivable turn-over than micro and medium
Inventory turnover	NS	NS	NS
Asset turnover	NS	S At least one business type has a significantly different financial performance; asset turn-over of manufacturing and trading are significantly higher than those engaged in services	S At least one group has a significantly different financial performance; small enterprises have significantly higher asset turn-over than micro and medium
Debt ratio	S Corporations have significantly higher debt ratio than single proprietorships	S Debt ratio of manufacturing is significantly higher than those engaged in trading	S At least one group has a high significant different financial performance; Medium enterprises have significantly higher debt ratio than micro and small
Return on sales	NS	NS	NS
Return on assets	NS	NS	NS
Return on equity	NS	NS	NS

This table summarizes the results of the test of difference in financial performance denoted as either significant (S) or not significant (NS). There are no significant differences in the liquidity, profitability, inventory turnover, return on sales, return on assets, and return on equity when the enterprises are grouped according to the form of organization, type of business, and asset size. There are significant differences in the receivable turnover, asset turnover, and debt ratios in some groupings.

The correlation revealed that a significant linear relationship exists between liquidity and activity, liquidity and leverage, and activity and leverage. However, the three performance measures showed no significant relationship with profitability. Conversely, it is clear from the study that while the MSMEs have high scores on liquidity, leverage, and most aspects of activity, they suffer from low profitability. The t-test showed no significant difference in the liquidity, profitability, and inventory turnover of the enterprises when grouped according to the organizational form, business type, and asset size. Nonetheless, a significant difference exists in receivable turnover, asset turnover, and debt ratios. The t-test revealed that single proprietorships have significantly higher receivable turnovers than corporations, while small enterprises have significantly higher receivable turnovers than both the micro and medium enterprises. Both manufacturing and trading businesses have significantly higher asset turnover than those engaged in services while small enterprises have significantly higher asset turnover than both the micro and medium enterprises. Corporations showed significantly higher debt ratio compared with sole proprietorships; manufacturing business, compared with trading business; and medium enterprises, compared with both micro and small enterprises. The subject MSMEs should revisit their strategies on the use of financial resources to maximize profit and the overall value of their business. Since liquidity, activity, and leverage have been the core advantages of these MSMEs, efforts should be geared towards improving profitability aspects. Mainly, the enterprises should reexamine their cost structure, pricing policies, and expense management practices. They should also identify and assess the risks associated with their revenue generating activities. Since both liquidity and

activity are related to leverage, these enterprises have to reassess how the former can further result in an optimum level of borrowing.

These enterprises should take advantage of borrowed funds and assess how optimal capital structures will maximize the value of the enterprises. In that way, the MSMEs will continue to play an important role in the growth of the economy. The study also brings about the need for business owners and shareholders to make use of financial performance information in coming up with vital and critical business decisions. The risks associated with profitability confirm the need of entrepreneurs to capacitate themselves on tools and techniques to better manage their finances. Moreover, entrepreneurs have to connect financial performance to the larger external environment of the business. Future researchers can focus on a larger sample size and a broader geographical coverage. In addition, country comparison of the MSME performance can also be undertaken.

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BIOGRAPHY

Dr. Rufo R. Mendoza is an Associate Professor and a Program Director in Public Finance at the Asian Institute of Management. He can be contacted at: Stephen Zuellig Graduate School of Development Management, Eulogio Lopez Foundation Building, 123 Paseo de Roxas, Makati City, Philippines. E-mail: rrmendoza@aim.edu

International Journal of Business and Finance Research
Vol. 9, No. 4, 2015, pp. 81-87
ISSN: 1931-0269 (print)
ISSN: 2157-0698 (online)

IBFR
www.theIBFR.com

DETERMINANTS OF SILVER FUTURES PRICE VOLATILITY: EVIDENCE FROM THE THAILAND FUTURES EXCHANGE

Woradee Jongadsayakul, Kasetsart University

ABSTRACT

This research studies determinants of silver futures price volatility in Thailand Futures Exchange using generalized autoregressive conditional heteroskedasticity model. The sample data consist of daily closing price, volume, and open interest of silver futures from the period June 21, 2011 to December 26, 2012 for the nearby month contract with 376 sample data points. I construct data sample by switching or rolling over to the next maturing contract one day before the expiration date. The empirical results reveal there is no significant relationship between volatility and time to expiration. There are a negative role for trading volume and a positive role for open interest in determining silver futures price volatility. The analysis of silver futures price volatility insists the Clearing House that margin requirements for silver futures should not be affected as the time to maturity of the contract decreases. The findings are also helpful to risk managers dealing with silver futures and predicting silver futures price volatility.

JEL: C32, G13, G32

KEYWORDS: Futures Price Volatility, Silver Futures, Samuelson Hypothesis

INTRODUCTION

Derivatives products such as forwards, futures, and options are great tools, which investors can use to predict future spot prices and minimize their risk. Derivatives in Thailand have started long before Thailand Futures Exchange (TFEX) came into existence. Usually they are in the form of an over-the-counter between each counterparties. On May 17, 2004, TFEX, a subsidiary of the Stock Exchange of Thailand (SET), was established as a derivatives exchange. TFEX has traded SET50 index futures, SET50 index options, gold futures, silver futures, interest rate futures, single stock futures, crude oil futures, USD futures, and sector futures since then. In 2013, TFEX's average daily volume was 68,017 contracts, 55.21% more than the 43,823 in the previous year. About 99.61% of the 2013 derivatives trading were futures. Before trading futures in TFEX, investors are required to deposit initial margin with their respective brokers to ensure that they fulfill their futures contract obligations. Initial margin requirements for futures contracts are set by Thailand Clearing House Co., Ltd. (TCH). Their required rates are the same on the same underlying across different maturities and typically only 10 to 15 percent of the full value of the futures contracts. At the end of day, brokers will calculate the profit and loss and add or subtract funds via a Mark-to-Market process. If the balance in the margin account falls below the maintenance margin level, investor will receive a margin call to top up his or her margin account to meet the initial margin requirement. One of the important factors affecting margin rate is futures price volatility. Therefore, understanding and characterizing futures price volatility has been a key issue in futures market research. Previous research has explained futures price volatility by variables such as time to maturity, volume, and open interest.

Samuelson (1965) states that volatility of futures prices should increase as the contract approaches expiration. It is widely referred to as the "Samuelson hypothesis". The logic behind this conclusion is that the market is more sensitive to news regarding near-maturity contracts than more-distant contracts, which

is indicated by greater volatility for the near-maturity contract (Ripple and Moosa, 2009). Numerous studies have investigated the Samuelson hypothesis empirically, and the hypothesis has been supported in commodity futures markets (Daal and Farhat, 2004; Duong and Kalev, 2008; Karali, Dorfman and Thurman, 2009; Karali and Thurman, 2010) and currency futures markets (Madarassy Akin, 2003). Samuelson hypothesis also holds in TFEX where SET50 futures price volatility (Dolsutham et al., 2011) and gold futures price volatility (Jongadsayakul, 2014b) increase as expiry approaches. However, using GARCH(1,1), Jongadsayakul (2014a) find the evidence of inverse maturity effect in case of crude oil futures traded in TFEX. In addition, Chen, Duan and Hung (1999) find that the volatility of the Nikkei-225 index futures price decreases when the contract is closer to its maturity.

Futures trading activity proxied by volume and open interest is another important determinant of futures price volatility. Numerous works have examined the relationship between trading volume and futures price volatility. Considerable evidence exists a positive correlation between futures price volatility and trading volume (Madarassy Akin, 2003; Xin, Chen and Firth, 2005; Kuo, Hsu and Chiang, 2005; Pati, 2006; Ripple and Moosa, 2009; Jongadsayakul, 2014a, 2014b); however, Bessembinder and Seguin (1993) suggest that the volatility-volume relationship might depend on the type of trader. Daigler and Wiley (1999) find that the public drives the positive volatility-volume relationship whereas trades by clearing members and floor traders often exhibit an inverse relationship between volatility and volume. Moreover, Avramov et al. (2006) show that informed trades lead to a reduction in volatility while non-informational trades lead to an increase in volatility. The introduction of open interest as an additional explanatory variable is motivated by the fact that open interest and its change differ significantly from trading volume. The expectation is that open interest is negatively related to volatility (Xin, Chen and Firth, 2005; Feng and Chuan-zhe, 2008; Ripple and Moosa, 2009; Jongadsayakul, 2014b), as the availability of more contracts represents increased market depth, implying greater liquidity. However, Madarassy Akin (2003) and Pati (2006) find the positive relationship between open interest and financial futures price volatility. Higher open interest means that there are more future trade expected and more opportunity for the prices to move into higher or lower levels. This implies an increase in current futures price volatility.

This paper therefore examines the relationships between silver futures price volatility, time to expiration, trading volume, and open interest in TFEX using Generalized Autoregressive Conditional Heteroskedasticity (GARCH) model. The results from the MA(1,7,15)-GARCH(1,1) model reveal there is no significant relationship between volatility and time to expiration. Silver futures price volatility is negatively related to trading volume and positively related to open interest. The analysis of silver futures price volatility insists TCH that margin requirements for silver futures should not be affected as the time to maturity of the contract decreases. The findings are also helpful to risk managers dealing with silver futures and predicting silver futures price volatility. Moreover, it adds to literature as another evidence of a negative role for trading volume and a positive role for open interest in determining silver futures price volatility, which are not as expected. The rest of the paper is organized as follows. In section 2, I discuss earlier work related to determinants of futures price volatility. Then I describe the data and outline the methodology in section 3. In section 4, I present empirical results from the MA(1,7,15)-GARCH(1,1) model. Finally, I conclude the paper and summarize the findings in section 5.

LITERATURE REVIEW

The literature contains numerous studies attempting to identify the important variables that influence futures price volatility. Samuelson (1965) states that volatility of futures prices should increase as the contract approaches expiration. It is widely known as the "Samuelson hypothesis". His study is based on two assumptions, namely that: (1) futures price equals expected future spot price, and (2) the spot price is stationary following an AR(1): $P_t = aP_{t-1} + u_t$, where $E(u_t) = 0$ and $E(u_t^2) = \sigma^2$. Bessembinder et al. (1996) presents a new analysis of the economic issues underlying the prediction of greater volatility for the near-maturity futures contract. They show the Samuelson hypothesis is successful without the two

assumptions. In their study, the change in the log futures price (Δf_t) is the summation of the ex-ante spot market risk premium (π), the unexpected rate of spot market price appreciation (u_t), and the change in the futures term slope weighted by the remaining time to expiration ($\Delta s_t \tau$). Therefore, the variance of futures price changes is

$$\text{VAR}(\Delta f_t) = \text{VAR}(u_t) + \tau^2 \text{VAR}(\Delta s_t) + 2\tau \text{COV}(u_t, \Delta s_t). \quad (1)$$

where VAR and COV denote variance and covariance, respectively. If $\text{VAR}(\Delta s_t)$ is a positive constant, then the variance of futures price increases with the square of the remaining time to contract expiration. Higher variance for more distant delivery date is inconsistent with the Samuelson hypothesis. Unlike $\text{VAR}(\Delta s_t)$, the sign of $\text{COV}(u_t, \Delta s_t)$ can be negative or positive. If $\text{COV}(u_t, \Delta s_t) < 0$, then the third term on the right side of (1) increases (toward zero) as the trading date approaches the contract expiration date. Therefore, their analysis implies that the Samuelson hypothesis requires negative covariance between spot returns and the slope of the futures term structure, which occurs in markets where prices are mean reverting.

The Samuelson hypothesis has been empirically supported in commodity futures markets (Daal and Farhat, 2004; Duong and Kalev, 2008; Karali, Dorfman and Thurman, 2009; Karali and Thurman, 2010) and currency futures markets (Madarassy Akin, 2003). Samuelson hypothesis also holds in cases of SET50 futures price volatility (Dolsutham et al., 2011) and gold futures price volatility (Jongadsayakul, 2014b). However, Chen, Duan and Hung (1999) find the inverse maturity effect in the Nikkei-225 index futures price volatility. Other studies also show that their results depend on the data and the methodology. Floros and Vougas (2006) find that the Samuelson hypothesis seems to be correct in simple linear regressions for both FTSE/ASE-20 and FTSE/ASE Mid 40 index. On the other hand, using GARCH models, there is no evidence to support Samuelson's hypothesis in FTSE/ASE-20 index over the whole period. However, using monthly series, GARCH models show a stronger support to the Samuelson hypothesis rather than linear regressions. Moreover, Jongadsayakul (2014a) shows that there is no significant relationship between crude oil futures price volatility and time to expiration in linear regression model while there is an evidence of inverse maturity effect in GARCH(1,1) model.

Futures trading activity proxied by volume and open interest is another important determinant of futures price volatility. When trading volume increases, it increases the probability that prices will move into higher or lower regions, and that their volatility will be greater than before (Xin, Chen and Firth, 2005). On the other hand, trading volume can be used as a measure of the information flow. Therefore, when new and unexpected information arrives, both volatility and volume change contemporaneously and positively to new information. Numerous works identify a strong positive relation between price volatility and trading volumes (Madarassy Akin, 2003; Xin, Chen and Firth, 2005; Kuo, Hsu and Chiang, 2005; Pati, 2006; Ripple and Moosa, 2009; Jongadsayakul, 2014a, 2014b). However, Bessembinder and Seguin (1993) suggest that the volatility-volume relationship might depend on the type of trader.

