

Editor:

Monzurul Hoque, Saint Xavier University

Associate Editors:

Thomas Krueger, Texas A&M University, Kingsville
Inayat Ullah Mangla, Western Michigan University

Editorial Board:

Sheri Faircloth, University of Nevada, Reno
Raj Kohli, Indiana University of South Bend
Hamid Moini, University of Wisconsin, Whitewater
G.N. Naidu, Illinois State University, Bloomington
Donald Swanton, Roosevelt University
Mark A. Wrolstad, Winona University

Exchange Rate Dynamics: The Case of US Dollar Exchange Rates Against Three Major Currencies in Asia

Byeongyong Paul Choi Jin-Gil Jeong

The Determinants of the Reinsurance Decision by Life Insurance Companies

Raja Bouzouita Arthur J. Young

Risk Management During the Real Estate Bubble: GARCH or Stable Distributions?

David Basterfield Thomas Bundt

The Wealth Effects of CFO Turnover: Evidence from Post-Sarbanes-Oxley Act

WaQar Ghani Rajneesh Sharma

Forecasting Future Sales of Manufacturing Firms

Reza Espahbodi Pouran Espahbodi Hassan Espahbodi

Loan Delinquencies and Bank Stock Returns

William Lepley

Improvements in NYSE Trading and Information Technology: 1878-1984

Joan C. Junkus

Is APV Better Than WACC for Non-Stationary Debt Ratio?

Howard Qi Guangsen Han

Investing Your Own Endowment Fund Like Harvard Invests

Timothy G. Peterson

Demand for Foreign Currency Reserves in Emerging Market Countries: Is Herding Applicable?

Maru Etta-Nkwelle

Maximizing IRA Returns Using FLP/LLC Discounting Techniques

William E. Maas Kevin M. Bahr Sean T. Carey

Table of Contents

- 1 Exchange Rate Dynamics: The Case of US Dollar Exchange Rates Against Three Major Currencies in Asia**
Byeongyong Paul Choi, Jin-Gil Jeong
- 11 The Determinants of the Reinsurance Decision by Life Insurance Companies**
Raja Bouzouita, Arthur J. Young
- 29 Risk Management During the Real Estate Bubble: GARCH or Stable Distributions?**
David Basterfield, Thomas Bundt
- 38 The Wealth Effects of CFO Turnover: Evidence from Post-Sarbanes-Oxley Act**
WaQar Ghani, Rajneesh Sharma
- 51 Forecasting Future Sales of Manufacturing Firms**
Reza Espahbodi, Pوران Espahbodi, Hassan Espahbodi
- 57 Loan Delinquencies and Bank Stock Returns**
William Lepley
- 66 Improvements in NYSE Trading and Information Technology: 1878-1984**
Joan C. Junkus
- 79 Is APV Better Than WACC for Non-Stationary Debt Ratio?**
Howard Qi, Guangsen Han
- 89 Investing Your Own Endowment Fund Like Harvard Invests**
Timothy G. Peterson
- 102 Demand for Foreign Currency Reserves in Emerging Market Countries: Is Herding Applicable?**
Maru Etta-Nkwelle
- 117 Maximizing IRA Returns Using FLP/LLC Discounting Techniques**
William E. Maas, Kevin M. Bahr, Sean T. Carey
- 126 International Index Investing During the Financial Crisis**
C. Edward Chang, H. Doug Witte, Tsu-Hong Yen
- 140 A Comparative Performance Analysis of Three Model Portfolios of Value Line**
Jamshid Mehran, Robert Balik, Raj K. Kohli
- 150 Women on the Board: Diversity and Firm Performance**
Sharon K. Lee

- 159 International Diversification**
Robert Balik, Jamshid Mehran
- 169 Do Jim Cramer's Mad Money Recommendations Have the Same Impact in a Bear Market as in a Bull Market?**
Peppi M. Kenny, Don T. Johnson
- 178 Exchange Traded Funds as a Vehicle for Implementing End-of-Month Trading Strategies**
Charles Rayhorn, Kenneth Janson, James Drosen

Exchange Rate Dynamics: The Case of US Dollar Exchange Rates against Three Major Currencies in Asia

Byeongyong Paul Choi and Jin-Gil Jeong

Abstract

With the daily exchange rate against the U.S. dollar data, we found that the volatility of the value of Chinese Yuan is smallest when compared with the Japanese yen and Korean won during the normal period, the Asian financial crisis period and the recent global financial crisis period. During the two crisis periods, we observe a higher volatility for the Korean won compared to the Japanese yen, indicating the “flight to quality.” However, the difference in the volatility is much less during the recent global financial crisis period, implying the “flight to Japanese yen” is not as prevalent as before. We also found that the difference between cross rates and direct market rates for the won/yen rate are statistically significant during the two crisis periods. Although currency speculators and arbitrageurs may find the opportunity for profit, the size of transaction cost may matter.

I. Introduction

Exchange rate dynamics have been analyzed in many different contexts. Kim and Roubini (2000), for example, investigated exchange rate anomalies in the non-U.S. industrial countries and provided evidence that delayed undervaluation may not systematically occur. Brandt and Santa-Clara (2002) used an assumption of incomplete markets and found that exchange rate volatilities are caused by the incompleteness of the market.

Furthermore, Bacchetta and Wincoop (2000) argued that the increase and stability in trade are not influenced by the exchange rate system, hence the volatility of exchange rates. Several papers also examine the relationship between exchange rate volatility and its effects on international trade and welfare, e.g., Devereux and Engel (2002), Warnock (2003), Campa and Goldberg (2005), and Gali and Monacelli (2005). In general, they found that the empirical relationship is not convincing.

As the world has integrated economically more than ever before, the volatility of exchange rates seems to have affected the welfare of corporations and individual consumers. Specifically, while the volatility needs to be managed for hedgers such as individuals and corporations who do not want to bear foreign exchange rate risk, the same volatility tends to be exploited for speculators and arbitrageurs who are ready to assume the risk.

In that regard, in the spirit of Lustig and Verdelhan (2007) and Walker (2008), Campbell et al. (2010) found that when the stock market is bearish or the economy is in crisis, the value of the core reserve currency, such as the U.S. dollar and the euro, appreciates. They argued that portfolio investors engage in global hedging through “flight to quality” where investors dump other commodity-dependent currencies such as the Australian dollar or Canadian dollar for managing volatilities in exchange rates.

Byeongyong Paul Choi, Assistant Professor, and Jin-Gil Jeong, Professor, are in the Department of Finance, International Business and Insurance at Howard University, Washington, DC.

In this paper, we examine the dynamics of the U.S. dollar exchange rate against three major currencies in Asia – the Japanese yen, Chinese Yuan, and Korean won – in the context of Campbell et al. (2010). Specifically, considering the ramifications of the Asian Financial Crisis in 1997 and the recent Global Financial Crisis triggered in 2008, we divide the full sample period into several subperiods - normal periods and two crisis periods - to see how the crises play out in volatilities of the exchange rates and to identify their implications for hedgers and speculators.

Interestingly, there exists a unique direct exchange market for the won/yen rate in Korea, reflecting the importance of economic ties between the two countries. For the won/yen exchange rates, across the subperiods, we examine whether there exists any significant difference between the direct market rates and the cross rates obtained by cancelling out the U.S. dollar. If so, we may infer the implications of the divergences: “flight to quality” or arbitrage opportunity.

According to the International Monetary Fund (IMF), the U.S., China, Japan, and Korea are ranked number 1, 2, 3, and 15, respectively, in the world by the sizes of their gross domestic product (GDP) in 2009. Thus, the largest economic bloc in the world is composed of the U.S. and its three major trading partners in Asia: Japan, China and Korea. Recently, unlike the earlier empirical findings, the volatilities of their exchange rates against the U.S. dollar seem to play a significant role in maintaining the stable growth of trade and investment for the economic bloc. In fact, all countries adopt flexible exchange regimes with the exception of China (managed float). Considering the important role played by the four countries in international trade and investment, it is worthwhile to investigate the exchange rate dynamics amongst those four major currencies.

II. Issues of the economic bloc

The U.S. has important economic issues with each of its trading partners. For example, the chronic trade surplus by Japan against the U.S. has been an ongoing issue. More importantly, during the last decade, the yen carry trade, exploiting the low value of the yen against the U.S. dollar and low interest rate in Japan, has been a standard strategy for speculators such as hedge funds, spurring the recent global liquidity crisis when speculators unwound their position.

In addition, the undervalued Chinese Yuan has been an important issue at the annual Sino-American economic forum in the context of China’s huge trade surplus against the U.S. In June 2007, the U.S. and Korea signed a landmark free trade agreement, waiting for ratification by the Congresses of each country. The volatility of the value of Korean against the U.S. dollar has been an important factor in determining the level of trade between the two countries in the context of the degree of exchange rate pass-through on domestic prices.

Furthermore, one of the most distinctive phenomena in the world economy has been multilateral trade agreements such as the World Trade Organization. As various trade barriers have been dismantled, domestic companies have tended to become more international than ever before. For example, the U.S. companies have established many foreign affiliates and subsidiaries in Asia (China, Japan and Korea) to enjoy comparative advantages and market base in the region, or vice versa. Most Fortune 500 companies now have operations in China, Japan and Korea. Consequently, their profitability is significantly affected by changes in the exchange rates against the Japanese yen, the Chinese Yuan and the Korean won. Indeed, exchange losses

may surpass profits in local currency obtained from efficient operations in the region. For the managers of the U.S. corporations, the empirical results may provide a reference when they need to decide how to hedge their economic stakes, e.g., cash flows in three major Asian currencies, against foreign exchange risk.

The considerable fluctuations in the value of the three currencies have affected all levels of economic activities and financial decisions not only for the U.S. and the three Asian countries, but also for other Asian countries and elsewhere. Traditionally, Asian countries tend to settle their international trade using either the U.S. dollar or the Japanese yen. Now, the Chinese Yuan plays a significant role as a reserve currency for some Asian countries. Thus, the alignment of the value of their currencies when compared to the yen/dollar and Yuan/dollar rates has always been an important policy issue for most Asian countries. Asian countries, therefore, closely monitor the behavior of the yen/dollar and Yuan/dollar rates to decide a favorable currency to settle their international transactions. In that regard, the results of this paper may provide some implications for those issues in the context of currency hedging and speculation for corporations and portfolio investors.

III. Data

We obtained daily exchange rate data from the FRED® (Federal Reserve Economic Data) database, published by the Federal Reserve Bank of St. Louis and daily direct market exchange rates for won/yen from the Economic Database System, published by the Bank of Korea. This study analyzes the daily exchange rate for the three major Asian countries over an extensive time period, a 29-year period between April 1981 and February 2010. The choice of this period coincides with the flexible exchange rate period.

Furthermore, in order to investigate the dynamics in three dollar-based exchange rates for the interesting time period, the sampling period is then divided into three sub-periods; normal period (January 1993 – June 1997 and January 1999 – February 2008), Asian financial crisis (July 1997 - December 1998) and the recent global financial crisis (February 2008 ~ February 2010). We follow Mitton (2002) to be consistent with the time period for the Asian financial crisis. The recent global financial crisis had been triggered with rumors of financial failure of Bear Stearns in February 2008.

IV. Results and their implications

The exchange rate's movement over the sample period is shown in Figure 1. To see the trend of the value of the three currencies, the nominal value of each currency is normalized to 100 with the base year of 1981. Over this sample period, it can be seen that the Japanese yen has gradually appreciated against the U.S. dollar, while the Korean won and the Chinese Yuan show movement in opposite directions against the U.S. dollar over the 29 years. It is obvious for the Chinese Yuan that the value is pegged to the U.S. dollar and is not moved by the market, but by government intervention. It can be noted that the Japanese yen shows more volatile movement than the other exchange rates. Interestingly, the value of Korean won has substantially depreciated over the two financial crisis periods, one near year 1998 and another around year 2008.

Figure 2 plots the trend of the normalized difference of values between a pair of exchange rates during the period including January 4, 1993 and February 19, 2010. It can be

noted that two normalized differences, i.e., yen minus Yuan and yen minus won, tend to be positive and show a similar pattern, implying that the Japanese yen has appreciated more than the other two currencies. The larger the magnitude, the more difficult it is for Japan to export its product to the region. Considering the low inflation rate in Japan due to chronic recession, compared to China and Korea, the real exchange rate of Japanese yen appears to have been seriously overvalued, hurting its economy.

Summary statistics are provided for daily changes in exchange rates among three exchange rates and the direct market rate for won/yen. Specifically, Table 1 reports the mean and the standard deviation of these variables for the three different time periods. It is distinctive that compared to Japanese yen and Korean won, the volatility of Chinese Yuan is smallest during the two crisis periods as well as during the full sample period. Since China has maintained a currency peg or managed float against the U.S. dollar up until now, the low standard deviation indicates that there exists no room for currency speculation that takes advantage of the volatilities.

Standard deviation of daily changes in exchange rate is 0.007485 for the Japanese yen during the whole sample period, and 0.009765 for the Korean won during this period. So, there is not a significant difference between the two exchange rates during this period. In contrast, however, during the Asian financial crisis, the standard deviation of the Japanese yen is 0.011227, while it is 0.025170 for the Korean won. Thus, the volatility of Korean won is more than twice as large as that of the Japanese yen. Interestingly, during the recent global financial crisis, the difference in magnitude of volatility for the two currencies has been reduced significantly: the standard deviation of daily changes for the Korean won is 0.015356 while that of the Japanese yen is 0.009356. The similar pattern is also observed for the standard deviation of daily changes for the won/dollar rate.

The pattern of the volatilities for the two currencies during the two financial crisis periods appears to be consistent with the idea of “flight to quality” or “flight to core reserve currency.” In times of economic crisis in Asia, investors tend to show “flight to Japanese yen” behavior by dumping soft currencies such as Korean won, thereby increasing the volatility of the currency.

Figure 3 shows the difference between the cross rate and direct market rate for the won/yen rate. There are two interesting observations worth noting from this graph. First, there are two large spikes during the two economic-crisis periods, i.e., Asian financial crisis and recent global financial crisis. Second, the band near the zero line shows some patterns. That is, the thickness of the band gradually increases toward two crisis periods, and then it diminishes after the crisis periods. Unlike Taylor (1987) who found no significant difference between the cross rates and the direct market rates, the visual inspection might suggest the possible opportunity for triangular arbitrage during the two crisis periods.

Next, we test whether the spikes are statistically significant by comparing the mean of differences between the won/yen cross rates and direct market rates. Table 2 shows the results of the mean t-test comparisons for the means of the different time periods. The results confirm that the means are statistically different at the 1 percent level for the normal period and the recent global financial crisis period and at the 10 percent level for the normal period and the Asian

financial crisis period. However, with respect to the two financial crisis periods, the p -value is insignificant.

The jump of variability in the difference (in Korean won) is also very noticeable: the standard deviations during the crisis periods (35.2181 and 24.3786) are at least four times as large as those during the normal period (6.3915) and the range – the difference between minimum and maximum values - is extremely large during the crisis periods (476.488 and 291.348) while the range during the normal period is relatively small (65.575).

V. Conclusion

For the last three decades, the values of three major currencies in Asia against the U.S. dollar show many interesting patterns. First, the value of the Japanese yen tended to appreciate against the U.S. dollar while the value of the Chinese Yuan and the South Korean won tended to depreciate against the U.S. dollar. The pattern provides an important implication for intra-regional trade imbalance among the four countries - the U.S., Japan, China and South Korea - with respect to chronic undervaluation of the Chinese Yuan.

Second, during the financial crisis periods, the volatility of the value of the Japanese yen and Korean won has increased significantly when compared with that of the Chinese Yuan. The increase in volatility during the crisis periods tends to provide an opportunity for speculators who are ready to take the financial risk. Furthermore, although the volatility of the Korean won is much higher than that of the Japanese yen, suggesting the possibility of “flight to quality” or “flight to reserve currency” during the Asian financial crisis period, the “flight to Japanese yen” appears to be less during the recent global financial crisis because the difference in the volatilities of the value of the two currencies is not distinctive.

Third, we observe huge spikes on a graph for differences between the won/yen cross rate and the direct market rate during the two financial crisis periods. The statistical test confirms that the spikes during the crisis periods, when compared to the normal period, are indeed statistically significant. Although this implies an opportunity for triangular arbitrage during the crisis periods, the size of transaction costs will matter whether it is profitable.

Figure 1

The Fluctuation of the Nominal Value of Three Major Currencies against the U.S. dollar:
Japanese yen, Chinese Yuan, and South Korean won
The value of each currency on April 13, 1981 = 100

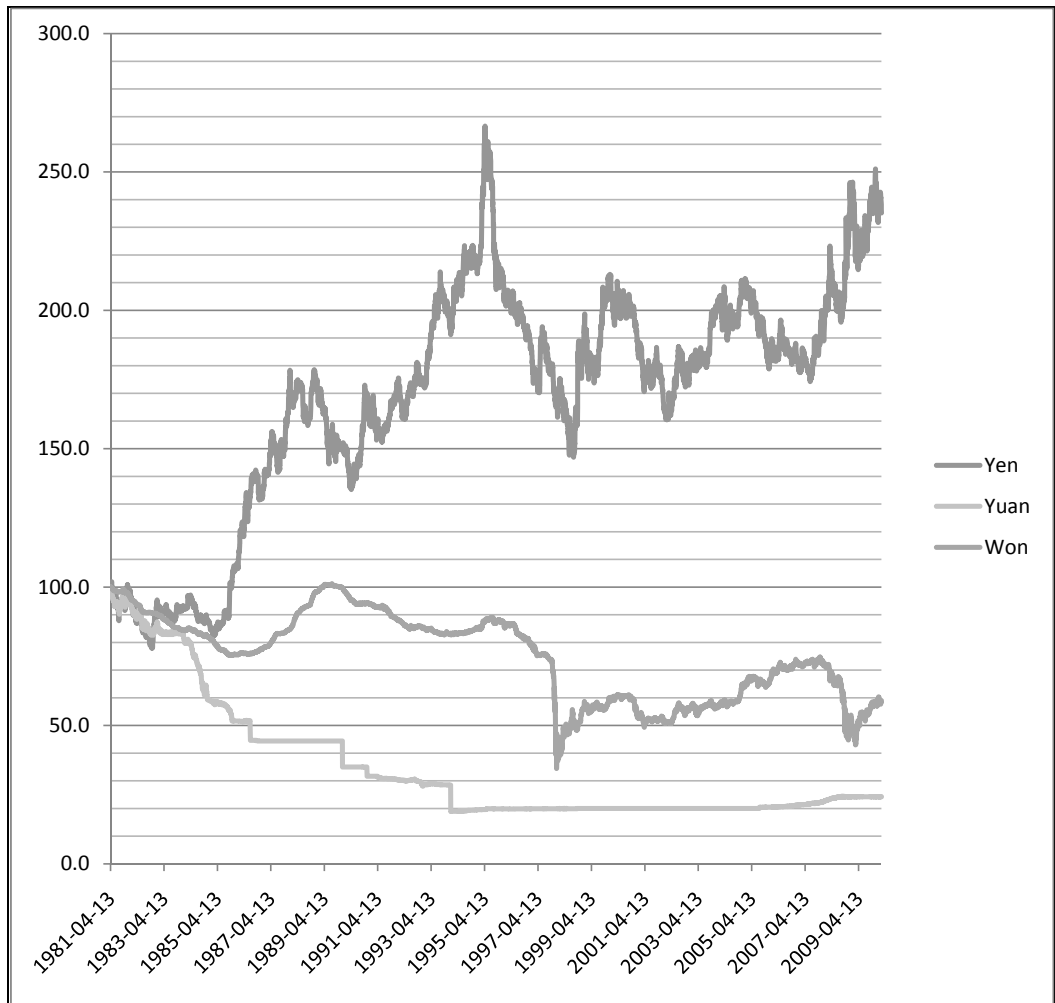


Figure 2

Normalized Difference of Values Between a Pair of Currencies:
 N(yen-Yuan), N(yen-won), and N(won-Yuan)
 Exchange rate on January 4, 1993 = 100
 (yen 125.40/\$, Yuan 5.7662/\$, won 789.20/\$)

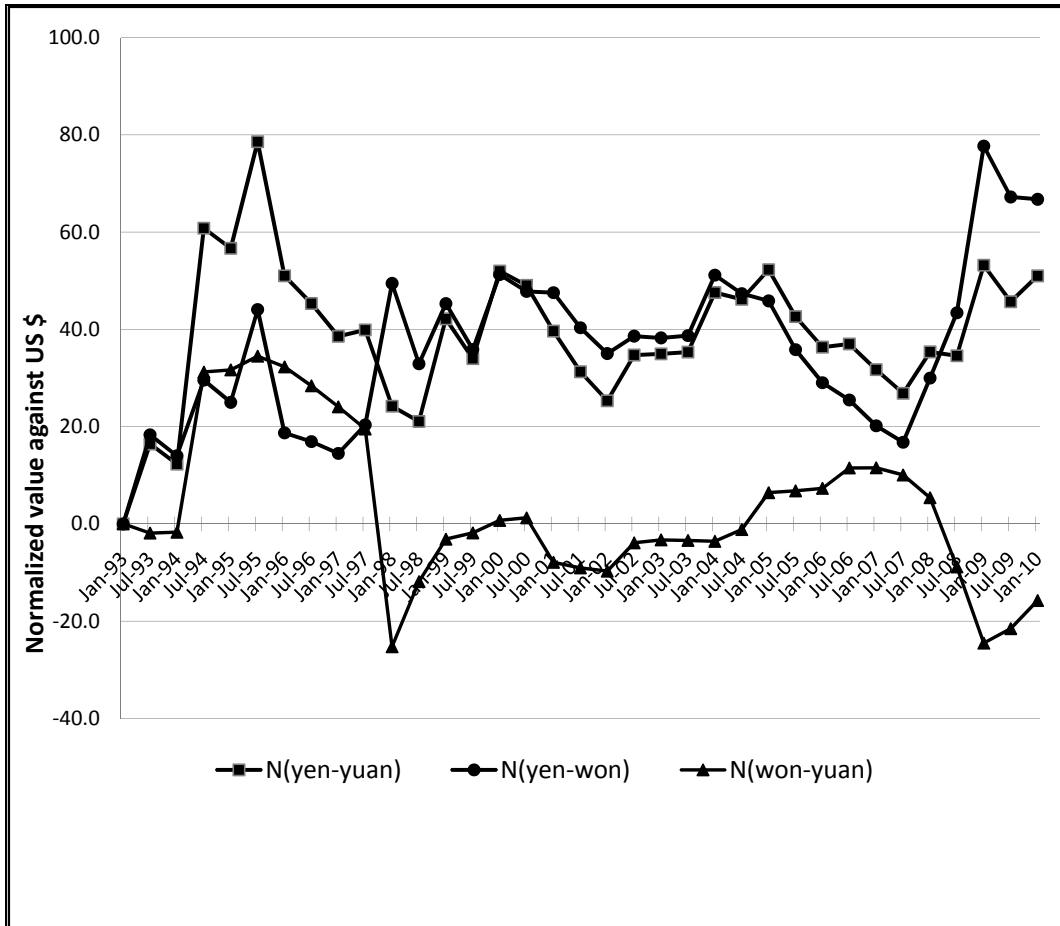


Figure 3

Difference Between Cross Rates and Market Rates: won per 100 yen
(January 4, 1993 –February 19, 2010)