Daigler and Wiley (1999) find that the public drives the positive volatility-volume relationship whereas trades by clearing members and floor traders often exhibit an inverse relationship between volatility and volume. Moreover, Avramov et al. (2006) show that informed trades lead to a reduction in volatility while non-informational trades lead to an increase in volatility. Besides trading volume, open interest is important indicator of trading activity. It reflects the current willingness of futures traders to risk their capital in the futures position, which indicates the level of market depth (Bessembinder and Seguin, 1993). A high level of open interest could help to create market conditions that would reduce pressure from prices when trading provides new information (Xin, Chen and Firth, 2005). Several studies find that open interest is negatively related to volatility (Xin, Chen and Firth, 2005; Feng and Chuan-zhe, 2008; Ripple and Moosa, 2009; Jongadsayakul, 2014b). However, Madarassy Akin (2003) and Pati (2006) find the positive relationship between open interest and financial futures price volatility. Higher open interest means that there are more

future trade expected and more opportunity for the prices to move into higher or lower levels. This implies an increase in current futures price volatility.

DATA AND METHODOLOGY

This study examines determinants of silver futures price volatility by using daily data downloaded from the websites of SETSMART and TFEX. The sample data consist of daily closing price, time to maturity, trading volume, and open interest of silver futures from the period June 21, 2011 to December 26, 2012 for the nearby month contract with 376 sample data points. I construct data sample by switching or rolling over to the next maturing contract one day before the expiration date. To analyze the volatility of silver futures price, I employ Generalized Autoregressive Conditional Heteroskedasticity (GARCH) methodology. Based on Akaike Information Criterion (AIC) and Schwarz-Bayes Criterion (SBC), a MA(1,7,15)-GARCH(1,1) model is chosen. Moreover, the basic GARCH specification is augmented by time to maturity variable and two trading activity variables, open interest and trading volume, in order to determine their relative contribution to the conditional variance. The following model is then estimated to investigate silver futures price volatility in TFEX.

$$R_t = \lambda_0 + \varepsilon_t + \mu_1\varepsilon_{t-1} + \mu_7\varepsilon_{t-7} + \mu_{15}\varepsilon_{t-15};\ \varepsilon_t|\Omega_{t-1} \sim N(0, h_t) \tag{2}$$

$$h_t = \alpha_0 + \alpha_1\varepsilon_{t-1}^2 + \beta_1 h_{t-1} + b_1 m_t + b_2 q_t + b_3 o_t \tag{3}$$

where R_t is the futures return, which are obtained by taking the difference of log of futures prices, h_t is the conditional variance, m_t is the time to maturity, q_t is the trading volume, o_t is the open interest, $\boldsymbol{\lambda}_0$, α_0, μ_i, and b_i are parameters, α_1 is the ARCH coefficient, β_1 is the GARCH coefficient. The sum of ARCH and GARCH coefficients indicates the degree of persistent in volatility.

RESULTS

To study determinants of silver futures price volatility, the MA(1,7,15)-GARCH(1,1) model is augmented by including time to maturity (m), trading volume (q), and open interest (o) as explanatory variables in the conditional variance equation. Then Bellerslev-Woodbridge's Quasi-Maximum Likelihood (QML) is used to estimate the MA(1,7,15)-GARCH(1,1) model. Table 1 presents the estimated results of MA(1,7,15)-GARCH(1,1) model, displaying the estimated coefficients and their P-values, as well as diagnostics tests and Wald test. The validity of the estimated model is assessed first by testing the standardized residuals for the presence of serial correlation and heteroskedasticity. Ljung-Box Q-test statistics up to lags 36 for serial correlation in the standardized residuals and standardized squared residuals are 18.224 (Prob. = 0.9824) and 38.456 (Prob. = 0.2361), respectively. Then a Lagrange Multiplier test is employed to examine whether the standardized squared residuals exhibit additional ARCH. LM ARCH (5) test is 8.272 (Prob. = 0.1419), which implies that the null hypothesis of no ARCH effects cannot be rejected and reveals that no further ARCH effects left in the standardized residuals.

The insignificant Ljung-Box Q statistics and LM ARCH statistics implies that the residuals of the estimated MA(1,7,15)-GARCH(1,1) model are reasonably well behaved and adequately capture the persistence in the variance of returns. Moreover, the estimation results of MA(1,7,15)-GARCH(1,1) model show that the coefficient for the previous shock (the ARCH coefficient: α_1) is 0.1787 and that for its lagged conditional variance (the GARCH coefficient: β_1) is 0.5080. The GARCH coefficient (β_1) is highly statistically significant at the level of 1%. The sum of the two coefficients is 0.6867, which implies that the persistent in volatility is not so high. Since the Wald test shows the sum of the two coefficients statistically less than 1 at the 1% significance level, the volatility process is co-variance stationary, stable and evidences of mean reverting. Maturity is shown to be insignificant. The estimated coefficients of volume and open interest are -0.0003 and 0.0003, respectively, which are statistically significant at the level of 10% and 5%, respectively.

However, the signs of trading volume and open interest coefficients are not as expected. The results indicate a negative relationship between trading volume and volatility due to higher informed trades in TFEX. An increase in open interest means that there are more future trade expected and more opportunity for the prices to move into higher or lower levels. This leads to an increase in current futures price volatility.

$$R_t = \lambda_0 + \varepsilon_t + \mu_1\varepsilon_{t-1} + \mu_7\varepsilon_{t-7} + \mu_{15}\varepsilon_{t-15};\ \varepsilon_t|\Omega_{t-1} \sim N(0, h_t)$$
$$h_t = \alpha_0 + \alpha_1\varepsilon_{t-1}^2 + \beta_1 h_{t-1} + b_1 m_t + b_2 q_t + b_3 o_t$$

Table 1: Estimation Results of MA(1,7,15)-GARCH(1,1) Model

Conditional Mean Equation Coefficient/Statistic	Estimated Value	P-Value
λ_0	-0.0005	0.4871
μ_1	-0.0759	0.1998
μ_7	0.0592	0.2481
μ_{15}	-0.1051**	0.0459
Conditional Variance Equation		
α_0	0.0001	0.1630
α_1	0.1787	0.2225
β_1	0.5080***	0.0092
b_1	0.0000	0.7573
b_2	-0.0003*	0.0651
b_3	0.0003**	0.0378
Standardized Residual Diagnostics		
Ljung-Box Q (36)	18.224	0.9824
Ljung-Box Q^2 (36)	38.456	0.2361
LM ARCH (5)	8.272	0.1419
Wald Test		
H_0: $\alpha_1 + \beta_1 \geq 1$	-2.490***	0.0064

*This table shows the estimation results of MA(1,7,15)-GARCH(1,1) Model. Diagnostics tests based on LM ARCH (5), Ljung-Box Q (36), and Ljung-Box Q^2 (36) of residual and squared residual indicate that the estimated model is well fit. The sum of ARCH and GARCH coefficients is 0.6867, indicating that the persistent in volatility is not so high. Wald test shows its value statistically less than one, indicating that volatility process is co-variance stationary, stable and evidences of mean reverting. Maturity is insignificant, whereas trading volume and open interest tend to be significant. ***, **, and * indicate statistically significant at the 1%, 5%, and 10% level, respectively.*

CONCLUDING COMMENTS

This research studies determinants of silver futures price volatility in Thailand Futures Exchange using the MA(1,7,15)-GARCH(1,1) model. The sample data consist of daily closing price, volume, and open interest of silver futures from the period June 21, 2011 to December 26, 2012 for the nearby month contract with 376 sample data points. I construct data sample by switching or rolling over to the next maturing contract one day before the expiration date. The results from the MA(1,7,15)-GARCH(1,1) model reveal there is no significant relationship between silver futures price volatility and time to expiration, whereas trading volume and open interest tend to be significant. However, the signs of trading volume and open interest

coefficients are not as expected. The results indicate a negative relationship between silver futures price volatility and trading volume, and a positive relationship between silver futures price volatility and open interest. Therefore, trading volume and open interest are the two important variables, explaining the price volatility of silver futures traded in TFEX. Since margin requirement is affected by futures price volatility, the results of this study will assist TCH in setting margin requirements. No consistent relationship between silver futures price volatility and time-to-maturity indicates that the margin requirement should not be affected as the time-to-maturity of the silver futures contract decreases. The findings are also helpful to risk managers dealing with silver futures and predicting silver futures price volatility. It is noted that the role of trading volume on silver futures price volatility is negative. The inverse relationship between volume and volatility is possible due to trading by clearing members and floor traders. However, this study uses total volume. Therefore, further analysis of this issue should include both informed trades and non-informational trades to confirm the results.

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ACKNOWLEDGMENTS

The author acknowledges financial support from Department of Economics, Kasetsart University, and the helpful comments of the journal editors, Terrance Jalbert and Mercedes Jalbert, and two anonymous reviewers.

BIOGRAPHY

Woradee Jongadsayakul is Assistant Professor of Economics at Kasetsart University. Her research focuses on Financial Economics and Project Evaluation. She can be reached at Faculty of Economics, Kasetsart University, 50 Ngam Wong Wan Road, Chatuchak, Bangkok 10900 Thailand, woradee.j@ku.ac.th.

International Journal of Business and Finance Research
Vol. 9, No. 4, 2015, pp. 89-102
ISSN: 1931-0269 (print)
ISSN: 2157-0698 (online)

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GROWTH AND VOLATILITY OF MICROPOLITAN STATISTICAL AREAS IN THE U.S.

Bienvenido S. Cortes, Pittsburg State University
Michael Davidsson, Pittsburg State University
Michael McKinnis, Pittsburg State University

ABSTRACT

A micropolitan statistical area is defined by the U.S. Department of Commerce as "A core based statistical area associated with at least one urban cluster that has a population of at least 10,000, but less than 50,000." Recently, the U.S. Census Bureau also identified the micropolitan area as an "emerging metropolitan area." Despite its growing importance, the literature on the economic characteristics of micropolitan areas so far has been limited. The objectives of this study are: (1) to describe the geographic distribution, growth, and volatility of the U.S. micropolitan areas during the 1969-2012 period; and (2) to identify and measure the determinants of growth and volatility of micropolitan areas. Findings show that micropolitan area growth is dependent on sectoral composition, initial market size, and spatial/locational effects.

JEL: R11, R12

KEYWORDS: Micropolitan, Volatility, Central Place

INTRODUCTION

Local politicians, city managers, economic development directors, chambers of commerce, and academics have always been concerned about the economic well-being and prosperity of their local economies. Stiff competition for new firms, investment, and jobs has pitted communities against one another, with activities ranging from the provision of tax incentives to workforce skills development to natural and man-made amenities. The promotion of local economic growth and development remains controversial and problematic especially for local policy-makers. The literature on economic growth is extensive, and although the findings regarding certain determinants of growth may be consistent, these may still provide misleading and risky prescriptions to policy-makers looking for quick fixes. For example, Polzin argues that much attention has been focused on policies which have more public appeal such as education and infrastructure (rather than on sustaining basic industries) but "no proven relationship with state economic growth." (2001: 423)

The analysis of the determinants of U.S. economic growth has been applied to various geographic areas (nation, regions, states, metropolitan areas, and cities) and time periods. This paper focuses on another geographical delineation based on census population called the micropolitan statistical area. This delineation was defined in 2001 by the Office of Management and Budget as a geographical area with one or more counties and an urbanized core with a population of 10,000 to 49,999. This "micro area" is thus somewhere between a metro area and a non-metropolitan/rural area. Its significance is reflected in its desirable mix of urban-rural characteristics and amenities (Vias *et al.*, 2002). As Glavac *et al.* state: "Indeed, the availability of small-town lifestyles, combined with the availability of many modern conveniences once found only in large metropolitan centers, have recently made these micropolitan centers an increasingly important portion of the American landscape." (1998: 633) Thus, the objectives of this paper are:

1. To identify the fastest-growing (and slowest-growing) micropolitan areas based on growth rates of population and per capita personal income (1969-2012);
2. To determine and measure the causes of economic growth and volatility of micropolitan areas.

The following section describes the economic growth (in terms of population and per capita personal income) and geographical distribution of micropolitan areas in the U.S. for the period 1969-2012. This section is followed by a review of past studies examining the determinants of growth of micropolitan areas. Although information on growth is important, what is more useful for policy-makers is to know whether changes in economic activity are stable or volatile over time. Thus, a major objective of this study is to examine the differential effects of different economic variables, particularly industrial composition, location, and suburb vs. central city, on the growth and volatility of population and income in micropolitan areas. A theoretical model is presented and then empirically tested on a sample of U.S. micropolitan areas for the period 2000-2012; tests and adjustments for problems of heteroscedasticity and muticollinearity are also applied. Finally, a discussion of the findings and policy implications are provided.