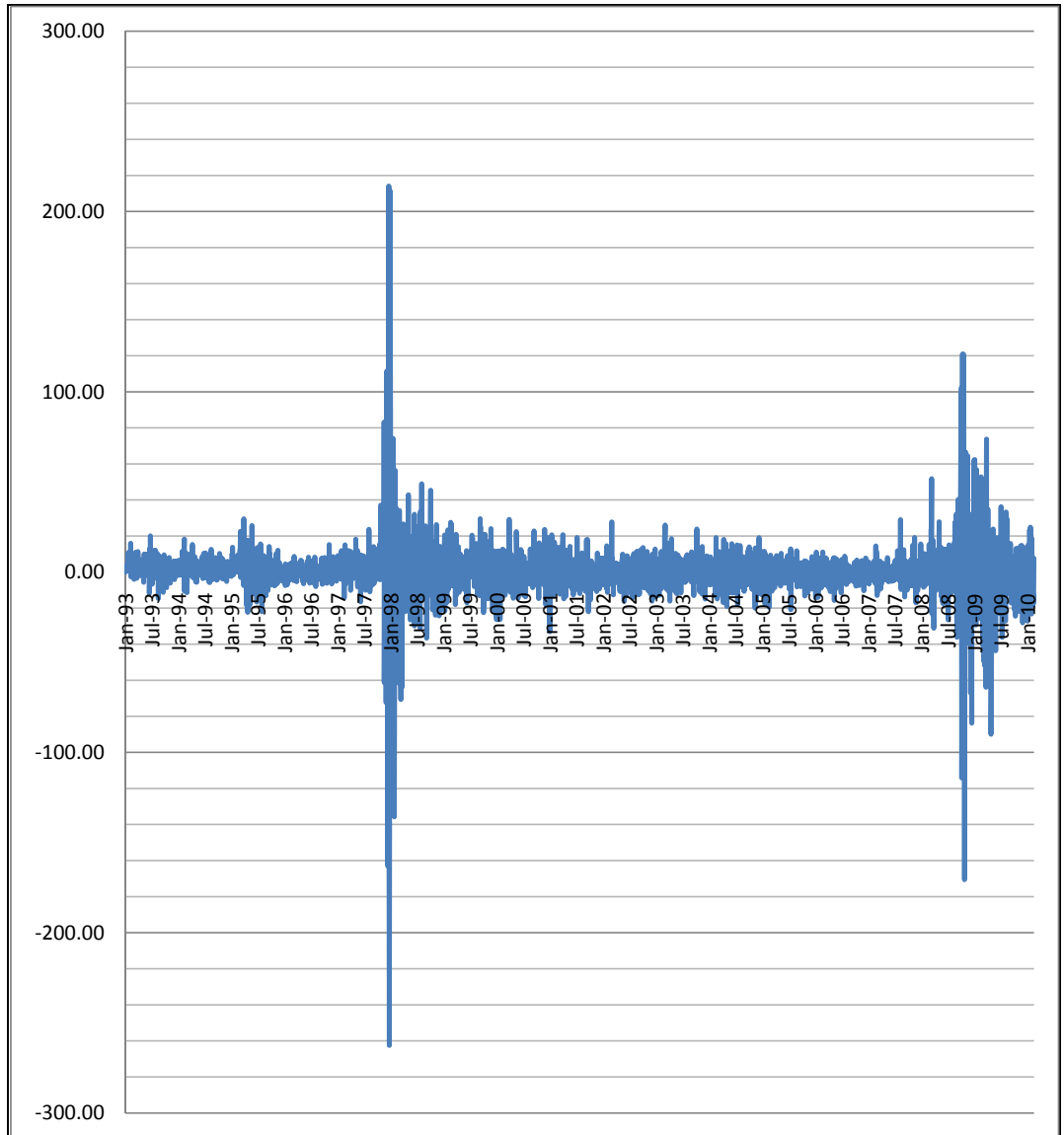


Table 1

Changes in the value of three currencies against the U.S. dollar
(Daily and annual)

		Yen	Yuan	won	won/yen
(a) Full Sample Period (January 4, 1993 – February 19, 2010)					
Mean	Daily	0.000104	-2.35E-05	-4.53E-05	-9.07E-05
	Annual	0.037862	-0.008594	-0.016533	-0.033101
Standard Deviation	Daily	0.007485	0.005268	0.009765	0.012363
	Annual	2.731879	1.922823	3.564175	4.512363
(b) Asian Financial Crisis (July 1, 1997 – December 31, 1998)					
Mean	Daily	9.96E-05	1.46E-05	-0.000539	-0.000438
	Annual	0.036349	0.005320	-0.196822	-0.160011
Standard Deviation	Daily	0.011227	0.000730	0.025170	0.029018
	Annual	4.097773	0.266279	9.187016	10.59155
(c) Global Financial Crisis (February 20, 2008 – February 19, 2010)					
Mean	Daily	0.000362	0.000104	-0.000290	-0.000574
	Annual	0.132115	0.038022	-0.105974	-0.209542
Standard Deviation	Daily	0.009356	0.001335	0.015356	0.017499
	Annual	3.414811	0.487388	5.604951	6.387173

Table 2

Comparative Analysis on the Difference between the Cross Rate and the Direct Market Rate
(Unit: Korean won)

	(1)	(2)	(3)	Mean T-test		
	Normal Period	Asian Financial Crisis	Global Financial Crisis	(1) vs. (2)	(1) vs. (3)	(2) vs. (3)
Mean	0.71124	2.04673	-0.71702	-1.90 (0.058)	2.77 (0.0057)	1.35 (0.1773)
Std. Dev.	6.3915	35.2181	24.3786			
Minimum	-33.007	-262.446	-170.509			
Maximum	29.565	214.042	120.839			
Range (Max-Min)	62.572	476.488	291.348			
N (# of Days)	3245	357	491			

Notes: T-test comparisons for means were utilized to test for significant different between different sub-sample periods. T-stats are reported along with *p*-values shown in parentheses. Normal period: January 4, 1993 – June 30, 1997 & January 4, 1999 – February 19, 2008; Asian financial crisis period: July 1, 1997 – December 31, 1998; Global financial crisis period: February 20, 2008 – February 19, 2010. Number of observations indicates number of days in exchange rates trading days.

References

- Bacchetta, Philippe, and Wincoop, Eric: Does exchange-rate stability increase trade and welfare? *The American Economic Review*, 90 (2000): 1093-1109.
- Broeck, Mark, and Slok, Torsten: Interpreting real exchange rate movements in transition countries. *Journal of International Economics*, 68 (2006): 368-383.
- Campa, Jose, and Goldberg, Linda: Exchange rate pass-through into import prices. *The review of Economics and Statistics*, 87 (2005): 679-690.
- Campbell, John Y., Karine Serfaty-De Medeiros, and Luis M. Viceira: Global Currency Hedging. *The Journal of Finance*, 65 (2010): 87-121.
- Devereux, Michael, and Engel, Charles: Exchange rate pass-through, exchange rate volatility, and exchange rate disconnect. *Journal of Monetary Economics*, 49 (2002): 913-940.
- Gali, Jordi and Monacelli, Tommaso: Monetary policy and exchange rate volatility in a small open economy. *Review of Economic Studies*, 72 (2005): 707-734.
- Kim, Soyoung, and Roubini, Nouriel: Exchange rate anomalies in the industrial countries: A solution with a structural VAR approach, *Journal of Monetary Economics*, 45 (2000): 561-586.
- Lustig, Hano N., and Adrien Verdelhan: The Cross-section of foreign currency risk premia and consumption growth risk. *American Economic Review*, 97 (2007): 89-117.
- Meese, Richard A.: Testing for bubbles in exchange markets: A case of sparkling rates. *Journal of Political Economy*, 94 (1986): 345-373.
- Mitton, Todd: A cross-firm analysis of the impact of corporate governance on the East Asian financial crisis. *Journal of Financial Economics*, 64 (2002): 215-241.
- Taylor, Mark P.: Covered interest parity: a high-frequency, high-quality data study, *Economica*, 54 (1987): 429-438.
- Walker, Eduardo: Strategic currency hedging and global portfolio investments upside down, *Journal of Business Research*, 61 (2008): 657-668.
- Warnock, Francis E.: Exchange rate dynamics and welfare effects of monetary policy in a two-country model with home-product bias. *Journal of International Money and Finance*, 22 (2003): 343-363.

The Determinants of the Reinsurance Decision by Life Insurance Companies

Raja Bouzouita and Arthur J. Young

Abstract

Risk management is vital to any business including insurance companies, and reinsurance is the major risk management tool available to insurance companies. Insurance companies rely on reinsurance to manage underwriting risk, tax liability, and incentives to invest. This paper extends existing research by considering the decision to reinsure for life insurance companies in two ways. First, we analyze life insurance companies' propensity to reinsure any amount of business. Then, for those companies that do reinsure, we analyze the extent of reinsurance by examining the proportion of reinsurance relative to the total amount of premiums. Using two cross sections of data for U.S. life insurance companies, we find measures of underwriting risk, tax incentives, and incentives to invest are significant determinants of both aspects of the reinsurance decision.

I. Introduction

Risk management is vital to any business including insurance companies, and reinsurance is one of the several risk management tools available to insurance companies. The demand for insurance by insurance companies has been modeled after the corporate insurance decision. The traditional motives for corporate insurance purchases are (i) expected bankruptcy costs, (ii) tax liability, and (iii) conflicts of interest among various claimholders.

This paper empirically examines the usage of reinsurance among life insurance companies. The authors first examine the factors that influence the likelihood that life insurance companies will reinsure a portion of their business. This is followed by an analysis of the factors affecting the extent of reinsurance usage by insurers that decide to reinsure. Unlike previous studies that have focused on the property and liability industry, our study examines the usage of reinsurance among life insurance companies. There are numerous and significant differences between the two industries. For example, in the property and liability industry, contracts are typically short-term especially for property insurance¹, product prices are cyclical, and changes in claims are associated with potentially catastrophic events such as hurricanes and earthquakes. Whereas, in the life and health industry, many contracts tend to be long-term, contracts may involve investments which are influenced by changes in market interest rates, and contract benefits tend to change with demographic trends and revisions of mortality tables. These differences require a separate analysis of the demand for reinsurance in the life insurance industry. Focusing on the life insurance industry will not only allow researchers to examine the use of reinsurance among life insurance companies, but will allow them to determine if the factors that are significant in the reinsurance decision in the property-liability industry are also relevant for life insurance companies' reinsurance decision.

Reinsurance is a contractual agreement under which the primary insurer transfers part or

Raja Bouzouita, Ph.D., and Arthur J. Young, Ph.D., CFA, are associate professors of finance at the Economics and Finance Department, Harmon College of Business Administration, University of Central Missouri, Warrensburg, Missouri 64093. Contact author via e-mail: ayoung@ucmo.edu.

¹ Some liability insurance contracts may have long tail such as medical malpractice, workers' compensation, and auto liability.

all risks to another insurance company, the reinsurer. The reinsurer can be either another direct insurer or a specialist reinsurance company. Reinsurance arrangements may vary in the distribution of losses or the amount of coverage depending on the source of underwriting risk, the unexpected variation in claims and the amount of coverage; thereby affecting the value of the firm.² Doherty and Tinic (1981) were the first to show that the reinsurance decision, as a risk management tool, affects the value of the insurance firm³. Their theory provided insights to the broader question of what market imperfections cause companies to engage in risk management activities.

This paper extends the research on risk management activities by considering the decision to reinsure. For those companies that do reinsure, we analyze the firm's aggregate proportion of reinsurance relative to the total amount of premiums. As both decisions are influenced by similar explanatory variables, our discussion of the motivations to reinsure is often described as one process, the decision to reinsure. Several research hypotheses are developed from existing literature on the motives for risk management practices. We find that the decision to reinsure is determined by measures of underwriting risk, tax incentives and underinvestment incentives.

The remainder of the paper is organized as follows. The following section provides a brief review of the extensive literature on the determinants of the reinsurance decision in the property and liability insurance industry and the limited literature on the life insurance sector. The third section provides the theoretical background on demand for reinsurance. The fourth section presents the sample and the variables used in the analysis. The fifth section discusses the empirical results. The last section presents the summary and concluding remarks.

II. Related Literature

Primary insurers provide the mechanism for individuals, families and businesses to share risks so that no single policyholder faces financial ruin if a covered risk occurs; reinsurance provides the same protection for insurance companies.⁴ Reinsurance reduces the risk of default of primary insurers, the contracting costs between the different claimholders, and the insurer's tax liability. Existing literature has focused on the determinants of reinsurance proportion by property and liability insurers (Mayers and Smith (1990), Garven and Lamm-Tenant (2003),

² Life reinsurance arrangements could be structured either as a proportional or non-proportional agreement. Under proportional reinsurance, the primary underwriter and the reinsurer agree to share premiums and claims proportionately. In contrast, under non-proportional agreements, the reinsurer promises to pay claims that exceed the retention level of the ceding company. Whether the reinsurance agreement is proportional or non-proportional it can be either facultative or a treaty agreement.