MICROPOLITAN STATISTICAL AREAS

The number of micropolitan statistical areas as defined by the Office of Management and Budget changes over time in response to Census Bureau population figures of the counties that compose these areas. Based on the 2000 Census, there are 560 micro areas with a combined population accounting for 10.3 percent of total U.S. population. The growth of population inside the micropolitan areas during the period 1990-2000 was 9.9% (see data tables in: http://www.census.gov/population/www/cen2000/briefs/phc-t29/index.html) In 2010, OMB defined 536 micropolitan areas with a combined population of 27,154,213, or approximately 8.8% of U.S. (see http://www.census.gov/population/www/cen2010/cph-t/cph-t-5.html). For a map of these areas, check: http://www.census.gov/population/metro/files/metro_micro_Feb2013.pdf.

As can be seen in Table 1, the populations and per capita incomes of these 536 micropolitan areas varied considerably over the period.

Table 1: Population and Per Capita Income Characteristics of 536 Micropolitan Areas, Various Years

	Population			Income		
Year	**Low**	**High**	**Mean**	**Low**	**High**	**Mean**
1970	2,793	159,666	38,335	1,330	7,041	3,269
1980	6,726	175,970	43,195	3,196	19,383	8,261
1990	9,339	194,215	44,437	5,458	29,862	14,986
2000	12,088	208,230	48,383	9,922	53,720	23,077
2012	13,200	217,390	50,777	19,866	116,978	36,152

Note: Authors' calculations.

Using a longer time period 1969-2012 and population and per capita personal income data for 536 micropolitan areas from the Bureau of Economic Analysis, average annual growth rates (calculated as logarithms of the first differences) for different time periods are presented in Table 1.

Table 2: Population and Per Capita Income Growth (in %) in the 536 Micropolitan Areas

	1970-1980	**1980-1990**	**1990-2000**	**2000-2012**	**1969-2012**
Population	1.40	0.50	0.90	0.40	0.80
Per capita income	9.08	6.18	4.36	3.82	5.70

Note: Authors' calculations.

As Table 2 shows, the growth rate of population in the micropolitan statistical areas averaged less than one percent annually from 1969 to 2012; the growth rates for the different decades ranged from 0.4% in the 2000s to a high of 1.4% in the 1970s. In 2012, the total population of the 536 micropolitan statistical areas

was 27,216,731. Grouping the micropolitan areas into their respective Census Bureau regions, Division 3 (East North Central consisting of the states of Indiana, Illinois, Michigan, Ohio, and Wisconsin) had a combined population of 5,684,567, or 20.9% of the total micropolitan population; it also had the largest number of micropolitan areas at 104. This division was followed by Division 5 (South Atlantic) with over four million. Division 1 (New England) had the smallest population at 1,094,646, spread over 12 micropolitan areas. At the individual state level, seven percent of the total micropolitan population resided in Ohio, which has 32 micropolitan areas. Although Texas had the largest number of micropolitan areas (43), it came in second in terms of population, accounting for approximately six percent. Connecticut and Maine had only one micropolitan area each, while Alaska, Hawaii, Maryland, and Massachusetts had two each. Based on the OMB definition, a micropolitan area consists of more than one county and has an urban core with 10,000-49,999 individuals. In 2012, the micropolitan statistical area population ranged from 13,200 in Craig, CO, to 217,390 in Claremont-Lebanon, NH-VT.

In terms of per capita income growth, Table 2 shows the variability in income growth following national business cycles. Examining per capita income (in nominal dollars) for 2012, micropolitan area income varies widely from a high of $116,978 per capita in Williston, ND, to a low of $19,866 in Rio Grande City, TX. This is to be expected given the regional differences in population density, cost of living, job opportunities, educated workforce, etc. At the Census Bureau division level, the average income per capita narrows somewhat from a high of $37,346 in Division 3, which also has the highest proportion of the micropolitan population, to a low of $34,673 in Division 7 (West South Central consisting of Arkansas, Louisiana, Oklahoma, and Texas).

The economic growth of a micropolitan area is important, but more so is the stability or volatility (i.e., the long-term track record) of that growth. As Fruth aptly states: "Simply identifying the areas that have the fastest or slowest growth rates is insufficient when trying to determine the character of a local economy. The rate, consistency, or stability of the growth is equally important." (Fruth, 2013) Table 3 provides volatility data, measured as the standard deviation of the population growth rate and income growth rate for the entire 1969-2012 period and for separate decades. As can be seen, the volatility of micropolitan area income growth is three times larger than that of population growth. Unlike population changes which seem to be stabilizing over time, income growth is more variable, reflecting national income trends.

Table 3: Volatility of Population and Per Capita Income Growth in Micropolitan Areas

	1970-1980	1980-1990	1990-2000	2000-2012	1970-2012
Population	1.56	1.22	0.80	0.70	1.26
Per capita income	4.44	4.00	2.46	3.30	4.14

Note: Authors' calculations.

The average population growth volatility for the entire period was 1.26, with Fort Polk South, LA experiencing the highest rate at 0.065 and Manitowoc, WI with the lowest at 0.004. Similarly, the average volatility of per capita income growth was 0.034, with Hereford, TX having the highest rate at 0.15 and Lewistown, PA with the lowest variability at 0.026. Of the top 50 most volatile (in terms of population and income growth) micropolitan areas, the most volatile are found consistently in two divisions, Division 7 (West South Central) and Division 8 (Mountain). Similarly, inspection of the top 50 least volatile (most stable) micropolitan areas based on income and population shows that the majority of these stable micro areas are located also in two divisions, namely Division 2 (Middle Atlantic states of New Jersey, New York, and Pennsylvania) and Division 3 (East North Central states of Indiana, Illinois, Michigan, Ohio, and Wisconsin). Thus, there is a strong correlation between population volatility and income volatility of micropolitan areas during the period (correlation = 0.40; prob < 0.0001).

Grouping the micropolitan areas with high volatility rates ("high" being values greater than the mean plus one standard deviation) and low rates (values less than the mean minus one standard deviation) resulted in

only 61 (out of 536 areas, or 11%) micro areas with high income volatility rates during the period and only eleven having low rates. Similarly, only 63 out of 536 micros had "high" population volatility rates and only two had "low" rates. Thus, it is apparent that income volatility and population volatility in U.S. micropolitan areas exhibit a good deal of homogeneity. This generally homogeneous sample provides an opportunity for understanding the determinants of local economic growth and volatility as well as the implications for regional analysis and policy.

PAST LITERATURE

The current study focuses on the growth and stability of local geographic economies called micropolitan statistical areas. Specifically, it examines the impact of industrial composition or economic base on the vitality (in terms of income and population growth) of these micropolitan areas. The extant literature on the impact of diversification on economic growth is extensive (see for example, Felix, 2012; Carlino *et al.,* 2009, 2003; Kuhlmann *et al.,* 2008; Izraeli and Murphy, 2003; Smith and Gibson, 1988; Jackson, 1984) mainly due to the policy implications of pursuing a "diversified portfolio" of industries to promote regional growth. The empirical findings, however, are mixed. Although there is no guarantee that a varied industry mix will lead to more jobs and higher incomes, local officials, politicians, and policymakers tend to favor diversification as a catch-all solution. Rather than focusing on the growth (volatility)-diversity relationship, this study attempts to identify the particular industries which have a generally significant impact on the growth and volatility of micropolitan areas. This objective provides more relevant and useful information to policy-makers rather than simply concluding that industrial diversification leads (or does not lead) to increased growth (or reduced volatility).

Another policy objective involves analyzing the relationship between job growth in the micropolitan central city vs. job growth in the surrounding suburbs. Do micropolitan city growth and suburban growth complement each other or are they conflicting? Moreover, this study covers a more recent time period, 2000-2012. This period of observation is particularly relevant as the delineation of micropolitan statistical areas was made by OMB in 2001; more important, this period also reflects national business cycles with peaks in March 2001 and December 2007. Finally, the study makes adjustments for heteroscedasticity, regional fixed effects, and spatial or distance effects.

The study of micropolitan areas has attracted both economic researchers and geographers before the U.S. government decided to officially delineate these areas as somewhere between rural/non-metropolitan areas and metropolitan areas. Glavac *et al.* asserted that these micropolitan areas were important to analyze since these are "…areas that now provide many of the amenities of larger cities while still maintaining some of the rural lifestyle and small-town character that some people cherish." (1998: 637) They maintained that these micro areas are different not only in terms of geographic scale but also relative to the "determinants and processes" affecting their economic growth. Glavac *et al.* estimated a simultaneous population-employment model and found that employment lead changes in population in micropolitan areas. Their results also showed that transfer payments and retail sales have positive effects on micropolitan growth while distance from a metropolitan area, property taxes, and percentage of population that are black have negative effects. Finally, amenities have no influence on micropolitan growth.

Vias *et al.* (2002) examined the same data set of 219 micropolitan areas studied earlier by Glavac and colleagues (1998). They applied the human ecology theory to explain the relationship between industrial specialization and population change in micropolitan areas. Vias and others (2002) grouped the micropolitan areas into nine functional areas based on the employment distribution across various sectors. They found that more diversified micropolitan areas grew faster while those dependent on agriculture, mining, and government sectors lagged; micropolitan areas that are classified as manufacturing, service, and trade places were stable during the period under study.

In their 2006 study, Mulligan and Vias analyzed 581 micropolitan counties (not areas) identified by the US Census Bureau and Office of Management and Budget using 1990 census and found micropolitan growth from 1980 to 2000 reflected the national geographic trend where both population and employment "shifted out of the Midwest and Northeast into the Southern and Western regions of the nation" (p. 206) They also showed that these micropolitan counties were becoming more diversified during the period due to: (1) county size (in terms of employment) with larger counties less diversified, or more specialized, than smaller counties; (2) counties with larger employment shares (or functional specializations) in agriculture, mining, and government were less diversified, while those with larger shares in trade were more diversified; (3) manufacturing was not important; (4) location was not important. Similar to Glavac *et al.* (1998), Mulligan and Vias (2006) also applied two-stage least squares method to analyze the interactions between population and employment growth. They found that changes in the populations of micropolitan counties were greater in the West and South regions; larger counties grew faster; initial population level is an important determinant; micropolitan counties with higher employment shares in agriculture and mining had slower growth than those with higher shares in trade, services or government; transfer payments limited growth. Mulligan (2009, 2010) found that the multiplier effects of construction and services were greater than that of manufacturing.

Recent studies by Davidsson and Rickman (2011) and Cortes *et al.* (2013) reexamined the economic performance of micropolitan statistical areas using larger sample sizes, more recent time periods, and more explanatory variables including industrial composition, amenities, demographic variables, distance, regional dummy variables as well as fiscal policy variables. The most important determinants of micropolitan population growth were industry composition, regional/census division location of the micropolitan areas, and fiscal policy.

Aside from employing the human ecology theory and economic base theory following Vias *et al.* (2002) and Mulligan (2009, 2010) as bases for this study, another useful perspective is that of the central place theory (CPT) which identifies a rank order or hierarchy of central places (see Blair, 1991). That is, there are lower-order places such as villages or towns which produce food and other lower-order/routine household products, and there are higher-order places such as cities or regional capitals which produce specialized goods such as automobiles. The CPT's two important concepts are threshold (or minimum market size) and range (the maximum distance consumers are willing to travel in order to buy products). As discussed earlier, micropolitan areas are becoming more diversified; thus, such "lower-order places" have the ability to be diverse given their various functional specializations and abilities. In addition, given the geographic dispersion and distribution of micropolitan areas around the country, the role of distance to a higher-order place or metropolitan area needs to be considered. Finally, since Vias *et al.* stated micropolitan areas may be "large and significant enough to stand on their own" (2002: 400), this study will also analyze the interactions and contributions of the central city vs. suburbs in the micropolitan area context. In an early study, Voith (1998) estimated a structural model to determine the causality between city growth and suburban growth. He found that city income growth in large cities of metropolitan areas leads to higher income growth in the suburbs, higher housing prices, and minimally, population growth. On the other hand, Leichenko (2001) found that the city-suburb relationship differs over time. In the 1970s, 1980s, and 1990s, the direction of causality was from suburban growth (population and jobs) to city growth; city growth was important in positively affecting suburban growth only in the 1990s. Hollar (2011) compares and contrasts the two views on the metropolitan central city-suburb relationship: (1) the rival view which asserts that the central city and suburbs are independent competitors in the labor market; (2) the ally view which states that there is a positive, complementary relationship between the central city and the suburban area. Hollar (2011) found support for the interdependent or allies view.