³ To quote, "The reinsurance agreement affects the risk return structure of the insurer's liability portfolio and consequently affects the risk-return characteristics of the insurer's common stock".

⁴ Several studies have sought to explain the corporate insurance purchase decision. Among these are: Mayers and Smith (1982), (1987) and (1990), Skogh (1989), Garven and Lamm-Tenant (2003), Cole and McCullough (2006), and Weiss and Chung (2004). These studies contend that corporate insurance purchases are motivated by (i) the comparative advantages of insurance companies by providing real services, (ii) the position of the firm's expected tax liability, (iii) conflict of interest among various claimholders such as between owners and managers and/or shareholders and bondholders, (iv) expected bankruptcy costs and (v) the regulatory status of the firm.

Hoerger, Sloan and Hassan (1990)⁵, Adiel (1996), Shortridge and Avila (2004), and Cole and McCullough (2006)). Garven and Lamm-Tenant (2003) formally analyzes the demand for reinsurance by property and liability insurance companies. In a contingent claims framework, they investigate the valuation effects of the reinsurance decision. Their theory predicts that the demand for reinsurance is determined by the firm's leverage, the correlation between the firm's investment returns and claims costs, the line mix of insurance, and the degree of investment in tax-exempt assets. These predictions are supported by an empirical study of the property and liability insurance industry during the 1980s. Adiel (1996), using panel data for property and liability insurers, finds no support for his hypothesis that insurers adjust their reinsurance as a function of their marginal tax rate. A more recent study by Shortridge and Avila (2004) confirms the Mayers and Smith (1990) finding that reinsurance is negatively related to diversification of the owners' portfolio. Their study uses a small sample of publicly traded property and liability insurers. Finally, Cole and McCullough (2006) while examining the effect of the state of the international reinsurance market on the demand for reinsurance support previous findings on the motives for the demand for reinsurance in property and liability industry.

One of two studies that deal with reinsurance for the life insurance is Lee, Palmer and Skipper (1992). Using 1987 data, the authors analyze the retention level per policy by 97 U.S. insurers. Factor analysis was used to determine the important factors that affect the retention level. The analysis shows that firm size, organizational form, average policy size, proportion of term insurance, and new business are significant determinants of the life insurer retention limits per policy. In particular, size, mutual form and average policy size are associated with a higher retention level. Whereas, companies with higher proportions of term insurance and new business have a lower retention level implying more reinsurance. The second study by Adams, Hardwick, and Zou (2008) for life insurance companies in the United Kingdom in the period from 1992-2001 finds that life insurers with low marginal tax rates during the before planning period tend to use more reinsurance, consistent with hypothesis from Adiel (1996).

Our paper adds to this literature by integrating the financial literature on underwriting risk, tax management and agency theory in order to provide a framework of analysis for the decision to reinsure. Further, for companies that choose to reinsure, we analyze the factors that determine the proportion of the business that is reinsured.

III. Theoretical Background on Incentives for Reinsuring

The seminal work of Modigliani and Miller (1958) shows that under perfect market conditions, financial policy decisions are irrelevant. More recent research studies, theoretically and empirically, demonstrate that risk management adds value to the firm.⁶ This value added stems from violations of perfect market conditions. The corporate finance literature hypothesizes that corporate risk management programs are motivated by costs of financial distress, tax management and investment incentives. The latter analysis has been extended to the insurance industry in several studies.⁷ This paper will demonstrate that the reinsurance decision

⁵ Hoerger, Sloan and Hassan (1990) analyze the likelihood to reinsure and the proportion of reinsurance for a sample of primarily medical malpractice underwriters.

⁶ See for example Smith and Stulz (1985) and Nance, Smith and Smithson (1993).

⁷ See for example Mayers and Smith (1990) and Hoerger, Sloan and Hassan (1990).

by life insurance companies is motivated by similar objectives related to risk management practices.

Reinsurance reduces financial distress from underwriting risk: The traditional role for reinsurance is to protect the ceding company against catastrophic claims and hence reduce the underwriting risk. Life insurance companies provide protection against losses from a variety of personal risks but face mortality risk and morbidity risk which could result in unexpected claims. Life insurance companies buy reinsurance to spread their risk and minimize their losses. The use of reinsurance could help smooth the earnings of the company, enhance its profitability and, therefore, reduce the probability and severity of financial distress.⁸ Financial strength is especially important for life insurance companies whose policyholders are mostly buying long-term products.

Reinsurance as a tax management tool: Smith and Stulz (1985) contend that corporate tax schedules are essentially progressive. The federal income tax liability is similar to the value of a call option on the firm's taxable income; therefore, an increase in income volatility will increase the expected tax liability. Companies will actively use investment strategies, accounting practices, and realization of securities gains or losses to reduce expected tax liability by lessening the volatility of their taxable income. In the insurance industry, several studies have shown that property and liability firms engage in similar practices to achieve the same goal.⁹ Therefore, insurers have an incentive to use reinsurance to smooth their income and minimize their tax liability.

Reinsurance and Underinvestment Incentives: Conflicts between the main stakeholders in the firm may explain corporate risk management decisions. Myers (1977) argued that equity holders may not undertake certain positive net present value projects since they bear the full costs of the projects while sharing the benefits with debt holders. Consequently, underinvestment arises. Since policyholders, like debt holders, have a fixed claim against the assets of the firm, managers may have incentives to decline positive net present value projects when the potential for unexpected large losses exist. Mayers and Smith (1987) show, that the purchase of insurance may reduce this underinvestment problem if the risk of large unexpected losses is transferred to the insurance company. Furthermore, Myers (1977) explains that the underinvestment problem is amplified within companies with large investment opportunities. For these reasons, we expect that the use of reinsurance by insurance companies may encourage insurance managers to expand their companies' capacity to exploit growth opportunities available to the insurance company.

The purpose of this paper is to use this theoretical framework and apply it to the reinsurance decision within the life insurance industry. This analysis will provide insights into the competing hypotheses and assess the relative importance of each.

IV. Sample, Variable Measurement and Empirical Model

Data and Sample

The study uses financial data from the 1998 and 2000 National Association of Insurance Commissioners (NAIC) Tapes for a cross-section of life insurers. The sample size for the 1998

⁸ See for example Mayers and Smith (1990).

⁹ See for example Cummins and Grace (1994) and Mayers and Smith (1990).

and 2000 data is 938 and 947 insurers respectively. This sample represents 90 percent of industry assets and 87 percent of insurance in force.¹⁰ The NAIC database includes some companies that either are in financial distress or are non-operating. This may cause some companies to have unusual values such as zero surplus and negative premiums written. These companies were eliminated from the sample. Also, companies that are classified as reinsurers by A.M. Best Company (1999) were not included in the analysis.¹¹

Life insurance companies are organized either as groups or unaffiliated companies. Group entities could file a consolidated tax return or an individual tax return. This study uses company level data rather than consolidated group-level data. This gives a more revealing insight into the reinsurance decision at the operational level of insurance companies in our sample.

Definition of the variables

Our empirical approach entails estimating two separate models. The first is a probit model, which estimates the propensity to reinsure for the full sample of insurance companies. For the subset companies with some reinsurance, we estimate a model for the proportion reinsured using ordinary least squares, OLS, regression to determine the factors influencing the reinsurance level. The reported probit and OLS coefficient estimates are not directly comparable.¹² To account for potential selection bias, we performed a Heckman (1979) selectivity adjustment to estimate the equation for the amount reinsured and found evidence of sample selection bias.¹³ Though the OLS and the probit models have different dependent variables, we expect both models to yield similar results as we employ the same set of explanatory variables and the hypotheses apply equally to the two models.

The dependent variable in the probit analysis is defined as a binary variable whose value equals one for companies with non-zero reinsurance premiums and zero otherwise. In the OLS model, the dependent variable is defined as the proportion of reinsurance ceded to total volume of direct premiums written plus reinsurance assumed and thus excluding companies with no reinsurance. This measure is consistent with the definitions used in previous studies on reinsurance such as Mayers and Smith (1990). This variable measures the proportion, in aggregate, of reinsurance that life insurance companies contract. The probit model is applied to all companies in the sample and the OLS analysis excludes the companies with no reinsurance.

¹⁰ Industry figures were taken from Life Insurance Fact Book. American Council of Life Insurance (2001).

¹¹ Best's Key Rating Guide: Life and Health, 1998 and 2000 classify life insurance companies according to their marketing structure as agency, brokerage, direct marketing, mass marketing and reinsurer.

¹² The probit coefficient can be interpreted as a weighted average of two effects: (1) the effect of an increase in an independent variable on the probability that the dependent variable exceeds the limit (greater than zero) and (2) the effect on the expected value of the dependent variable, given that it is above the limit. The magnitude of these effects depends on the values of the independent variables. As these variables grow large, the first effect goes to zero and the second effect converges to the value of the probit coefficient. OLS regression on a sample restricted to observations above the limit provides an estimate of the second effect, but OLS imposes a constant rate of change in the proportion of reinsurance, whereas the probit model implies a nonconstant change in the propensity to reinsure. Moreover, the OLS estimate is biased because the expected value of the truncated error term is positive.

¹³ Heckman (1979) developed a method that estimates the Inverse Mills Ratios (LAMBDA) using the predicted probability values from the probit model. The IMR enters the second stage regression as an additional explanatory variable. The null hypothesis of no sample selection bias is rejected if the coefficient on the LAMBDA variable is not significantly different from zero.

Financial Distress from Underwriting Risk Hypothesis: Insurance companies' underwriting experience is closely related to its financial standing. To test for the effect of underwriting risk on the reinsurance decision the following seven variables are used: volatility in claims paid, three measures of business composition, business concentration, the number of states in which companies operate, and policy lapse ratio. The first variable related to the financial distress hypothesis is variability in claims paid, VOLATILITY, calculated as the coefficient of variation in claims paid scaled by total assets paid by the insurer, is used to account for overall risk of the loss distribution. A similar measure is used by Hoerger, Sloan and Hassan (1990) to estimate the risk of the loss distribution for property and liability insurance companies as it affects their reinsurance decision. For the coefficient of variation in claims paid, the mean and the standard deviation of claims paid were calculated using five years of observations ending with the year of analysis. Companies that experience high variability in claims paid are hypothesized to have higher demand for reinsurance to reduce their risk of insolvency.

The next set of variables related to the financial distress hypothesis affecting the underwriting experience of the insurer is measures of business composition. Companies that have lines of business that are potentially more susceptible to wide variations in claims are expected to have a higher proportion of reinsurance. The proportions group insurance (GROUP), accident and health (HEALTH) and annuities (ANNUITY) are included to account for the business composition.¹⁴ We expect group insurance to have a negative impact on the demand for reinsurance. This can be explained by the fact that group insurance claims are lower than under individual life insurance as the risk of adverse selection is controlled through group underwriting standards such as requiring minimum participation by employees and/or having the employer automatically set the amount of coverage.

Baranoff and Sager (2002) argue that in the life insurance industry the most important source of product risk is health insurance writings as it is subject to high uncertainty with regard to benefit payments. Therefore we expect that insurance companies with a high proportion of health insurance premiums will have a higher demand for reinsurance.

Annuity products sold by life insurance companies are mainly interest sensitive. Because owners bear the investment risk, the company's risk exposure is significantly reduced.¹⁵ Therefore, we hypothesize that the demand of reinsurance and the proportion of annuity premiums are negatively related.

The fifth variable related to the financial distress hypothesis is the level of business concentration. A comprehensive measure of concentration that may affect the underwriting results of the insurer through diversification among the different lines of business is the variable HERF. This variable, the Herfindahl index, measures the concentration of an insurer's business calculated as the sum of the squares of premium proportions in each of the different lines of business of direct premiums written. A low value of the Herfindahl index is an indication of

¹⁴ We excluded the proportion of life insurance as the sum of these four proportions adds up to one for most insurance companies included in the sample.