DATA AND METHODOLOGY

The theoretical bases for this study are a combination of regional economics, economic geography, and human ecology approaches (specifically, the traditional economic base model and Central Place Theory). It derives much from earlier models of metropolitan-micropolitan economic growth developed and tested by Vias *et al*. (2002). The model estimated here uses the micropolitan statistical area (as defined by Office of Management and Budget) as the main unit of observation. There are four dependent variables: population growth, income growth, population volatility, and income volatility. The explanatory variables of interest are industry structure (shown here by the nine different sector employment shares), central city employment change, and suburban employment change. Except for the control variables (regional dummy variables and distance), all the exogenous factors are expressed as percentage changes. The values of these exogenous variables pertain to beginning or near the beginning of the time period under study so as to account for any simultaneity issue and to address any concerns regarding the direction of causation between the variables. To adjust for spurious results, location-specific factors such distance and census division variables are included in the specification. Thus, the general specification is:

$$\begin{aligned}\text{Growth (or Volatility)} = \alpha + \beta_1(\text{Initial population}) + \beta_2(\text{Initial income}) + \beta_3(\text{Food}) + \beta_4(\text{Health}) + \\ \beta_5(\text{Professional}) + \beta_6(\text{Finance}) + \beta_7(\text{Other}) + \beta_8(\text{Manufacturing}) + \beta_9(\text{Retail}) \\ + \beta_{10}(\text{Wholesale}) + \beta_{11}(\text{Construction}) + \beta_{12}(\text{Central city employment}) + \\ \beta_{13}(\text{Suburban employment}) + \beta_{14}(\text{Distance}) + \sum\text{Census division dummies}\end{aligned}$$

As mentioned earlier, volatility is measured by the standard deviation of the annual growth rates of population and per capita income of micropolitan areas. Based on the traditional economic base theory, changes in employment for nine separate industries (namely, construction; manufacturing; wholesale trade; retail trade; finance and insurance; professional, scientific, and technical services; health care and social assistance; accommodation and food services; other services except public administration) are included in the model to help identify the key sectors which contribute to micropolitan growth and stability. This study focuses on the mix of industries and does not include a diversity index given the latter's high correlation with specific sectors as also found by other researchers (see for example, Felix, 2012; Cortes *et al.* 2013). Following Leichenko (2001), central city employment and suburban employment are also added as variables of interest. Initial examination of raw correlation between job growth in the micropolitan area's central city and its surrounding suburban area indicates a negative and statistically significant relationship (corr = -2.33, prob < 0.02), contrary to the generally positive and complementary central city-suburb relationship for metropolitan areas (Rappaport, 2005; Hollar, 2011). Following central place theory, initial population and initial income are included to reflect the "threshold" requirements for lower-order places such as micropolitan areas. Initial per capita income for 2000 is also included to check for conditional convergence of micropolitan area income growth rates and is expected to be negative following the literature. The Central Place Theory's concept of "range" is represented here by the distance variable. Following Partridge *et al.* (2008) and Partridge and Rickman (2008), distance to the nearest metropolitan area is used in this study. The relationship between distance and area economic growth, however, is ambiguous. As stated by Cortes *et al.* (2013), a negative relationship may result from loss of agglomeration economies as distance to a metro area increases ("tyranny of distance"). On the other hand, nearness to a metro area may have a conflicting or restrictive effect on a micropolitan area resulting from increased competition for revenues, labor input, and services from a larger and denser metropolitan area ("tyranny of proximity"). Finally, census division dummy variables are added to account for regional fixed effects; the base division is Census Division 1.

The general model above is estimated using the EViews software and annual data for the period 2000-2012 for a cross-section of 417 micropolitan statistical areas. The dependent variables are measured over the 2000-2012 period, while the main explanatory variables (except for initial income, initial population, distance, and regional dummy variables) are percentage changes over the period 2002-2007 to account for

national business cycle effects as well as to adjust for any potential endogeneity bias. The data are taken primarily from the U.S. Bureau of Economic Analysis (for data on micropolitan area income and population), U.S. Census Bureau American FactFinder (for data on number of employees by industry), and State of the Cities Data Systems: County Business Patterns Special Data Extract (for data on central city and suburban job growth). Data on the distance to the nearest metropolitan area are taken from Davidsson and Rickman (2011). Descriptive statistics of the variables of the model are available from the authors upon request.

RESULTS

Table 4 shows the results of applying ordinary least squares regression on the model with population and income growth as dependent variables. Each regression was initially tested for heteroscedasticity; the presence of heteroscedasticity was then corrected using White's (1980) heteroscedaticity-consistent standard errors and covariance. In addition, tests employing Variance Inflation Factors indicated no problem of multicollinearity. The results indicate that employment growth in many industries (except for construction and other services sectors) has a positive and significant influence on the population growth of micropolitan areas. More interesting, job growth in the suburbs (and not in the central city) has a positive impact on micropolitan population. The initial levels of population and income have a direct effect on population growth indicating that beginning market size attracts people. The census divisions 5 (South Atlantic) and 8 (Mountain) grew faster than the base or omitted region, Division 1 (New England), reflecting the continued population shift from the northeast to the southern and mountain states. Finally, distance has a negative but insignificant effect on population growth of micropolitan areas.

Table 4: OLS Regressions of Population Growth and Income Growth, 2000-12

Variable	Population Growth		Per Capita Income Growth	
	Coefficient	t-statistic	Coefficient	t-statistic
Constant	-1.10	-4.14***	4.68	12.16***
Population 2000	0.000004	3.58***	-0.000002	-1.37
Income 2000	0.00003	3.93***	-0.00003	-2.61***
Accommodations & Food	0.0045	2.63***	-0.0017	-0.73
Health Care	0.0079	4.23***	-0.0081	-3.60***
Professional & Scientific	0.0011	1.65*	-0.0015	-2.24**
Finance & Insurance	0.0063	4.56***	-0.0028	-1.33
Other Services	0.0009	1.61	-0.0016	-2.06**
Manufacturing	0.0018	1.92*	0.0023	1.19
Retail Trade	0.0136	5.31***	-0.0009	-0.27
Wholesale	0.0011	2.77***	0.0004	0.67
Construction	0.0016	1.41	0.0065	2.66***
City Job Growth	0.0025	1.25	0.0085	3.45***
Suburban Job Growth	0.0016	3.11***	-0.0002	-0.16
Distance to Metropolitan Area	-0.0003	-0.32	0.0061	2.93***
Census Division 2	-0.1008	-0.78	-0.0487	-0.21
Census Division 3	0.0991	0.81	-0.7046	-3.24***
Census Division 4	0.1749	1.26	0.0065	0.03
Census Division 5	0.4661	3.30***	-0.7928	-3.40***
Census Division 6	0.0921	0.61	-0.5482	-2.31**
Census Division 7	0.1166	0.75	0.0443	0.16
Census Division 8	0.5364	3.20***	-0.4329	-1.31
Census Division 9	0.2829	1.60	-0.8162	-3.20***
Adjusted R-squared	0.42		0.37	
F-statistic	14.60 (prob<0.0001)		12.10 (prob<0.0001)	
Number of observations	417		417	

*Note: This table shows the OLS regression estimates for the model, with population growth and income growth as dependent variables. ***significant at 1% level; **significant at 5%; *at 10%.*

In terms of income growth, only employment change in the construction industry has a direct and significant effect; on the other hand, the more people are employed in the health care, professional and scientific, and other services sectors, the slower the income growth. Interestingly, unlike population growth, micropolitan

income tends to be more affected by job changes in the center city. This result tends to support the Central Place Theory's hierarchy of places. Moreover, the positive and statistically significant distance variable indicates that lower-order places such as micropolitan areas may be more self-supporting and dynamic given their own functional abilities and diversity. The census division dummy variables show that, relative or compared to the micropolitan areas located in the northeast region (Division 1), incomes grew much slower in Division 3 (East North Central), 5 (South Atlantic), 6 (East South Central), and 9 (Pacific) micropolitan areas during the 2000-12 period.

As mentioned earlier, this study is also concerned with the stability or volatility of a micropolitan area's economic growth over time. Table 5 shows the results of regressing micropolitan population (and income) volatility on the same set of explanatory variables. An examination of the coefficient estimates for the various employment sectors shows that job changes in the professional sector, retail trade, and construction cause volatility in population growth. Similarly, employment changes in the suburban areas lead to increased instability. On the other hand, micropolitan areas with larger initial populations and income levels tended to have lower volatility, consistent with other studies (see Felix, 2012). Locational factors indicate that the farther the micropolitan area is to a larger urban area, the greater the population volatility; moreover, relative to Division 1 (New England) micropolitan areas, those micro areas located in Division 8 (Mountain) had more variable population growth rates while those in Division 2 (Middle Atlantic) had lower volatility.

Table 5: OLS Regressions of Population Volatility and Income Volatility, 2000-12

Variable	Population Volatility		Per Capita Income Volatility	
	Coefficient	t-statistic	Coefficient	t-statistic
Constant	1.02	-4.51***	-0.63	-0.70
Population 2000	-0.000003	-4.74***	-0.00002	-6.99***
Income 2000	-0.00001	-2.09**	0.0001	4.84***
Accommodations & Food	0.0003	0.29	0.0009	0.22
Health Care	-0.0012	-1.13	-0.0071	-1.77*
Professional & Scientific	0.0009	2.73***	-0.0009	-0.73
Finance & Insurance	-0.0002	-0.18	-0.0103	-2.99***
Other Services	0.00003	0.11	-0.0002	-0.16
Manufacturing	0.0004	0.52	0.0040	1.19
Retail Trade	0.0038	2.19**	-0.0027	-0.47
Wholesale	0.0003	0.67	-0.0010	-0.92
Construction	0.0015	1.87*	0.0079	2.52**
City Job Growth	0.0009	0.86	0.0067	1.41
Suburban Job Growth	0.0008	1.81*	0.0015	0.87
Distance to Metropolitan Area	0.0012	1.98**	0.0069	2.98***
Census Division 2	-0.2353	-2.09**	0.5601	1.96**
Census Division 3	-0.1580	-1.49	0.4450	1.86*
Census Division 4	-0.1147	-1.04	0.9000	3.00***
Census Division 5	0.0256	0.23	0.5335	1.96**
Census Division 6	-0.1484	-1.29	0.7495	2.41**
Census Division 7	-0.1288	-1.07	1.7981	4.80***
Census Division 8	0.2602	1.73*	1.83	4.06***
Census Division 9	-0.0054	-0.04	0.2789	0.83
Adjusted R-squared	0.37		0.41	
F-statistic	12.09 (prob<0.0001)		14.14 (prob<0.0001)	
Number of observations	417		417	

*Note: This table shows the OLS regression estimates for the model, with population volatility and income volatility as dependent variables. ***significant at 1% level; **significant at 5%; *at 10%.*

As with population volatility, variations in construction employment contributed to higher income volatility during the period under study. However, two sectors – health care and finance & insurance – had a restraining effect on income volatility in the micropolitan areas. This finding indicates that specific sectors in the micropolitan economy, and not its overall diversity, may not only be sources of internal growth but also serve as stabilizers during national business cycles. Interestingly, the location of jobs either in the city proper or the suburbs does not have any influence on income volatility. Similar to the population volatility case, distance from a metropolitan area leads to more volatility in micropolitan area incomes. Finally,

except for the west coast or Division 9 (Pacific), all of the census divisions' micropolitan areas have experienced proportionately greater instability in income growth than the base group located in the northeast region (Division 1) during the 2000-12 period.

CONCLUSION

The geographic scale, geographic distribution, and character of micropolitan statistical areas continue to attract the attention of social scientists and policymakers. This is to be expected as migration and population shifts occur and income and wealth are redistributed across the United States. The objectives of this study are to describe the current state of U.S. micropolitan statistical areas in terms of income and population trends and to identify the various factors that contribute to the growth and volatility of these areas. It developed and tested a regional economic growth (volatility) model for a cross-section of 417 micropolitan areas for the period 2000-2012. Ordinary least squares regression technique is applied to the sample; adjustments are also made to correct for empirical issues of multicollinearity, heteroscedasticity, and endogeneity. This study adds to the literature of micropolitan areas by identifying specific industries or functional specializations which not only can contribute to positive economic growth but also help to stabilize business fluctuations. Consistent with Glavac *et al.* (1998), our findings show that employment changes in specific sectors lead population growth. Moreover, initial market size (in terms of population and income) and job growth in the suburbs have a positive impact on population growth in micropolitan areas. In terms of income growth, sectors have differential effects: health, professional, and other services have a restraining effect on growth as compared to construction. An important limitation of this study is that the primary sector is not included (due to data limitations) even though agriculture has lead GDP growth in recent years. Increases in job opportunities in the center city have a direct contribution to income growth in the entire micropolitan area. Distance and regional location are also important determinants. In terms of volatility, changes in construction employment are a major source of instability for micropolitan areas. However, sectors such as health care and finance and insurance tend to have a moderating or stabilizing effect. The point is that micropolitan areas need to identify those home-grown industries that promote vitality, and encourage internal expansion via appropriate local credit or tax incentives instead of attempting to attract new firms or industries into the micropolitan area. Suggestions for further research include the application of geospatial tests and the determination of factors which may affect the decision of outside firms to locate in micropolitan areas. There is much to be learned from investigating the "psychology of place."