¹⁵ The risk-based capital formula gives zero weight to annuity products signaling no risk to the life insurance companies. See Baranoff and Sager (2002).

low concentration and the insurer's business is spread across several lines of business. The theoretical arguments advanced by Mayers and Smith (1990) on the effect of business concentration, either across lines of business or geographically pertain to two competing hypotheses, the expected bankruptcy costs or the risk of default and the real services incentives for the purchase of reinsurance. The expected bankruptcy costs relates directly to the risk of underwriting. If an insurer's exposures are higher than expected due to a natural or a man-made catastrophe such as a strong hurricane or a terrorist attack resulting in large number of deaths and injuries due to business concentration. On the other hand, as the business of the direct underwriter becomes more dispersed across several lines of business or geographically, the insurer would benefit from the expertise in terms of claim settlement and rate setting that reinsurance companies possess. Consistent with the findings of Mayers and Smith (1990) and Shortridge and Avila (2004) we expect that HERF and the decision to reinsure to be negatively related.

The sixth variable related to the financial distress hypothesis is the number of states in which companies operate. To capture geographic business diversification we include the number of states (NSTATE) the company is licensed to operate. For a company that operates in large number of states, the value of reinsurance services becomes more valuable for the direct writer in terms of skills and technology specific to the area. The geographic diversification is more important in property liability business given the different exposures to natural catastrophes and value of property insured. In life insurance, geographic concentration may reflect differences in the standard of living in terms of income and demographics but no significant differences in mortality and morbidity rates unless there is a high target terrorist attack that could result in a large number of deaths. Like with the variable HERF, we expect the decision to reinsure and the NSTATE to be negatively related.

The next variable related to the financial distress hypothesis is the policy lapse ratio. Lee, Palmer and Skipper (1992) argue that companies that have poor experience with persistency tend to have higher demand for reinsurance. Persistency is measured by the variable LAPSE RATIO, which is the proportion of policies that lapsed to the aggregate number of policies. Policyholders may cancel their policies for a number of reasons such as no need for protection, unemployment, or a substantial increase in cost of life insurance policies. Policies that lapse may result in adverse selection against the company in the sense that low risk policyholders are more likely to cancel and those who really need the coverage, regardless of economic standing, will keep their coverage. This anti-selection bias against the insurance company may result in higher than expected mortality experience for the company and may deteriorate profitability. A high LAPSE RATIO implies that the company has incurred first year expenses without the opportunity to collect enough premiums to make a profit and cover acquisition costs. We predict that companies with a high LAPSE RATIO will have a higher demand for reinsurance.

Tax Management Hypothesis: To test the effect of tax incentives on the reinsurance decision, a proxy for the tax position of the company is calculated. Ideally, net operating loss carryover should be used as a proxy for the company's tax position. This information is not reported on the financial statements of insurance companies. Instead, we use the coefficient of

variation of operating income, TAX, to measure the volatility of earnings.¹⁶ As explained in the theoretical section, the goal of using reinsurance as a tax management tool is to reduce the volatility of earnings. The mean and standard deviation are calculated using previous 5-year observations. We expect a positive relationship between operating income volatility and the demand for reinsurance.

Managerial Incentives to Underinvest Hypothesis: To test for underinvestment hypothesis we use two variables: growth opportunities, and insurance leverage. Myers (1977) suggests that the magnitude of the underinvestment problem is more severe in companies with ample investment opportunities.¹⁷ To test for the underinvestment problem, we include the variable GROWTH as a proxy for investment opportunities available to the company. The variable GROWTH measures the amount of new premiums in proportion to total business. Writing new policies may cause a drain on the capital of the company. Life insurers typically incur high initial expenses in providing long-term policies. Companies hope these expenses will be recovered from subsequent premium revenues. For companies experiencing rapid growth, the returns from valuable marginal opportunities may accrue to new policyholders at the expense of existing policyholders. Without reinsurance, managers may act to protect existing policyholders and forego the valuable opportunities. To mitigate this conflict between different policyholders, rapidly growing companies may use a higher proportion of reinsurance. We anticipate a direct relationship between the demand for reinsurance and the growth variable.

Mayers and Smith (1987) argue that high leverage exacerbates the underinvestment problem. To test the effect of leverage on the reinsurance decision we use the variable, INSLEV. This variable, as used by Hoerger, Sloan and Hassan (1990), is defined as the ratio of direct premiums written to policyholders' surplus. One possible hypothesis regarding the effect of underwriting leverage on the reinsurance decision is that reinsuring the risky claims reduces the probability of financial distress by reducing the risky debt. A lower insurance leverage ratio reduces the variance of firm value and therefore mitigates the underinvestment problem. This reasoning echoes findings in the insurance literature such as Colquitt and Hoyt (1997) that provide evidence that highly leveraged life insurance companies are more likely to use hedging instruments. Therefore, we expect the effect of leverage on the reinsurance decision to be positive.

Control Variables: In addition to the above discussed variables, the purchase of reinsurance can be influenced by other company-specific factors. This study considers the effect of three variables: free cash flow, group affiliation, organization form, and company size.

Free cash flow and reinsurance are compensating sources of capital so that we expect a negative relationship between these two variables. Following Wells et al (1995), internal capital, FREE CASH, is defined as net operating income plus investment income plus additional capital

¹⁶ Other studies such as Cummins, Phillips and Smith (2001) use an indicator variable, equal to one for positive taxable income and zero otherwise, to test tax incentives for hedging. We tried a similar measure in our preliminary tests with no qualitative or quantitative changes in our final results reported in Table 3.

¹⁷ Cummins, Phillips, and Smith (2001) report that researchers use growth rates to approximate growth opportunities.

paid in minus gross interest expenses minus income taxes minus policyholder dividends minus stockholder dividends. We predict that companies with higher undistributed cash flows will have less reinsurance.

The variable AFFILIATION measures group membership and is used to capture the structure of the life insurance industry. Life insurance companies are organized either as single non-affiliated companies or they can be part of a fleet of companies under common management. Groups tend to be larger and more diversified across lines of business, as well as geographically, than single companies. Consequently, companies that are members of a group can share expertise with fellow members on complex insurance problems and can be directly reinsured through group mechanisms. The variable AFFILIATION is an indicator variable equal to one if the company is a member of group and zero otherwise. We expected this variable to have a negative sign as affiliated companies will have a lower demand for reinsurance than independent companies. This argument was made by Lee, Palmer and Skipper (1992).

There are two dominant organizational structures in the life insurance industry, mutual companies and stock companies.¹⁸ Stock companies have conflicts of interest between shareholders and policyholders. The mutual form combines the functions of owners and customers; therefore, for mutual companies, the conflict between shareholders and policyholders is nonexistent.¹⁹ It can be expected that mutual companies would rely less on reinsurance to mitigate the agency problem. However, Garven (1987) argues that reinsurance is a substitute for equity and, as mutual companies do not have direct access to the capital market, these companies will rely more on reinsurance as a source of financing. We include a dummy variable, MUTUAL, which equals one if the company is organized as a mutual and zero otherwise. Because of these opposing effects we cannot a priori predict the sign of the organizational form variable on the demand for reinsurance is an empirical issue.

Another control variable that may have an effect on the reinsurance decision is company size. There are two competing hypotheses with regard to the effect of size on the decision to reinsure. The first hypothesis is that size accounts for informational and scale economies, in the sense that larger companies will cede less of their primary business given their ability to diversify risk across business lines. A large company may safely sustain, to some extent, variations in its underwriting experience without affecting its operating performance. The second hypothesis is that within larger companies agency problems are more significant. In these companies, reinsurance could be used to mitigate the impact of agency costs. A similar argument was made by Mayers and Smith (1990). The variable SIZE is measured as the natural logarithm of admitted assets. The impact of these control variables cannot be predicted on theoretical grounds but may influence the estimation of the demand for reinsurance.

The expected relationships between the explanatory variables and the propensity to reinsure are the same as those to the proportion of reinsurance. Two models are estimated, a probit estimation for the propensity to reinsure and OLS model for the proportion of reinsurance.

¹⁸ There is a third organization form, fraternal societies, which account for only a small proportion of insurance in force.

¹⁹ For a further analysis of the conflict of interest among the different claimholders in an insurance company see for example Pottier and Sommer (1997) and Krishnaswami and Pottier (2001).

Additionally, since the two models are estimated for different firms, the empirical results of the two models may be different in terms of magnitude and/or significance.

V. Empirical Results

Table 1 lists the definition of variables used and their expected relation to the dependent variable. Table 2 reports the descriptive statistics across the years of analysis and tests of significance of the mean and median between reinsurance users and nonusers. Considering the test of the difference in the mean and the median of the independent variables, we find significant differences between users and nonusers.

The results of the probit analysis are presented in Table 3. We report the results for two years to be able to see whether the results we obtain from one year model are consistent with another year. The dependent variable is an indicator variable that equals 1 for reinsurance users and zero otherwise. Our sample shows that 92 and 88 percent of the companies report non-zero reinsurance premiums in 1998 and 2000 respectively. A positive coefficient on a right-hand side variable indicates a positive association between that variable and the probability of being a reinsurance user. The reported results show that several of the independent variables have the predicted effects on the propensity to reinsurance. There is support for the hypotheses of financial distress from underwriting risk, tax incentives and managerial incentives to under invest hypotheses.

Financial Distress from Underwriting Risk Probit Results: One function of the reinsurance decision is to manage future uncertainty and ensure earnings stability which is highly valuable in the life insurance business as many customers are purchasing long term contracts. Our results show that five of the eight variables measuring underwriting risk related to financial distress hypothesis are statistically significant and have the expected sign as follows. The VOLATILITY variable is positive and significant. This provides evidence that life insurance companies with higher risk in the claims distribution are more likely to reinsure to transfer their mortality risk and echoes Shortridge and Avila (2004) and Hoerger, Sloan and Hassan (1990) finding for the property and liability industry. The business composition variables indicate that the proportion of group insurance, GROUP, and the proportion of annuities, ANNUITY, have a negative effect on the propensity to reinsure. As discussed in the previous section, group insurance underwriting standards are used to mitigate adverse selection through minimum required participation and/or allowing the employer to select the amount of coverage. Annuity products are less risky for insurers as the policyholders in many contracts bear the investment risk. The other product line, HEALTH, expected to have a positive impact on the decision to reinsure is significant in the 2000 sample only. The coefficient on HERF is negative and significant indicating that companies whose business line concentration is low are reinsuring a higher proportion of their business. The coefficient of the variable NSTATE is positive and significant indicating that companies whose geographic concentration is low are more likely to reinsure. This result is consistent with Mayers and Smith (1990) and Shortridge and Avila (2004) findings in the property and liability industry that the real-service effect is more important than the reduction in expected bankruptcy costs gained through reinsurance. These empirical results from the probit model indicate that seven variables, VOLATILITY, GROUP, HEALTH, ANNUITY, HERF, NSTATE, and LAPSE RATIO are related to the propensity to reinsure as predicted by the hypothesis that the possibility of financial distress from underwriting risk

influences the reinsurance decision. Most of the statistically significant explanatory variables are consistent across the two samples with the exception of the measures of product proportions. The GROUP measure is significant in the 2000 sample and HEALTH and ANNUITY are significant in the 1998 sample.

Tax Management Probit Result: The coefficient on the TAX variable is significant and positive. This finding indicates that the TAX variable is related to the propensity to reinsure as predicted by the hypothesis that the desire to reduce taxes by smoothing income influences the decision to reinsure.

Incentives to Underinvest Probit Results: the coefficient on the GROWTH variable is significant and positive as predicted supporting the underinvestment hypothesis. This result is in contrast to Cummins, Phillips and Smith (2001) who find no significant impact of growth in assets on the use of derivatives in the life and health industry. Reinsurance has the potential of enhancing firm value by reducing the incentives by managers to underinvest. The coefficient of the INSLEV variable is significant and has a positive sign. Higher leverage is associated with a higher proportion of the direct business being reinsured. This further confirms that highly leveraged companies will benefit more from reinsurance than companies with lower leverage. This result supports the findings by Colquitt and Hoyt (1997) with regard to the use of derivatives in the life insurance industry in reducing the underinvestment problem.

Control Variables Probit Results: We find the variable AFFILIATION to be positive and significant which indicates that life insurance companies that are members of a group are more likely to reinsure. This result may be driven by intra-company transactions. This evidence is consistent with Mayers and Smith (1990) findings that group membership is positive and significant in the property liability industry. The variable SIZE is positive and significant. Large companies are more likely to reinsure than smaller companies. This result supports the agency cost hypothesis as proposed by Mayers and Smith (1990).

The results of the OLS model are reported in Table 4. The model was estimated using Heckman's (1979) two step correction to the OLS regression, which involved the inclusion of the inverse Mills ratio from the probit regression as an additional independent variable. The inverse Mill's ratio, or LAMBDA, is significant indicating that selection bias is present. However, the inclusion of this variable corrects for the selection bias. In this model, the dependent variable is defined as the proportion of reinsurance to total direct premiums written for companies with some reinsurance. The probit model is used to analyze the decision to reinsure while the OLS model is used to analyze the extent of the demand for reinsurance. In the OLS model, we tested the assumption of homoscedasticity of the error term. We found evidence of violation of the latter assumption. The reported t-statistics are adjusted for heteroscedasticity using White's method. Note that the OLS model has more variables that are significant and carry the predicted sign. We focus our attention on these additional variables significant in the OLS model.

The coefficient on the LAPSE RATIO is significant and positive. This result indicates that companies with a high lapse ratio will cede a higher portion of their direct premiums to

mitigate the potential problem of adverse selection and its likely negative impact on the overall performance of the company.

Control Variables OLS Results: One of the purposes of reinsurance is to free up capital and cash. An alternative to external financing is the availability of internal funding from free cash flows. Consistent with prediction, the FREE CASH variable has a negative sign and is significant. This indicates that the existence of excess cash flows decreases the proportion of business to reinsure. In addition, the availability of free cash flow may reduce the probability that the company will experience financial distress in the future. The SIZE variable, in this model, is negative and significant. This finding supports the informational and scale economies hypothesis. Larger companies will cede less of their primary business given their ability to diversify risk across business lines. A large company may safely sustain, to some extent, variations in its underwriting experience without affecting its operating performance.

VI. Summary and Concluding Remarks

Our overall results on the demand for reinsurance by life insurance companies provide support for the hypotheses advanced in the corporate risk management literature. The diversity of explanations reflects the fundamental importance of the risk management program to any corporation. Companies with greater underwriting risk are more likely to reinsure and tend to reinsure a larger proportion of their business. The desire to reduce taxes tends to increase the likelihood of using reinsurance and the proportion of business that is reinsured. Further, this study investigates the effects that reinsurance may have on the incentives for underinvestment in the life insurance industry. The relation between reinsurance and growth opportunities is positive and significant, and shows that reinsurance helps owners to overcome the underinvestment incentive problem. We find consistent results of the analysis of the decision to reinsure using a Probit model of the propensity to reinsure and the analysis of the proportion of business that companies reinsure using a linear regression model.

This study further contributes to our understanding of the demand for reinsurance by life insurance companies. Instead of focusing on underwriting risk reduction as the primary reason to reinsure, our study highlights the role of reinsurance in lessening some of the conflicts between the different stakeholders of an insurance company. Even though recently, there has been a significant rise in the level of securitization of insurance risk, still there are some impediments to a wider use. Some of these include cost savings of reinsurance premiums, lack of expertise among insurance managers and accounting treatment of securitization of risk. As long as there is ample capacity in the reinsurance market, reinsurance will remain the dominant risk management tool for insurance companies along with sound underwriting and pricing.²⁰

Further research is needed to incorporate the reinsurance decision within an integrated approach to manage all uncertainties facing a life insurance company from underwriting risk, asset risk and interest rate risk.

²⁰ Especially during a soft market characterized by abundance of capital, and by and large the reinsurance market is competitive.

Table 1
Variable Definitions and Hypotheses Summary

Dependent Variable

USAGE	Indicator variable: 1 for users, 0 for nonusers
REINSURANCE	$= \frac{\text{Reinsurance Ceded}}{\text{Direct Premiums Written} + \text{Reinsurance Assumed}}$

Independent Variable
Sign**Definition****Expected****Underwriting Risk**

VOLATILITY	Coefficient of variation of benefits scaled by total assets	+
GROUP	Proportion of group premiums to total direct premiums	-
HEALTH	Proportion of health premiums to total direct premiums	+
ANNUITY	Proportion annuity premiums to total direct premiums	-
HERF	Sum of squared share of each line of business	-
NSTATE	Number of States a company is licensed	-
LAPSE RATIO	Proportion of policies lapsed to total number of policies	+

Tax Incentives

TAX	Coefficient of variation of operating income	+
-----	----------------------------------------------	---

Agency Costs

GROWTH	Direct premiums written of new business to total DPW	+
INSLEV	Insurance premiums to surplus	+

Control Variables

FREE CASH	Net operating income + investment income + additional Capital paid in – gross interest expenses – income taxes – Policyholders' dividends – stockholders' dividends.	-
AFFILIATION	Indicator variable =1 if affiliated, 0 otherwise	+
MUTUAL	Indicator variable =1 if mutual, 0 otherwise	+/-
SIZE	Natural logarithm of total assets	+/-

Table 2A Descriptive Statistics

Year	Users				Non-Users				Difference Mean	
	1998(N=680)		2000(N=583)		1998(N=154)		2000(N=229)		1998	2000
Variables	Mean	SD	Mean	SD	Mean	SD	Mean	SD	t-Test	t-Test
VOLATILITY	0.30	0.38	0.56	6.86	0.41	0.99	0.43	1.08	2.27**	0.29
GROUP	0.25	0.36	0.26	0.35	0.17	0.34	0.17	0.33	1.96**	3.25***
HEALTH	0.16	0.27	0.15	0.26	0.12	0.27	0.14	0.28	1.69*	0.73
ANNUITY	0.11	0.23	0.12	0.22	0.15	0.29	0.15	0.29	-1.67*	-1.74*
HERF	0.66	0.23	0.65	0.24	0.77	0.20	0.80	0.28	-5.93***	-7.88***
NSTATE	26.40	20.13	28.40	20.40	14.06	18.1	16.60	19.4	6.97***	7.50***
LAPSE RATIO	0.08	0.19	0.05	0.07	0.06	0.13	0.05	0.11	-0.70	-0.40
TAX	0.63	9.89	0.30	0.47	0.81	9.42	0.21	0.41	0.63	2.65**
GROWTH	0.37	0.33	2.15	19.55	0.33	0.35	0.32	0.34	0.21	1.41
INSLEV	1.90	2.13	2.78	11.57	1.38	1.61	1.64	2.24	1.90*	1.47
FREE CASH	0.03	0.18	0.01	0.13	0.02	0.10	0.05	0.23	1.11	-3.18**
AFFILIATION	0.23	0.42	0.80	0.40	0.51	0.50	0.59	0.49	7.27***	6.40***
MUTUAL	0.10	0.30	0.10	0.31	0.04	0.21	0.05	0.23	2.18**	2.20**
SIZE	18.80	2.56	19.16	2.73	17.04	2.67	17.86	2.70	7.62***	6.10***

Table 2 B Descriptive Statistics

Year	Users		Nonusers		Difference Median	
	1998	2000	1998	2000	1998	2000
Variables	Median	Median	Median	Median	Z-Test	Z-Test
VOLATILITY	0.179	0.191	0.172	0.168	-0.53	0.85
GROUP	0.026	0.053	0.000	0.000	-5.70***	5.84***
HEALTH	0.009	0.009	0.000	0.000	-6.24***	5.06***
ANNUITY	0.002	0.003	0.000	0.000	-3.92***	3.35**
HERF	0.628	0.618	0.793	0.818	3.74***	5.84***
NSTATE	28	36	2	3	-5.56***	6.15***
LAPSE RATIO	0.030	0.024	0.021	0.019	-2.14**	1.01
TAX	0.382	0.162	0.382	0.256	0.00	2.65**
GROWTH	0.276	0.299	0.202	0.215	-0.89	2.26**
INSLEV	1.263	1.321	0.701	0.735	-3.21**	3.03**
FREE CASH	0.002	0.012	0.011	0.013	4.46***	0.23
AFFILIATION	1	1	1	1	7.06***	6.25***
MUTUAL	0	0	0	0	-2.18**	2.19**
SIZE	18.72	19.181	16.562	17.482	-5.88***	5.22***

*** Significant at the 1% level

** Significant at the 5% level

* Significant at the 10% level

Table 3
Determinants of the Likelihood of Reinsuring, Heckman Model

Dependent Variable	USAGE: 1 for users, 0 for nonusers			
Explanatory Variable	1998 Sample Estimates		2000 Sample T-Statistics ^a	
INTERCEPT	-2.8386***	-2.8529	-3.4049***	3.6667
<u>Underwriting Risk</u>				
VOLATILITY	0.0660***	2.3975	0.0621***	2.3810
GROUP	-0.0943	-0.3295	-0.7305**	-1.8978
HEALTH	0.5135***	2.0524	-0.3437	-0.6821
ANNUITY	-0.7783**	-1.9937	-0.1617	-0.4061
HERF	-0.8103***	-2.4550	-0.8002***	-2.3512
NSTATE	0.0088*	1.9441	0.0111**	1.7159
LAPSE RATIO	-0.8952	-0.9734	-1.0495	-1.1822
<u>Tax Incentives</u>				
TAX	0.5900***	2.8169	0.5300***	2.6181
<u>Agency Costs</u>				
GROWTH	0.4698***	3.0226	0.4321***	2.8420
INSLEV	0.5631**	1.8363	0.0879**	1.8731
<u>Control Variables</u>				
FREE CASH	-0.4303	-1.0751	-0.3277	-0.7950
AFFILIATION	0.3116**	1.8759	0.2446	1.4810
MUTUAL	0.2633	0.7680	0.3564	1.0082
SIZE	0.2448***	4.5201	0.2644***	5.1480
Number of Observations	812		824	
Pseudo R ²	0.2104		0.2061	
Log Likelihood	-169.7789		-174.1412	

^a T-statistics adjusted for heteroscedasticity using White's test.

*** Significant at the 1% level

** Significant at the 5% level

* Significant at the 10% level

Table 4
Second Stage OLS Estimates for Companies Using Reinsurance

Dependent Variable:	Proportion of Reinsurance Ceded			
Explanatory Variable	Estimates			T-Statistics ^a
INTERCEPT	0.5583 ^{***}	5.6329	1.0728 ^{***}	9.4459
<u>Underwriting Risk</u>				
VOLATILITY	0.0951 ^{***}	2.5729	0.0039 ^{***}	2.6058
GROUP	-0.0210	-0.7615	-0.3051 ^{***}	-2.6628
HEALTH	-0.0552	-1.4036	-0.0806	-1.3869
ANNUITY	-0.1529 ^{***}	-3.5763	-0.1005 ^{***}	-2.4379
HERF	-0.0474	-1.3379	0.0290	0.6780
NSTATE	0.0020 ^{***}	3.3630	0.0026 ^{***}	3.9319
LAPSE RATIO	0.0805 ^{**}	2.0370	0.3609 ^{***}	3.5700
<u>Tax Incentives</u>				
TAX	0.0018 ^{***}	3.4985	0.0214 ^{***}	2.1354
<u>Agency Costs</u>				
GROWTH	0.0075 ^{***}	3.5777	0.0026 ^{***}	4.9516
INSLEV	0.0075 ^{**}	1.9631	0.0068 ^{**}	2.8794
<u>Control Variables</u>				
FREE CASH	-0.4369 ^{***}	-6.2514	-0.1803 ^{***}	-2.8061
AFFILIATION	0.0088	0.3109	0.0156	0.6257
MUTUAL	-0.0032	-0.1732	-0.0421	-1.3005
SIZE	-0.0230 ^{***}	-4.5533	-0.0457 ^{***}	-7.7690
LAMDA	-0.3386 ^{***}	-4.4247	-0.2682 ^{***}	-3.7130
Number of Observations	747		730	
Adjusted R ²	0.1954		0.1731	

^a T-statistics adjusted for heteroscedasticity using White's test.