APPENDIX

Appendix A: Top 50 Fastest and Slowest Growing Micropolitan Areas

TOP 50 FASTEST GROWING MICRO AREAS (IN TERMS OF POPULATION, 1969-2012)		**TOP 50 SLOWEST GROWING MICRO AREAS (IN TERMS OF POPULATION, 1969-2012)**	
Area	**Average Growth**	**Area**	**Average Growth**
Breckenridge, CO (Micropolitan Statistical Area (MSA))	0.0568	Helena-West Helena, AR (MSA)	-0.0155
Pahrump, NV (MSA)	0.0476	Clarksdale, MS (MSA)	-0.0110
Edwards, CO (MSA)	0.0465	Cleveland, MS (MSA)	-0.0091
Gardnerville Ranchos, NV (MSA)	0.0454	Greenville, MS (MSA)	-0.0085
Summit Park, UT (MSA)	0.0433	Blytheville, AR (MSA)	-0.0075
Fernley, NV (MSA)	0.0428	Indianola, MS (MSA)	-0.0067
St. Marys, GA (MSA)	0.0352	Selma, AL (MSA)	-0.0064
Jackson, WY-ID (MSA)	0.0348	Fort Dodge, IA (MSA)	-0.0060
Heber, UT (MSA)	0.0342	Logan, WV (MSA)	-0.0057
Cedar City, UT (MSA)	0.0318	Greenwood, MS (MSA)	-0.0055
Truckee-Grass Valley, CA (MSA)	0.0316	Lamesa, TX (MSA)	-0.0051
Branson, MO (MSA)	0.0304	Butte-Silver Bow, MT (MSA)	-0.0049
Glenwood Springs, CO (MSA)	0.0304	Fort Madison-Keokuk, IA-IL-MO (MSA)	-0.0046
Okeechobee, FL (MSA)	0.0300	Parsons, KS (MSA)	-0.0046

Gillette, WY (MSA)	0.0299	Wahpeton, ND-MN (MSA)	-0.0045
Kill Devil Hills, NC (MSA)	0.0298	Bradford, PA (MSA)	-0.0044
Steamboat Springs, CO (MSA)	0.0297	Albert Lea, MN (MSA)	-0.0043
Elko, NV (MSA)	0.0296	Marion, IN (MSA)	-0.0043
Rio Grande City, TX (MSA)	0.0290	New Castle, PA (MSA)	-0.0042
Zapata, TX (MSA)	0.0289	Camden, AR (MSA)	-0.0041
Nogales, AZ (MSA)	0.0288	Bastrop, LA (MSA)	-0.0038
Clearlake, CA (MSA)	0.0285	Huron, SD (MSA)	-0.0038
Sevierville, TN (MSA)	0.0279	Galesburg, IL (MSA)	-0.0038
Clewiston, FL (MSA)	0.0273	Burlington, IA-IL (MSA)	-0.0038
Oak Harbor, WA (MSA)	0.0265	Beatrice, NE (MSA)	-0.0037
Shelton, WA (MSA)	0.0260	Bucyrus, OH (MSA)	-0.0037
Athens, TX (MSA)	0.0258	Altus, OK (MSA)	-0.0037
Hilo, HI (MSA)	0.0255	Pampa, TX (MSA)	-0.0036
Evanston, WY (MSA)	0.0252	Coffeyville, KS (MSA)	-0.0035
Eagle Pass, TX (MSA)	0.0248	Vernon, TX (MSA)	-0.0035
Hailey, ID (MSA)	0.0248	Clinton, IA (MSA)	-0.0035
Bozeman, MT (MSA)	0.0247	Warren, PA (MSA)	-0.0033
Jefferson, GA (MSA)	0.0247	Oil City, PA (MSA)	-0.0033
Vineyard Haven, MA (MSA)	0.0239	Ottumwa, IA (MSA)	-0.0033
Vernal, UT (MSA)	0.0238	Richmond, IN (MSA)	-0.0033
Mountain Home, AR (MSA)	0.0237	Atchison, KS (MSA)	-0.0032
Crossville, TN (MSA)	0.0237	Canton, IL (MSA)	-0.0032
Lake City, FL (MSA)	0.0234	Pecos, TX (MSA)	-0.0032
Durango, CO (MSA)	0.0230	Austin, MN (MSA)	-0.0031
Arcadia, FL (MSA)	0.0227	Natchez, MS-LA (MSA)	-0.0031
Winnemucca, NV (MSA)	0.0226	Jamestown, ND (MSA)	-0.0030
Sandpoint, ID (MSA)	0.0224	Mason City, IA (MSA)	-0.0029
Kerrville, TX (MSA)	0.0219	El Dorado, AR (MSA)	-0.0027
Sonora, CA (MSA)	0.0217	Lincoln, IL (MSA)	-0.0027
Dunn, NC (MSA)	0.0212	Amsterdam, NY (MSA)	-0.0027
Rock Springs, WY (MSA)	0.0210	Borger, TX (MSA)	-0.0026
Juneau, AK (MSA)	0.0209	Morgan City, LA (MSA)	-0.0026
Fredericksburg, TX (MSA)	0.0206	Big Spring, TX (MSA)	-0.0026
Huntsville, TX (MSA)	0.0202	Forrest City, AR (MSA)	-0.0026
Calhoun, GA (MSA)	0.0201	Middlesborough, KY (MSA)	-0.0026

TOP 50 FASTEST GROWING MICROPOLITAN AREAS (IN TERMS OF PER CAPITA INCOME)		**TOP 50 SLOWEST GROWING MICROPOLITAN AREAS (IN TERMS OF PER CAPITA INCOME)**	
Area	**Average Growth**	**Area**	**Average Growth**
Williston, ND (MSA)	0.0826	Clewiston, FL (MSA)	0.0417
Dickinson, ND (MSA)	0.0761	Pahrump, NV (MSA)	0.0442
Summit Park, UT (MSA)	0.0726	Hereford, TX (MSA)	0.0461
Cleveland, MS (MSA)	0.0696	Fernley, NV (MSA)	0.0466
Opelousas, LA (MSA)	0.0696	Grants, NM (MSA)	0.0475
Wahpeton, ND-MN (MSA)	0.0691	Crescent City, CA (MSA)	0.0486
Alice, TX (MSA)	0.0690	Peru, IN (MSA)	0.0490
Clarksdale, MS (MSA)	0.0678	Dumas, TX (MSA)	0.0491
Las Vegas, NM (MSA)	0.0675	Owosso, MI (MSA)	0.0491
Zapata, TX (MSA)	0.0668	Sturgis, MI (MSA)	0.0493
Hays, KS (MSA)	0.0668	Red Bluff, CA (MSA)	0.0493
Indianola, MS (MSA)	0.0667	Wauchula, FL (MSA)	0.0497
Aberdeen, SD (MSA)	0.0664	Pecos, TX (MSA)	0.0496
Mitchell, SD (MSA)	0.0664	Othello, WA (MSA)	0.0498
Gainesville, TX (MSA)	0.0663	Norwalk, OH (MSA)	0.0498
Kearney, NE (MSA)	0.0662	Gardnerville Ranchos, NV (MSA)	0.0501
Minot, ND (MSA)	0.0662	Susanville, CA (MSA)	0.0504
Brookings, SD (MSA)	0.0660	New Castle, IN (MSA)	0.0505
Durango, CO (MSA)	0.0659	Ionia, MI (MSA)	0.0505
Georgetown, SC (MSA)	0.0659	Hillsdale, MI (MSA)	0.0505
Brenham, TX (MSA)	0.0659	Connersville, IN (MSA)	0.0508
Key West, FL (MSA)	0.0659	Richmond, IN (MSA)	0.0508
Rock Springs, WY (MSA)	0.0655	Adrian, MI (MSA)	0.0510
Natchitoches, LA (MSA)	0.0653	Klamath Falls, OR (MSA)	0.0510
Eagle Pass, TX (MSA)	0.0653	Aberdeen, WA (MSA)	0.0511
Breckenridge, CO (MSA)	0.0652	Bucyrus, OH (MSA)	0.0511
Oxford, MS (MSA)	0.0651	Juneau, AK (MSA)	0.0512
Gillette, WY (MSA)	0.0648	Cedar City, UT (MSA)	0.0512

Fredericksburg, TX (MSA)	0.0647	Dodge City, KS (MSA)	0.0513
Jamestown, ND (MSA)	0.0647	Wooster, OH (MSA)	0.0513
Raymondville, TX (MSA)	0.0646	Shelton, WA (MSA)	0.0514
Morehead City, NC (MSA)	0.0644	Ashland, OH (MSA)	0.0514
Levelland, TX (MSA)	0.0644	Ontario, OR-ID (MSA)	0.0515
Greenwood, MS (MSA)	0.0642	Tiffin, OH (MSA)	0.0515
Taos, NM (MSA)	0.0642	Urbana, OH (MSA)	0.0515
Bainbridge, GA (MSA)	0.0641	Marshalltown, IA (MSA)	0.0516
Vermillion, SD (MSA)	0.0641	Okeechobee, FL (MSA)	0.0516
Helena-West Helena, AR (MSA)	0.0640	Summerville, GA (MSA)	0.0516
Snyder, TX (MSA)	0.0640	Moses Lake, WA (MSA)	0.0516
Poplar Bluff, MO (MSA)	0.0639	Eureka-Arcata-Fortuna, CA (MSA)	0.0517
Jackson, WY-ID (MSA)	0.0637	Logansport, IN (MSA)	0.0517
Kill Devil Hills, NC (MSA)	0.0637	Nogales, AZ (MSA)	0.0517
Steamboat Springs, CO (MSA)	0.0637	Coldwater, MI (MSA)	0.0518
Elk City, OK (MSA)	0.0637	Pullman, WA (MSA)	0.0519
Marshall, TX (MSA)	0.0637	Wilmington, OH (MSA)	0.0519
Troy, AL (MSA)	0.0636	Kendallville, IN (MSA)	0.0519
Fallon, NV (MSA)	0.0636	Decatur, IN (MSA)	0.0519
Española, NM (MSA)	0.0635	Plymouth, IN (MSA)	0.0520
Hailey, ID (MSA)	0.0634	Hilo, HI (MSA)	0.0520
Roanoke Rapids, NC (MSA)	0.0634	Alma, MI (MSA)	0.0521

Appendix B: Top 50 Most Volatile and Least Volatile Micropolitan Areas

TOP 50 MOST VOLATILE AREAS		**TOP 50 MOST VOLATILE AREAS**	
Area	**Stdev of PCPI Growth**	**Area**	**Stdev of Population Growth**
Hereford, TX (MSA)	0.1505	Fort Polk South, LA (MSA)	0.0652
Wahpeton, ND-MN (MSA)	0.1471	Evanston, WY (MSA)	0.0604
Lamesa, TX (MSA)	0.1451	Pahrump, NV (MSA)	0.0571
Guymon, OK (MSA)	0.1259	Gillette, WY (MSA)	0.0540
Williston, ND (MSA)	0.1083	Breckenridge, CO (MSA)	0.0501
Othello, WA (MSA)	0.1074	Craig, CO (MSA)	0.0499
Levelland, TX (MSA)	0.1023	Junction City, KS (MSA)	0.0476
Raymondville, TX (MSA)	0.0990	Elk City, OK (MSA)	0.0474
Plainview, TX (MSA)	0.0894	Rock Springs, WY (MSA)	0.0452
Gillette, WY (MSA)	0.0880	Fort Leonard Wood, MO (MSA)	0.0451
Jamestown, ND (MSA)	0.0872	St. Marys, GA (MSA)	0.0429
Zapata, TX (MSA)	0.0867	Gardnerville Ranchos, NV (MSA)	0.0384
Bay City, TX (MSA)	0.0860	Williston, ND (MSA)	0.0373
Pecos, TX (MSA)	0.0853	Mineral Wells, TX (MSA)	0.0363
Maryville, MO (MSA)	0.0837	Winnemucca, NV (MSA)	0.0357
Snyder, TX (MSA)	0.0834	Andrews, TX (MSA)	0.0351
Worthington, MN (MSA)	0.0826	Elko, NV (MSA)	0.0336
Dumas, TX (MSA)	0.0795	Wauchula, FL (MSA)	0.0333
Andrews, TX (MSA)	0.0779	Edwards, CO (MSA)	0.0325
Jackson, WY-ID (MSA)	0.0768	Vernal, UT (MSA)	0.0324
Clewiston, FL (MSA)	0.0764	Sault Ste. Marie, MI (MSA)	0.0318
Woodward, OK (MSA)	0.0763	Woodward, OK (MSA)	0.0313
Indianola, MS (MSA)	0.0737	Steamboat Springs, CO (MSA)	0.0304
Portales, NM (MSA)	0.0734	Ozark, AL (MSA)	0.0295
Vermillion, SD (MSA)	0.0733	Mountain Home, ID (MSA)	0.0284
Rock Springs, WY (MSA)	0.0717	Juneau, AK (MSA)	0.0282
Elk City, OK (MSA)	0.0713	Crescent City, CA (MSA)	0.0280
Garden City, KS (MSA)	0.0712	Plainview, TX (MSA)	0.0279
Breckenridge, CO (MSA)	0.0707	Dickinson, ND (MSA)	0.0277
Vernal, UT (MSA)	0.0703	Truckee-Grass Valley, CA (MSA)	0.0274
Pullman, WA (MSA)	0.0702	Weatherford, OK (MSA)	0.0271
Storm Lake, IA (MSA)	0.0700	Vineyard Haven, MA (MSA)	0.0269
Pierre, SD (MSA)	0.0677	Bay City, TX (MSA)	0.0264
Big Spring, TX (MSA)	0.0671	Oak Harbor, WA (MSA)	0.0263
Beatrice, NE (MSA)	0.0661	Fernley, NV (MSA)	0.0262
Minot, ND (MSA)	0.0657	Okeechobee, FL (MSA)	0.0259
Evanston, WY (MSA)	0.0657	Mountain Home, AR (MSA)	0.0255
Huron, SD (MSA)	0.0657	Summit Park, UT (MSA)	0.0254
Edwards, CO (MSA)	0.0643	Clearlake, CA (MSA)	0.0251