*** Significant at the 1% level

** Significant at the 5% level

* Significant at the 10% level

References

- Adams, Mike, Philip Hardwick, and Hong Zou, 2008. Reinsurance and Corporate Taxation in the United Kingdom Life Insurance Industry, *Journal of Banking & Finance*, 32: 101-115.
- Adiel, Ron, 1996, Reinsurance and the Management of Regulatory Ratios and Taxes in the Property-Casualty Insurance Industry, *Journal of Accounting and Economics*, 22: 207-240.
- A. M. Best Company Inc., 1999. Best's Key Rating, Oldwick, NJ: A. M. Best Company, Inc.
- American Council of Life Insurance, 2001, ACLI Life Insurance Fact Book.
- Baranoff, Eti, G., and Thomas W. Sager, 2002, The Relations Among Asset Risk, Product Risk, and Capital in the Life Insurance Industry, *Journal of Banking and Finance*, 26: 1181-1197.
- Black, Kenneth, Jr. and Harold D. Skipper, Jr., 1994, *Life Insurance*, Twelfth Edition (Englewood Cliffs, N.J.: Simon and Schuster).
- Cole, R. Cassandra and Kathleen A. McCullough, 2006, A Reexamination of the Corporate Demand for Reinsurance, *The Journal of Risk and Insurance*, 73, 169-192.
- Colquitt, L. Lee, and Robert E. Hoyt, 1997, Determinants of Corporate Hedging Behavior: Evidence from the Life Insurance Industry, *The Journal of Risk and Insurance*, 64: 649-671.
- Cummins, J. David and Elizabeth Grace, 1994, Tax Management and Investment Strategies of Property-Liability Insurers, *Journal of Banking and Finance* 18: 43-72.
- Cummins, J. David, Richard D. Phillips and Stephen D. Smith, 2001, Derivatives and Corporate Risk Management: Participation and Volume Decisions in the Insurance Industry, *The Journal of Risk and Insurance*, 68: 51-92.
- Doherty, Neil A., and S.M. Tinic, 1981, Reinsurance under Conditions of Capital Market Equilibrium: A Note, *Journal of Finance* 36, 949-953.
- Garven, J.R. 1987, On the Application of Finance Theory to the Insurance Firm, *Journal of Financial Services Research*, 1(September): 57-76.
- Garven, James R., and Joan Lamm-Tenant, 2003, The Demand for Reinsurance: Theory and Empirical Tests, *Insurance and Risk Management*, 7(3): 217-237.
- Greene, W. H., 1999, *Econometric Analysis*, Englewood Cliffs, NJ: Prentice Hall.
- Heckman, J., 1979, Sample Selection Bias as a Specification Error, *Econometrica*, 47:153-161.
- Hoerger, T., F. Sloan and M. Hassan, 1990, Loss Volatility, Bankruptcy, and the Demand for Reinsurance, *Journal of Risk and Uncertainty*, 3: 221-245.
- Krishnaswami, Sudha and Steven Pottier, 2001, Agency Theory and Participating Policy Usage Evidence from Stock Life Insurers, *The Journal of Risk and Insurance*, 68: 659-684.
- Lee, Kwangbong, Bruce A. Palmer and Harold D. Skipper, Jr., 1992, An Analysis of Life Insurer Retention Limits, *Journal of Risk and Insurance*, 59: 57-67.
- Mayers, David and Clifford W. Smith, 1982, On the Corporate Demand for Insurance. *Journal of Business*, 55: 281-296.
- Mayers, David and Clifford W. Smith, 1987, Corporate Insurance and the Underinvestment Problem, *Journal of Risk and Insurance*, 54: 45-54.
- Mayers, David and Clifford W. Smith, 1990, On the Corporate Demand for Insurance: Evidence from the Reinsurance Market, *Journal of Business*, 63: 19-40.
- Modigliani, Franco, and Merton H. Miller, 1958, The Cost of Capital Corporation Finance and the Theory of Investment, *American Economic Review*, 48:261-297.
- Myers, S.C., 1977, Determinants of Corporate Borrowing, *Journal of Financial Economics*, November, 147-176.

- Nance, D.R., C. W. Smith and C. W. Smithson, 1993, On the Determinants of Corporate Hedging, *Journal of Finance*, 68: 267-284.
- Pottier, Steven W. and David W. Sommer, 1997, Agency Theory and Life Insurer Ownership Structure, *The Journal of Risk and Insurance*, 64: 529-543.
- Shortridge, Rebecca and Stephen Avila, 2004, The Impact of Institutional Ownership on the Reinsurance Decision, *Risk Management and Insurance Review*, 7: No. 2: 93-106.
- Skogh, Göran, 1989, The Transactions Cost Theory of Insurance: Contracting Impediments and Costs, *The Journal of Risk and Insurance*, 56(4): 726-732.
- Smith, C.W., and R. M Stulz, 1985, The Determinants of Firms' Hedging Policies, *Journal of Financial and Quantitative Analysis*, 20: 391-405.
- Weiss, Mary A., and Joon-Hai Chung, 2004 U.S. Reinsurance Prices, Financial Quality, and Global Capacity, *The Journal of Risk and Insurance*, 71(3): 437-467.
- Wells, Brenda P., Larry A. Cox and Kenneth M. Gaver, 1995, Free Cash Flow in the Life Insurance Industry, *The Journal of Risk and Insurance*, 62(1): 50-66.

Risk Management during the Real Estate Bubble: GARCH or Stable Distributions?

David Basterfield and Thomas Bundt

Abstract

This paper backtests Value-at-Risk (VaR) for the Stable Paretian and GARCH models applied to the real estate bubble of 2005-2008. Specifically, we use a rolling time-varying quantile estimation method to backtest Value-at-Risk (VaR) on a widely-held real-estate ETF. Our statistical analysis allows us to test for both distributional assumptions and a model's ability to track volatility clustering. We find that neither the Stable Paretian nor GARCH model performs satisfactorily for both 95% and 99% VaR and over both crisis and pre-crisis periods. In some cases our rolling time-varying parameter estimation methodology allows the Stable model to successfully track volatility clustering, a procedure simpler to apply than standard GARCH models. Our results are sensitive to the length of the conditioning window, with both models doing better for the 50-day window relative to 100 and 200-day windows. Finally, of particular interest is the Stable model's high frequency of rejecting the unconditional coverage null, suggesting the Stable distribution poorly fit the data.

I. Purpose and Overview

This paper backtests Value-at-Risk (VaR) for the Stable Paretian and GARCH models applied to the real estate bubble of 2005-2008. Specifically, we use a time-varying quantile estimation method to backtest VaR on a widely-held real-estate exchange-traded fund (ETF). Our rolling estimation procedure allows the Stable model to track volatility clustering facilitating a direct comparison with the industry standard GARCH model. Our statistical analysis allows us to test for both distributional assumptions and a model's ability to track volatility clustering.

There is a growing literature on risk management applications of Stable distributions (Mittnik and Rachev 2000). (Young and Graff, 1995) show real estate return distributions follow a Stable distribution relative to the normal. (Basterfield and Bundt 2009) show the Stable model typically performs better during periods of high volatility at extreme quantiles relative to the GARCH when applied to exchange rate data during the Asian currency crisis. Yet, the application of stable distributions in finance is not robust and their usefulness, to some, has been discounted. For instance, conventional wisdom argues that while Stable distributions typically outperform the normal distribution, they tend to overestimate tail thickness in finance applications (Mittnik and Rachev 1993).

We take the position that the debate on the risk-management applications of the Stable distributions is unresolved. Accordingly, we extend the current literature in two ways: (1) we examine the efficacy of Stable distributions during the recent real estate bubble, and (2) we use a rolling time-varying parameter estimation methodology allowing us to compare Stable and GARCH models directly using conditional coverage failure rate analysis. Our goal is to contrast and compare Stable with GARCH models during a period of time of a widely-recognized

David Basterfield, Associate Professor of Finance, Department of Economics and Business Administration, Hillsdale College, 33 East College, Hillsdale MI, 49242, (517) 607-2412, dbasterfield@hillsdale.edu
Thomas Bundt, Associate Professor of Finance and Quantitative Analysis, Department of Economics and Business Administration, Hillsdale College, 33 East College, Hillsdale MI, 49242, (517) 607-2419, tbundt@hillsdale.edu

financial *bubble*. Accordingly, our research is aimed at testing VaR models when they matter the most, during a financial crisis.

II. Data and Descriptive Statistics

Daily trading data on real-estate investment trusts (REITs) is available in the form of ETFs. Based on having the highest trading volume, we selected the iShares Dow Jones US Real Estate ETF, trading symbol IYR on NYSEArca, which tracks the Dow Jones US Real Estate Index. We collected daily trading data on IYR over the ten-year period 6/19/2000-12/15/2009 available from Yahoo finance. The daily close is plotted in Figure 1. The nature of the real estate bubble is clearly shown with index values doubling over the 2004-2006 period, only to reverse during 2007-2008.

To determine the appropriate time period to split our sample into pre-crisis and crisis periods, we plotted a 30-day moving average of volatility, calculated as daily standard deviation, shown in Figure 2. Clearly volatility begins an upward spiral around 8/1/2007. Accordingly, we split our full sample into (1) a pre-crisis period 6/19/2000-7/31/2007, and (2) a crisis period 8/1/2007-12/15/2009. This will allow us to study a low- and high-volatility subsample allowing relative performance comparisons between the two VaR models.

We converted daily data into a continuously compounded return series. Table I compares summary statistics over the two periods. As reported in Table I, both periods are characterized by non-normal distributions as reported by the Jarque-Bera test. In addition, the change in volatility over the two periods is quite dramatic, with a 400% increase in volatility into the crisis sub-period.

III. Stable Index Estimates

(Lévy, 1924) showed tails of non-Gaussian stable distributions asymptotically follow the law of Pareto, giving rise to the term “Stable Paretian.” Stable distributions have four parameters: characteristic exponent or index of stability $\alpha \in (0, 2]$, skewness parameter β , scale parameter γ , and location parameter δ . The normal characteristic function requires restrictions

$\alpha = 2$, $\beta = 0$, $\gamma = \sigma^2/2$, and $\delta = \mu$. The key parameter governing the rate of decline of tail mass is the index of stability α . An important property of stable laws is moments of order $r > \alpha$ do not exist. Accordingly, if $\alpha < 1$, tails are of such large mass that expected value is undefined, i.e., moment-generating integrals are unbounded. For $\alpha < 2$, variance and covariance do not exist.

Table II reports 95% confidence intervals for stable index estimates over both periods using maximum likelihood²¹. Since the upper limits for both periods are less than 2, we reject the null of a finite variance process in both periods. None of our lower bounds are below 1, so we cannot reject the null of a finite mean. Note the 95% confidence interval for the pre-crisis period is much broader than in the crisis period revealing our alpha estimates during the crisis period are relatively imprecise. Nevertheless, the mean index estimate is smaller in the crisis sub-period reflecting the increased volatility characteristic of the crisis or high-volatility sub-period.

²¹ We estimated Stable indexes using STABLE available at <http://academic2.american.edu/~jpnolan/>. A general description of the software is found in Nolan (1997).

IV. VaR Models

Market risk analysis in finance typically involves mappings from extreme quantiles of return distributions to exposure measures such as Value at Risk. Specifically, VaR_p is the p -percentage quantile of our returns distribution, exceeded with probability $(1 - p)$, conditional on information in the previous period Ω_{t-1} :

$$(1) \quad VaR_p = F_{t|\Omega_{t-1}}^{-1}(p)$$

Accordingly, VaR prediction amounts to accurately forecasting returns distribution quantiles.

We backtested two VaR models: GARCH (1, 1), and Stable Paretian. The GARCH (1,1) model uses a conditional variance process to obtain daily volatility estimates:

$$(2) \quad \sigma_{t|\Omega_{t-1}}^2 = \delta_0 + \delta_1 \varepsilon_t^2 + \delta_2 \sigma_{t-1}^2$$

Accordingly, the conditional standard deviation for day t , σ_t , was estimated on a rolling daily basis using MLE and equation (2). Quantile estimates were then obtained using:

$$(3) \quad q_{p,t} = \Phi_p^{-1}(\sigma_{t|\Omega_{t-1}})$$

where $q_{p,t}$ is the p -percentage quantile forecast for time period t , Φ_p^{-1} is the standard normal inverse function for probability p , and $\sigma_{t|\Omega_{t-1}}$ is the volatility forecast conditioned on information in period $t-1$.