Hobbs, NM (MSA)	0.0643	Hilo, HI (MSA)	0.0245
Great Bend, KS (MSA)	0.0642	Price, UT (MSA)	0.0244
Hailey, ID (MSA)	0.0641	Snyder, TX (MSA)	0.0244
Burley, ID (MSA)	0.0626	Eagle Pass, TX (MSA)	0.0244
Hilo, HI (MSA)	0.0623	Borger, TX (MSA)	0.0244
Fort Morgan, CO (MSA)	0.0618	Jackson, WY-ID (MSA)	0.0244
Dickinson, ND (MSA)	0.0616	Hailey, ID (MSA)	0.0244
Alice, TX (MSA)	0.0615	Pullman, WA (MSA)	0.0241
Helena-West Helena, AR (MSA)	0.0614	Glenwood Springs, CO (MSA)	0.0241
Norfolk, NE (MSA)	0.0609	Key West, FL (MSA)	0.0239
Borger, TX (MSA)	0.0609	Hobbs, NM (MSA)	0.0238

TOP 50 LEAST VOLATILE AREAS		**TOP 50 LEAST VOLATILE AREAS**	
Area	**Standard Deviation of Income Growth**	**Area**	**Std Dev of Population Growth**
Lewistown, PA (MSA)	0.0255	Manitowoc, WI (MSA)	0.0040
Cortland, NY (MSA)	0.0258	Richmond, IN (MSA)	0.0041
Amsterdam, NY (MSA)	0.0261	Mason City, IA (MSA)	0.0048
Barre, VT (MSA)	0.0270	Jasper, IN (MSA)	0.0050
Frankfort, KY (MSA)	0.0270	Sunbury, PA (MSA)	0.0050
Pottsville, PA (MSA)	0.0273	Jamestown-Dunkirk-Fredonia, NY (MSA)	0.0050
Thomaston, GA (MSA)	0.0276	Newberry, SC (MSA)	0.0050
Grants, NM (MSA)	0.0276	Findlay, OH (MSA)	0.0051
Gloversville, NY (MSA)	0.0276	Marion, IN (MSA)	0.0051
Olean, NY (MSA)	0.0277	New Philadelphia-Dover, OH (MSA)	0.0053
Huntingdon, PA (MSA)	0.0278	Tiffin, OH (MSA)	0.0054
Oneonta, NY (MSA)	0.0279	Wilson, NC (MSA)	0.0054
Helena, MT (MSA)	0.0280	Red Wing, MN (MSA)	0.0054
Sunbury, PA (MSA)	0.0281	Lewistown, PA (MSA)	0.0055
Ogdensburg-Massena, NY (MSA)	0.0282	Freeport, IL (MSA)	0.0056
Rutland, VT (MSA)	0.0282	New Castle, PA (MSA)	0.0057
Alpena, MI (MSA)	0.0283	Paducah, KY-IL (MSA)	0.0057
Meadville, PA (MSA)	0.0284	Auburn, NY (MSA)	0.0057
Auburn, NY (MSA)	0.0285	Batavia, NY (MSA)	0.0058
New Castle, PA (MSA)	0.0286	Wabash, IN (MSA)	0.0058
Greenfield Town, MA (MSA)	0.0286	Corning, NY (MSA)	0.0058
Eureka-Arcata-Fortuna, CA (MSA)	0.0286	Greensburg, IN (MSA)	0.0059
Cambridge, OH (MSA)	0.0287	Barre, VT (MSA)	0.0059
Jamestown-Dunkirk-Fredonia, NY (MSA)	0.0287	Crawfordsville, IN (MSA)	0.0060
Red Bluff, CA (MSA)	0.0288	Zanesville, OH (MSA)	0.0060
Klamath Falls, OR (MSA)	0.0289	Ashtabula, OH (MSA)	0.0060
Portsmouth, OH (MSA)	0.0292	Salem, OH (MSA)	0.0060
Brainerd, MN (MSA)	0.0293	Danville, VA (MSA)	0.0060
Escanaba, MI (MSA)	0.0293	Ottawa-Peru, IL (MSA)	0.0060
Marion, OH (MSA)	0.0294	Albemarle, NC (MSA)	0.0061
Talladega-Sylacauga, AL (MSA)	0.0294	Somerset, PA (MSA)	0.0061
Augusta-Waterville, ME (MSA)	0.0295	Roanoke Rapids, NC (MSA)	0.0062
Malone, NY (MSA)	0.0296	Jacksonville, IL (MSA)	0.0062
Wisconsin Rapids-Marshfield, WI (MSA)	0.0298	Tullahoma-Manchester, TN (MSA)	0.0062
Merrill, WI (MSA)	0.0298	Decatur, IN (MSA)	0.0062
Orangeburg, SC (MSA)	0.0298	Galesburg, IL (MSA)	0.0063
Centralia, IL (MSA)	0.0298	Celina, OH (MSA)	0.0063
Lebanon, MO (MSA)	0.0300	Burlington, IA-IL (MSA)	0.0063
Richmond-Berea, KY (MSA)	0.0300	Seymour, IN (MSA)	0.0063
Batavia, NY (MSA)	0.0300	Forest City, NC (MSA)	0.0064
Claremont-Lebanon, NH-VT (MSA)	0.0301	Defiance, OH (MSA)	0.0064
Jackson, OH (MSA)	0.0302	Sandusky, OH (MSA)	0.0064
Clarksburg, WV (MSA)	0.0302	Chillicothe, OH (MSA)	0.0064
Bradford, PA (MSA)	0.0302	Hannibal, MO (MSA)	0.0064
Shelton, WA (MSA)	0.0302	Plymouth, IN (MSA)	0.0065
Menomonie, WI (MSA)	0.0303	Norwalk, OH (MSA)	0.0065
Ashtabula, OH (MSA)	0.0303	Seneca, SC (MSA)	0.0065
Baraboo, WI (MSA)	0.0303	LaGrange, GA (MSA)	0.0065
Tullahoma-Manchester, TN (MSA)	0.0305	Pottsville, PA (MSA)	0.0065
Clearlake, CA (MSA)	0.0305	Oneonta, NY (MSA)	0.0065

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AUTHORS' BIOGRAPHIES

Bienvenido S. Cortes is Chair of the Department of Economics, Finance & Banking and also Editor-in-chief of *The Journal of Managerial Issues*. He can be contacted at the Department of Economics, Finance & Banking, Pittsburg State University, Pittsburg, KS 66762. Email: bcortes@pittstate.edu.

Michael Davidsson is an assistant professor of economics at Pittsburg State University. He develops and supervises the *Pittsburg Micropolitan Area Economic Report* (quarterly) and the annual *Pittsburg Micropolitan Area Economic Profile*. He can be contacted at the Department of Economics, Finance & Banking, Pittsburg State University, Pittsburg, KS 66762. Email: mdavidsson@pittstate.edu.

Michael McKinnis is a full-time instructor of economics and finance at Pittsburg State University. He can be contacted at the Department of Economics, Finance & Banking, Pittsburg State University, Pittsburg, KS 66762. Email: mmckinnis@pittstate.edu.

International Journal of Business and Finance Research
Vol. 9, No. 4, 2015, pp. 103-114
ISSN: 1931-0269 (print)
ISSN: 2157-0698 (online)

IBFR
www.theIBFR.com

INTEREST RATE AND CREDIT SENSITIVITY OF SECTORAL OUTPUT IN NIGERIA

Ikechukwu Kelikume, Lagos Business School

ABSTRACT

The Keynesian framework for the transmission of monetary policy to real sectors of the economy proposes that changes in the cost of capital will lead to changes in investment culminating to a change in output measured in GDP. Conventionally, a reduction in interest rate will all things being equal stimulate economic activities that will trigger substantial growth in the economy. The existence of structural rigidities in most developing countries like Nigeria renders monetary policy ineffective and distorts the link between interest rates and sectoral output performance. This study seeks to investigate the relative responsiveness of sectoral output to changes in interest rate and credit allocation in Nigeria. The study will make use of quarterly time series data spanning over a period of 23 years, sourced directly from the CBN and the National Bureau of Statistics. The paper utilized the impulse response function and Granger causality test to examine the sensitivity of sector output to changes in interest rate and credit. The intention is to understand the dynamic sensitivity of sectoral output to changes in interest rate and credit allocations. The result obtained from the study show the various sectors of the Nigerian economy responds significantly to credit allocation but not to interest rate. The result concludes that the use of interest rate to influence sector output growth for Nigeria is in-effective while efforts should be channelled at selective credit allocation and a mix of monetary and fiscal policy to achieve the desired macroeconomic short term and long term goals.

JEL: E43, E51, E23

KEYWORDS: Interest Rates, Credit Sensitivity, Sectoral Output

INTRODUCTION

Interest rate and credit allocation impacts on every sector of the economy but not on an equal basis manner or in a unidirectional pattern (Pellényi, 2012). This heterogeneity of the sensitivity of sectoral output to interest rate and credit allocation is of paramount implication in the scheme of monetary policy because the distributional consequences can distort the channel of monetary policy transmission mechanism. Thus, sectoral heterogeneity is an evident challenge to monetary policy. Mainstream economic thought, prior to the great depression, was based on Say's law that anchors on the assumption that supply creates its demand. That is; the economy consumes whatever it produces so that the economy is always in a state of equilibrium. The Keynesians reversed the classical assumption with the argument that the economy cannot maintain itself at full employment as a result of some structural deficiencies and rigidities in the system. Keynes, therefore, postulated that a combination of monetary and fiscal policy is needed to stimulate the economy by inducing investment directly. He reasoned that a reduction in interest rate will automatically stimulate investment that will have a positive impact on the various sectors of the economy.

Bernanke and Kuttner (2005), in their study on the reaction of the stock market to federal reserve policy noted that the tightening of monetary policy may be viewed as mild aggregately, but it may be excessive for some specific sectors producing strong distributional effects within the economy.

In a similar study carried out on the Ugandan economy, Nampewo, Munyambonera and Lwanga (2013), found monetary policy to exert an adverse significant effect on sectoral growth and on the overall economy with the conclusion similar to the recent findings by Asghar and Hussain (2014), "that different sectors of the Pakistan economy responds to monetary policy shocks at different times and in different ways". Nigeria like most developing economies in Sub-Saharan Africa has embarked on several reforms in the financial service sector with the most recent reform being the banking sector reform of 2004 in which all commercial banks were mandated by CBN to meet the N25, billion minimum paid-up capital by 31st December 2005. Despite the strengthening of the financial service sector with the series of merger and consolidation that has taken places in Nigeria since 2005, most sectors of the economy are still underfunded and burdened by the high cost of credit.

Recent studies conducted by Salami and Kelikume (2011) on the linkage between the manufacturing sector and other sectors of the Nigerian economy showed that there exist the financial service sector and the rel sector of the Nigerian economy. This explains why various sectors react differently to monetary policy shocks. According to Adolphus J. Toby & Deborah B. Peterside (2014), Nigerian banks are highly liquid, but they presumed that lending to the agriculture and manufacturing sectors are extremely risky. Hence, they believe intensifying credit to these sectors is unjustifiable and unwarrantable with respect to the risk and cost. In the empirical literature, the monetary transmission mechanism is considered broadly without taking into account the grass root impact of changes in interest rate and credit allocation on the various sectors of the economy. The mechanism via which interest rate and credit affect growth is indirect as any change in interest rate will first influence the level of investment in different sectors before affecting the gross domestic product GDP as a whole.

The consideration of how the various sectors respond to changes in monetary policy will help provide a guide in understanding the monetary policy mix to be adopted my monetary authorities to ensure steady growth in virtually all the sectors of the economy (Nwosa and Saibu, 2012). This study is urgent considering the observation of Ndekwu (2013) that boom and busts cycles exhibited in the Nigeria financial markets can engender strong and opposing effects on credit allocation and output growth in the real economy and, hence, on the effectiveness of CBN's monetary policy. Hence, this study is meant to examine the interest rate and credit sensitivity of sectoral output in Nigeria. The remaining parts of this paper is organized as follows; the literature review is carried out in the next section whiles the discussion on thedata and methodology comes up after the literature review. Following the discussion on the data and methodology, is the presentation and analysis of the result while the final section concludes the study.

LITERATURE REVIEW

The literature is rich with attempts to study the impact, sensitivity and causality of interest rate and credit on sectoral output (Deodola and Lippi 2000; Hayo and Uhlenbrock 2000; Farès and Srour 2001; Raddatz and Rigobon 2003; Irvine and schuh 2004; Adebiyi 2006; Pellényi (2006); Tena and Tremayne 2006; Cortes and Kong 2007; Waheed 2006; Josephine 2008; Majid 2008; Saibu and Nwosa 2011; Saibu and Nwosa 2011 Haruna, Yahya and Nasiru 2013; Onuonga 2014 & Asghar and Hussain, 2014). Others notable studies focused on the link between financial system and economic growth (Beck, Levine & Loayza 2000; Ajisafe & Folorunso 2002; Levine 2005; Dey & Flaherty 2005; Adebiyi 2006; Akinlo 2007; Chimobi & Uche 2010; Cappiello, Kadareja, Kok Sorensen & Protopapa 2010) Generally, two main hypotheses have evolved in the literature that links output to interest rate and credit. The two hypotheses are the finance-led growth hypothesis and the growth-led finance hypothesis. The former states that the financial liberalization that reduces interest rates will transfer idle resources from the surplus to the deficit sector thereby stimulating growth while the later states that demand for financial services induced by real economic growth will result in an expansion of the financial sector.

Several studies used different methods to analyse and examine the responsiveness of sectoral output to interest rate changes. The studies by Deodola and Lippi 2000; Hayo and Uhlenbrock 2000; and Irvine and schuh 2004, used the Vector Auto-Regression (VAR) to study the effect of monetary policy shocks on output while Josephine (2008) employed the simple regression analysis to analyze the impact of monetary policy shocks on the economy. Adebiyi 2006; Majid 2008; Saibu and Nwosa 2011; Haruna, Yahya and Nasiru 2013 and Onuonga 2014 all applied the Auto-Regressive Distributed Lag (ARDL) model and Error Correction Model (ECM) to examine the disaggregated effect and dynamic response of output to monetary policy shock. Pellényi (2006) using structural factor model to analyze the sectoral impact of monetary policy in Hungary found that the output response of industry, construction and trade are very strong. The result strongly suggests that each sector reacts differently to monetary shocks. Further, within manufacturing, subsectors producing durable goods respond more to a monetary expansion.

Early studies by Koivu (2002), on the finance-growth nexus using the fixed-effect model and unbalanced panel data from 25 transition countries, demonstrated that the interest rate margin was negatively and significantly related to economic growth. In addition, the study found that an increase in the quantum of credit did not spur economic growth, thereby concluding that credit growth has not always been sustainable and may actually decline. Arnold and Vrugt (2002), evaluated the impact of monetary policy shocks on sectoral output in the Netherlands. In their conclusion, they found large sectoral variation in monetary policy transmission. Dey & Flaherty (2005), using a two-stage lease square regression model to test the impact of bank credit and stock market liquidity on output growth, found that bank credit is not a determinant of GDP growth. Dedola and Lippi (2005), investigating the differential output effects of unanticipated monetary policy shocks with industry data from 5 OECD countries, found that the impact of monetary policy is more robust in industries that produce durable goods, which are more capital-intensive and with little borrowing capacities. Besides, the output effects of policy shocks seemed more robust in industries with higher interest rate burden.

Tena and Tremayne (2009), analyzing the UK data, found cross-sectional differences across industries and asymmetries in different sectors to a monetary policy change. Alam, and Waheed (2006), examining channels of monetary transmission mechanism in Pakistan across several sectors of the economy, found the manufacturing, wholesale and retail trade, finance and insurance sectors declined significantly with changes in the rate of interest while the agricultural sector, mining and quarrying, construction, and ownership of dwellings were insensitive to interest rate changes. Cortes and Kong (2007), examining the impact of monetary policy on the Chinese economy, found bank lending rate to be a robust indicator of monetary policy in China.The result obtained from the study revealed that the response of different province in China to monetary policy changes were positively linked to the share of loans allocated to industrial firms and the primary sector of the country's aggregate output.

Cappiello, Kadareja, Kok Sorensen Protopapa (2010), using a panel data approach to study the relationship between bank loans, credit standards and output in the Euro area found that the effect of the supply of credit on GDP was positive and statistically significant. The few studies in the Nigeria on sector responsiveness to credit have been inconclusive and scanty. The study by Akinyele and Osinubi (2006), pointed out that the real sector of the Nigerian economy has depended largely on the banking system for working capital with which to acquire inputs. However, increases in bank lending rates complicate the problems of rising cost of working capital which altogather slows the productivity and in the performance of the sector. Ikenna (2012), using an Autoregressive Distributed Lag (ARDL) test for the possibility of a credit crunch in the real sector, revealed that deregulation had an adverse effect on the credits allocation to real economic sectors in the long run. He concluded that Deposit Money Banks in Nigeria have an aversion towards lending to the real sector. Nwosa and Saibu (2012), investigating the channels of monetary transmission across the different sectors of the Nigerian economy, found that the channels through which monetary policies were transmitted to various sectors were different. On the one hand, interest rate channel was liable for the

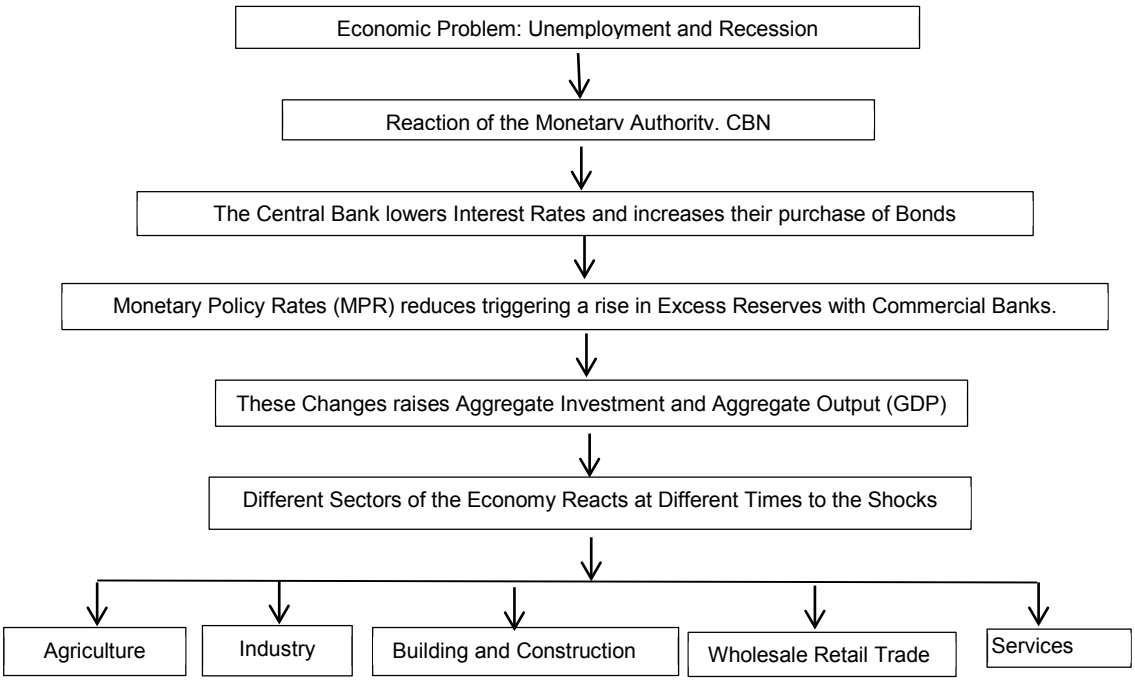
transmission of monetary policy impulse to the agriculture and manufacturing sectors whereas the exchange rate channel transmits monetary policy impulse directly to the building and construction, mining, service and wholesale and service sectors. In a similar study, using auto regressive distributed lag modelling technique, Haruna and Yahya (2013) conclude that relationship between private sector credit and economic growth to support the growth-lead finance hypothesis in the long-run.

In carrying out a study that links various sectors of the Nigerian economy, a proper clasification and identification of the sectors need to be established. Currently, the economy can be broadly classified into five (5) main activity sectors namely, Agriculture, Industry, Building and Construction, Wholesale and Retail Trade and the Service sector. Existing studies reviewed in the Nigerian economy have so far explored the relationship between monetary policy and growth by concentrating on aggregated output relegating sector-specific analysis to the background (Ajisafe & Folorunso 2002; Adebiyi 2006; Akinlo 2007; Chimobi & Uche 2010). This study hopes to explore and narrow the gap in the literature by examining the sensitivity of sectoral output to changes in interest rate and credit.

DATA AND METHODOLOGY

In the context of the Nigerian economy, this research is carried out using quarterly secondary data sourced from the Central Bank of Nigeria and the National Bureau of Statistics. The quarterly frequency date covers the period 1990 to 2012 for the five major activity sectors in Nigeria. Following the Keynesian framework for analysing monetary policy impact on the economy, an expansionary monetary policy will impact sector output through an increase in investment induced by a fall in interest rate. This will further increase credit to the private sector and decrease exchange rate but the extent to which monetary policy impacts output depends on the extent to which the various sectors respond to changes in monetary policy tool.

Figure 1: How Changes in Monetary Policy Affects the Economy Using the Keynesian Framework



This figure shows how changes in monetary policy impacts on the economy using the Keynesian framework: In the Keynesian model, changes I monetary policy affects interest rate which in turn affects investment spending and aggregate demand but the various sectors of the economy reacts differently to the shocks emanating from the change in monetary policy.

Model

Adopting model from the work of Shabri Majid (2008), Nwosa and Saibu (2011) and Haruna et al (2013), the functional model for sector output sensitivity to the private sector credit and interest rate is stated as follows;

$$Y_{it} = f(INT, CPS) \tag{1}$$

Where Y_{it} is the contribution of the ith sector to gross domestic product, INT is the prime lending rate while CPS is the credit to the private sector. The prime lending rate is considered to be appropriate because it is the lowest rate offered to credit worthy customer and this has a direct bearing on investment. The model expressed in estimation form is expressed as follows;

$$Y_{it} = \beta_0 + \beta_1 INT_t + \beta_2 CPS_t + u_t \tag{2}$$

From equation 2, Y_t is the sector specific RGDP, $\mathcal{U}$ is the error term; β_0 is the intercept while β_1 and β_2 represent the slope coefficients of Interest rate and credit to the private sector variable (INTR and CPS).

On a-priori, $\beta_1 < 0$ and $\beta_2 > 0$

To derive the impulse response function we specify equation 2 in its VAR modeling form expressed in equations 3, 4 and 5 respectively

(3)

$$INT_t = \alpha' + \sum_{j=1}^{k} \beta_j Y_{t-1} + \sum_{j=1}^{k} \delta_j INT_{t-j} + \sum_{j=1}^{k} \phi_j CPS_{t-j} + U2t$$

$$Y_{it} = \alpha + \sum_{j=1}^{k} \beta_j Y_{t-j} + \sum_{j=1}^{k} \delta_j INT_{t-j} + \sum_{j=1}^{k} \phi_j CPS_{t-j} + U1t \tag{4}$$

$$CPS_t = \alpha'' + \sum_{j=1}^{k} \beta_j Y_{t-j} + \sum_{j=1}^{k} \delta_j INT_{t-j} + \sum_{j=1}^{k} \phi_j CPS_{t-j} + U3t \tag{5}$$

Where the u's in the equations are stochastic error terms, called impulses or shocks. Given that we utilized time series data, the variables were tested for the presence of unit roots with the aid of Augmented Dickey-Fuller (1981) unit root test procedure. In addition, the Granger (1969) granger causality tests how much of Y_t is explained by INT and CPS and vice versa.

RESULTS AND DISCUSSION

Before estimating the Vector Auto-Regression (VAR) model, the variables were tested for the presence of unit roots with the aid of the Augmented Dickey-Fuller and the Phillip-Perron unit root tests. The result of the unit root test is reported in Table 2 below. The result shows that agriculture, industry, building & construction, wholesale & retail trade, services, credit to the private sector and interest rate are non-stationary. In Table 1 the result shows the building and construction and credit to the private sector variables were not stationary at levels. However, when Phillip-Perron unit root tests were applied, all the variables became stationary at their individual levels.

Table 1: Unit Root Test for the Variables

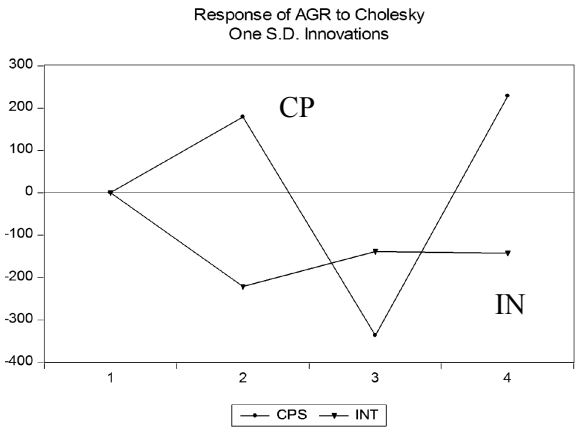
Variables	ADF Test Statistics	Status	PP Test Statistics	Status
AGR	-7.472 (0.000)***	I(1)	-21.752 (0.000)***	I(1)
IND	-6.235 (0.000)***	I(1)	-27.074 (0.000)***	I(1)
BDS	-2.424 (0.137)	I(0)	-14.707 (0.000)***	I(1)
SER	-3.137 (0.026)***	I(1)	-13.035 (0.000) ***	I(1)
WRT	-1.550 (0.505)**	I(1)	-19.943 (0.000)***	I(1)
CRP	-1.864 (0.348)	I(0)	-9.656 (0.000) ***	I(1)
INT	-8.753 (0.000)***	I(1)	-13.525 (0.000)***	I(1)

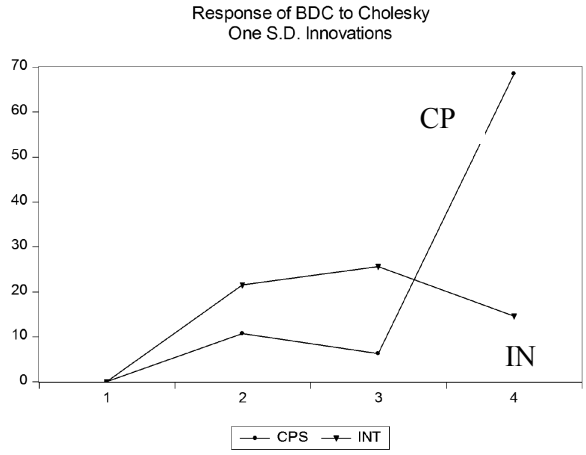
*Note: AGRQ= Agriculture Output, INDQ = Industry y Output, BDCQ = Building & Construction Output, WRT Q= Wholesale & Retail Trade Output, SERQ = Service Sector Output, CPS = Credit to the Private Sector, INTR = interest Rate. This table shows the results of the Augmented Dickey-Fuller (ADF) Unit Root test, which indicate that the level of each variables are integrated or stationary at their individual levels. The figures in parenthesis are the respective probability values while the symbol ** and *** indicates significance at 5 percent and 1 percent level.*

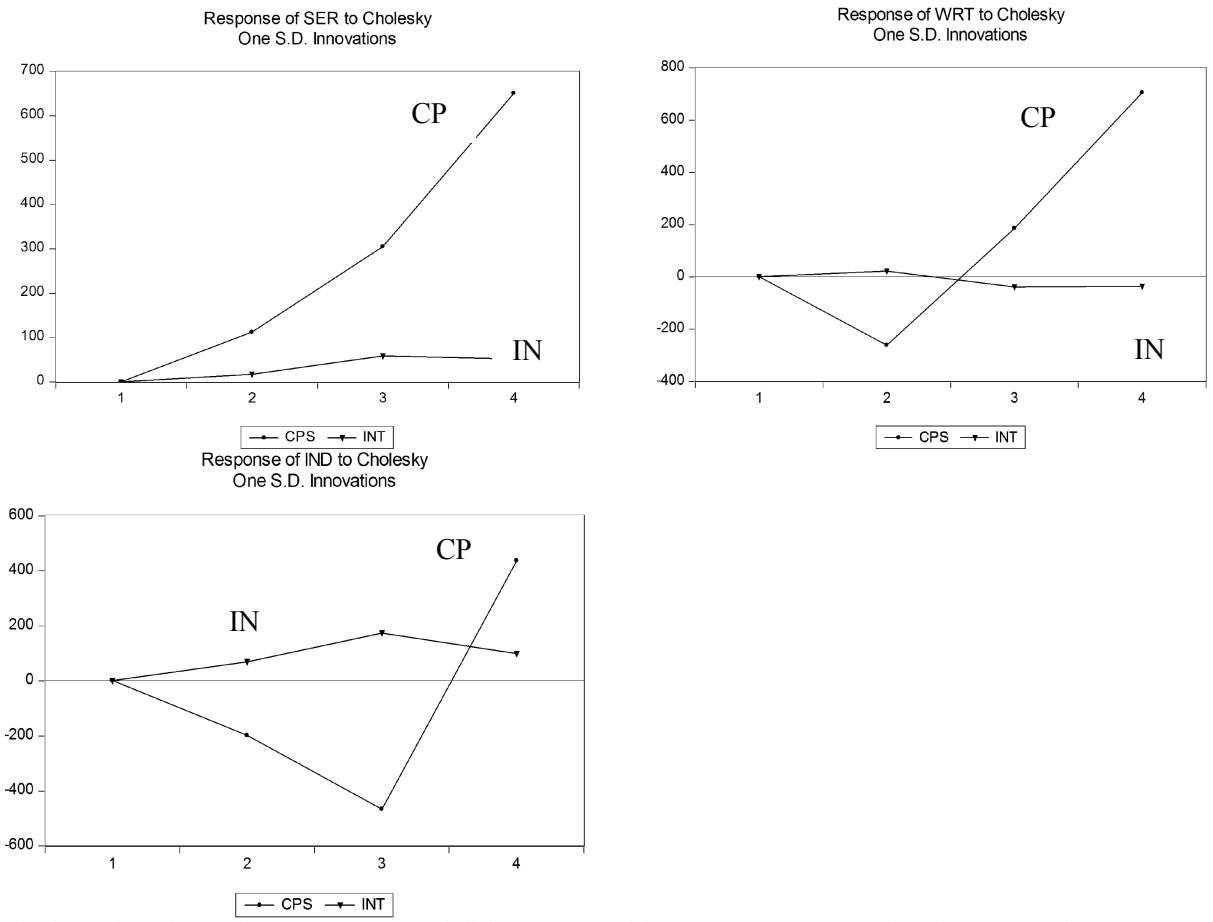
Impulse Response Functions

Given that all the variables were found to be integrated of order one using the Phillip-Perron unit root tests, we proceeded to estimating the VAR models in equations 3, 4 and 5. Given that the aim of the study is to test the interest rate and credit sensitivity of sect oral output, we do not report the result of the VAR model here, but do use the result to generate the impulse response function. Figure 2 shows how the various sectors respond to shocks triggered by either interest rate or changes in credit to the private sector. Beginning with the agricultural sector output, a rise in credit, holding other variables constant, cause an increase in real agric output over the course of the first quarter. The upward trend in agricultural sector output is cut short at the end of the first quarter where it begins to decelerate over the second quarter due to the fading off of the effect of the shock. It accelerates and become positive again during the third and the fourth quarters.

Figure 2: Impulse Response Functions of the Sectors to Credit and Interest Rates







This figure shows the impulse response functions of all the five sectors of the Nigerian economy to credit and interest rate changes. It portrays the reaction of the five sectors as a function of credit and interest rate, parameterizing the dynamic behavior of the sectors.

From the same chart, it can be easily seen that interest rate shocks produced a persistent negative impact on agricultural sector output. One explanation to the positive effect of credits to agricultural sector output in the first quarter and third quarter is that these two periods accounts for the planting season and harvest season respectively. The response of Building and Construction output to interest rate and credit shocks produced a similar upward impact with that of the agricultural sector output in the first quarter through to the third quarter. However, the response of Building and Construction output to interest rate shocks appeared to be greater than the shock from credit in the same time period. Interestingly, from the third quarter the sector responded positively to credit shocks and negatively to interest rate shocks respectively.

The response of the service sector output to interest rate and credit shocks produced an interesting pattern. Service sector output responds positively almost immediately to an increase in credit to the private sector but is relatively insensitive to shocks emanating from a rise in interest rate over the four quarters. The implication of this is that a change in monetary policy rate by the Central Bank of Nigeria may not have any significant impact on the service sector output. The result for the Wholesale and Retail Trade sector shows that it takes approximately between two to three quarters for the sector to respond positively to an increase in credit to the private sector while the response of the sector to interest rate changes is relatively flat. Finally, the result of industrial sector output shows that it takes approximately three quarters for the sector to respond accordingly to changes in credit to the private sector and interest rate. For the industrial sector, output initially decreases for the first two quarters in response to an increase in the credit to the private sector. However, all other sectors remaining constant but by the third quarter, the sector begins to respond positively to credit shocks. Interest rate shocks have a negative impact on Industry only after the

third quarter. The results of the impulse response function are in accordance with the result obtained by Pellényi (2006) and Nwosa and Saibu (2012). While Pellényi (2006), found each sector in the Hungarian economy respond differently to monetary shocks, the result obtained by Nwosa and Saibu (2012) shows that that the channels through which monetary policies were transmitted to various sectors in Nigeria were different. One the one hand, none of the sectors responds significantly to changes in interest rate, on the other hand, all the sectors are sensitive to changes in credit.

Granger Causality Tests

To test for causality as pioneered by Granger (1969) test is employed. It provides an evaluation in terms of which variable causes the other. The Granger causality tests affirmed our findings from the impulse response function. From Table 2, the result of the Granger causality test shows the existence of a unidirectional significant relationship between credits to the private sector and the five major sectors of the Nigerian economy. This is shown by significant F-statistic values of the various variables in Table 2. One sector that stands out in terms of its relations to credit is the building and construction sector which exhibits a bi-directional relationship with credit to the private sector. With the exception of building and construction sector, the result shows interest rate does not granger cause sectoral growth. The interesting finding of this study is that sectoral credit allocation is an important tool in influencing and controlling the Nigerian economy.

Table 2: Pairwise Granger Causality Tests

Null Hypothesis	Obs.	F-Statistic	Prob.
CPS does not Granger Cause AGR	129	5.6177	0.0012
AGR does not Granger Cause CPS		0.9410	0.4231
INT does not Granger Cause AGR	129	0.1850	0.9065
AGR does not Granger Cause INT		0.0035	0.9997
INT does not Granger Cause CPS	129	2.8666	0.0394
CPS does not Granger Cause INT		2.3991	0.0712
CPS does not Granger Cause BDC	129	11.3541	0.0000
BDC does not Granger Cause CPS		2.1090	0.1026
INT does not Granger Cause BDC	129	4.2056	0.0072
BDC does not Granger Cause INT		0.3117	0.8169
CPS does not Granger Cause IND	129	5.9399	0.0008
IND does not Granger Cause CPS		2.3374	0.0770
INT does not Granger Cause IND	129	0.4626	0.7089
IND does not Granger Cause INT		0.0449	0.9873
CPS does not Granger Cause SER	129	2.8962	0.0380
SER does not Granger Cause CPS		1.0704	0.3643
INT does not Granger Cause SER	129	1.8693	0.1383
SER does not Granger Cause INT		0.0900	0.9654
CPS does not Granger Cause WRT	129	3.3203	0.0221
WRT does not Granger Cause CPS		1.5057	0.2165
INT does not Granger Cause WRT	129	0.0900	0.9654
WRT does not Granger Cause INT		0.0837	0.9688

*This table suggests that Credit is an important source of variation to sectoral growth in Nigeria. On the other hand, interest rate does not granger cause sectoral growth. *** and ** denote rejection of the null hypothesis at the 1 and 5 per cent level.*

CONCLUDING COMMENTS

This study set out to examine interest rate and credit sensitivity of sectoral output in Nigeria over the period 1990: Q1 to 2012: Q4. The study made use of the granger causality test and the impulse response function to determine the relative sensitivity of the aggregated five sectors to changes in interest rate and credit to the private sector. The result obtained from the study shows that sectoral output is sensitive to Credit allocation but not to interest rate. In other words, the five sectors of the economy are very sensitive to credit allocations. Therefore, Credit is a useful tool for boosting sectoral output growth in Nigeria. A major tool that the Central Bank uses to control the movement of macroeconomic aggregates is the variation in the

stock of money and interest rate. The insensitivity of sectoral output to changes in interest rates suggests that monetary policy is largely ineffective in influencing sector growth in Nigeria. This finding suggests a mix of monetary and fiscal policy to achieve the desired goals of monetary authority in Nigeria. It is worth mentioning that for government financing policies to achieve the targets for sectoral development, Nigeria will need an ample quantum of purposefully targeted investments in all the sectors to improve infrastructure, augment productivity, and intensify competitiveness of small and medium-scale enterprises. In this paper, we aggregated and assumed only five sectors and tracked the behavior of the five sectors in relation to aggregate credit to the private sector. Further research might examine broader sectors of the Nigeria economy and the relative credit allocated to the specific sectors of the Nigeria economy. This might necessitate the use of a dynamic panel data analysis to capture the random effect and the fixed effects associated with the various sectors of the Nigeria economy as they react to changes in interest rate and credit.

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BIOGRAPHY

Ikechukwu Kelikume is currently the head of Department of Accounting, Economics and Finance at the Lagos Business School. He leads sessions in microeconomic and macroeconomic environment of business, strategy and microeconomics of competitiveness at Lagos Business School. Ike undertakes research and consults in areas which include macroeconomic modeling, financial and monetary economics, industrial economics, agribusiness and the oil and gas sector. In addition, Ike also engages in consulting activities. His consulting activities have included assignments for the World Bank, the Nigerian Economic Summit Group, Oando Nigeria Plc, South Atlantic Petroleum Ltd and Total Nigeria Plc. Ikelikume@lbs.edu.ng

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Mercedes Jalbert, Managing Editor
The IBFR
P.O. Box 4908
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