Rolling quantile estimates for stable distributions were calculated directly using STABLE:

$$(4) \quad q_{p,t} = S(\alpha, \beta, \gamma, \delta; \Omega_{t-1}).$$

V. Backtesting Procedures and Results

We backtested our VaR models using daily performance comparisons used by trading firms and mandated by regulators.²² These procedures amount to failure rate analysis applied to VaR exceptions, defined as events when actual VaR exceeds its forecast. We controlled for the clustering of VaR exceptions by following conditional coverage tests of (Christoffersen 1998), which test whether a sequence of VaR exceptions constitute an i.i.d. Bernoulli sequence. Specifically, conditional coverage tests examine the joint null of the unconditional coverage rate

²² For a review of mandated backtesting procedures, see (Jorion 2007) pages 142-153. Note that our tests and model rankings are based on 50- and 200-day windows. We also tested a 100-day window and found it differed only slightly from the 200-day window.

and independent exceptions to VaR. The conditional coverage null is $E[I_t | \Omega_{t-1}] = p$, where p is the coverage rate, I_t indicates an exception to VaR at time t , and Ω_{t-1} is the information set. Specifically, I_t , the exceptions indicator variable for day t , is set to one when the actual loss exceeds the forecast VaR for that day, and zero otherwise. Following (Kupiec 1995), the unconditional null is $E[I_t] = p$ which ignores how exceptions cluster in time. The null of independent exceptions is tested against a first-order Markov process. Accordingly, rejection of the conditional coverage null can be explained by 1) an inappropriate distributional assumption, or 2) clustering of exceptions, or 3) both.

Like the normal, the Stable distribution is typically applied under the i.i.d. assumption and therefore offers no dynamic structure to the researcher to model volatility clustering. To remedy this we employed a rolling time-varying parameter estimation technique to condition daily Stable VaR forecasts. Specifically, we used 50, 100, and 200-day windows to condition our quantile estimates. This rolling estimation approach allows us to compare models not designed to specifically model heteroscedasticity, notably the Stable Paretian model, with the GARCH benchmark, which is specifically designed to track volatility clustering²³. In addition, our approach requires less computational effort and parameters estimates than the industry standard GARCH model.

Table III presents likelihood ratio values for the conditional coverage null for each model at the 95% and 99% VaR using a 50-day conditioning window over the pre-crisis and crisis periods. In the pre-crisis period, we reject 95% and 99% conditional coverage nulls for both models. Additional analysis concluded the stable model conditional coverage null was rejected for 99% VaR because the unconditional coverage null was rejected, a surprise given our prior that Stable models perform best at extreme quantiles. In addition, the fact that the GARCH model rejects the unconditional coverage null at the 95% quantile during a period of relative calm is surprising since our priors were the GARCH model would outperform the Stable at the 95% quantile. Finally, the failure of GARCH to track volatility clustering for both 95% and 99% quantiles, for which the model is designed, was a surprise.

Over the crisis period we fail to reject the conditional coverage null for both models at 95% and 99% quantiles. Comparing likelihood ratio values, which follow a chi-square distribution, we can rank models where the lower the likelihood ratio value the better the model fit. Based on likelihood ratios, further analysis revealed the GARCH model outperforms the Stable for 95% whereas it underperforms the Stable for 99% VaR confirming our prior that Stable models perform best at extreme quantiles. It is interesting that our time-varying estimation approach tracks volatility clustering for the Stable model during the crisis period, whereas it fails during the pre-crisis period.

Table IV presents statistical tests of coverage rates using a 200-day conditioning window. For the pre-crisis period, we reject the conditional coverage null for the GARCH model at both quantiles. Further analysis reveals both the unconditional coverage and independence nulls were rejected for both 95% and 99% quantiles for the GARCH model, a surprise given the GARCH

23 Our rolling parameter estimation approach is consistent with time-varying parameters and is similar to a Bayesian updating model. For example, (Berkowitz and O'Brien 2002) update ARMA-GARCH model parameters on a daily basis for internal bank VaR data.

model is designed to track volatility clustering. On the other hand, for the pre-crisis period, we reject the conditional coverage null for the Stable model at the 95% quantile, but fail to reject for the 99% quantile. This result confirms our priors which expected the Stable model to outperform the GARCH at extreme quantiles.

For the crisis period, the GARCH model fails to reject the conditional coverage null for both quantiles, whereas we reject the conditional coverage null for both quantiles for the Stable model. Analysis revealed, for both quantiles, the Stable model rejected the unconditional null indicating it was an inappropriate distribution but failed to reject the independence null. This is a surprising result since the stable model typically performs better during periods of high volatility. Finally, the superiority of the GARCH model in the crisis period was also unexpected. Accordingly, for the 200-day conditioning window, the significant result is that the GARCH model outperforms the stable at extreme quantiles during a period of relatively high volatility.

VI. Conclusion

This paper evaluates the predictive quality of day-ahead VaR forecasts using a time-varying parameter estimation approach applied to daily real-estate index data during the real-estate bubble. Specifically, we backtest daily-ahead VaR forecasts for two models: Stable Paretian and GARCH. Our testing procedures allow separate evaluation of distributional assumptions from model dynamics associated with volatility clustering.

Testing Stable and GARCH models during periods of financial volatility is important since, at its heart, stable distributions are capable of modeling rare events. Indeed, stable models can forecast infinite-variance return distributions. On the other hand, GARCH models successfully track volatility clustering and are widely employed on Wall Street despite their adherence to smooth continuous well-defined return distributions. Examining how each model performs during financial bubbles is important in future risk management applications.

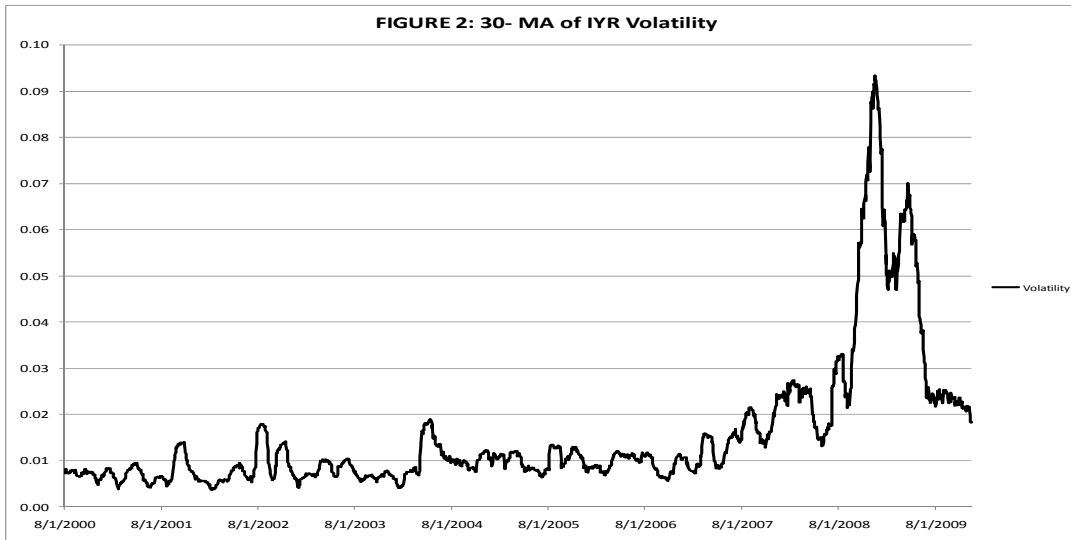
What insights stem from our research? First, our rolling estimation approach allows the Stable model to successfully track volatility clustering, a procedure simpler to apply than standard GARCH models. Second, our results are sensitive to the length of the conditioning window, with both models doing better for the 50-day window relative to 100 and 200-day windows. Third, neither model performs well over both periods and over quantiles, with the GARCH marginally outperforming the Stable. However, for the 50-day conditioning window during the crisis period, our results confirm what was expected, the stable model outperforms the

GARCH for extreme quantiles although neither model is satisfactory for the pre-crisis period. Of particular interest is the Stable model's high frequency of rejecting the unconditional coverage null, suggesting the Stable distribution poorly fit the data. What can explain the relatively poor performance of the Stable model? We suspect that the alpha values indicate tail masses are not so large as to provide a distribution advantage to the Stable model. Accordingly, areas of future research include re-examining the role of the normal model in the real-estate bubble.

What do our results imply about the use of VaR models in a financial bubble? The poor

performance of both Stable and GARCH models is likely to disappoint adherents to VaR and Stable models as they don't perform as expected, i.e., Stable models perform relatively poorly at extreme quantiles, where they are expected to have a comparative advantage relative to GARCH models. Accordingly, additional research on VaR and Stable models during financial bubbles is required to resolve some of these issues.

Figures and Tables



Descriptive Statistic	Pre-crisis Period 6/19/2000-7/31/2007	Crisis Period 8/1/2007-12/15/2009
Mean	0.06%	-0.06%
Standard Deviation	0.96%	3.93%
Skewness	-0.46	-0.26
Kurtosis	5.02	6.64
Range	0.09	0.38
Jarque-Bera p-value	0.00	0.00

Precrisis Period 6/19/2000-7/31/2007	Crisis Period 8/1/2007-12/15/2009
[1.7968, 1.9098]	[1.4146, 1.688]

Quantile	Pre-crisis Period 6/19/2000-7/31/2007	Crisis Period 8/1/2007-12/15/2009
95%		
GARCH	25.7766*	1.5575
Stable	28.2409*	2.0515
99%		
GARCH	36.6570*	3.7881
Stable	10.2120*	2.5825

* denotes rejection of conditional coverage null at 5% significance level

Quantile	Pre-crisis Period 6/19/2000-7/31/2007	Crisis Period 8/1/2007-12/15/2009
95%		
GARCH	15.5282*	3.7450
Stable	35.2663*	10.9987*
99%		
GARCH	22.4314*	5.1862
Stable	6.0848	10.3951*

* denotes rejection of conditional coverage null at 5% significance level

References

- Basterfield, D. and T. Bundt, 2009, Backtesting Value at Risk during the Asian Currency Crisis: Stable Paretian versus GARCH Models, *Journal of Global Business Development*, 1 (1), 125-137.
- Berkowitz, J. and J. O'Brien, 2002, How Accurate are Value-At-Risk Models at Commercial Banks? *The Journal of Finance*, 57, 1093-1111.
- Christoffersen, P., 1998, Evaluating Interval Forecasts, *International Economic Review*, 39, 841-862.
- Jorion, P., 2007, *Value at Risk*, 3rd Ed., McGraw-Hill.
- Kupiec, P., 1995, Techniques for Verifying the Accuracy of Risk Measurement Models, *The Journal of Derivatives*, 2, 73-84.
- Lévy, P., 1924, Theorie Des Erreurs La Loi De Gauss Et Les Lois Exceptionnelles, *Bulletin de la Societe de France*, 52, 49-85.
- Mittnik, S. and S. Rachev, 1993, Modeling Asset Returns with Alternative Stable Distributions, *Econometric Reviews*, 12, 261-330.
- Mittnik, S. and S. Rachev, 2000, *Stable Paretian Models in Finance*, Wiley
- Nolan, J., 1997, Numerical Computation of Stable Densities and Distribution Functions, *Communications in Statistics – Stochastic Models*, 13(4), 759-774.
- Young, M. and R. Graff, 1995, Real Estate is Not Normal: A Fresh Look at Real Estate Return Distributions, *Journal of Real Estate Finance and Economics*, 10, 225-259

The Wealth Effects of CFO Turnover: Evidence from Post-Sarbanes-Oxley Act

WaQar Ghani and Rajneesh Sharma

Abstract

This study investigates the impact of CFO turnover on shareholder wealth in the post-Sarbanes-Oxley Act period. Our tests are based on a sample of 244 CFO turnovers during the post-SOX (2003-2007) years. Our full and sub-sample empirical results show that market reaction to CFO turnover events was significantly negative for all departure reasons. Prior Pre-SOX research showed no significant market reaction around most CFO departure events with the exception of a sudden CFO departure event. Thus, our results indicate that SOX has influenced market participants' perception of CFO turnover event as value relevant. We provide evidence that supports existing literature that CFO turnover is disciplinary in nature.

I. Introduction

Prior research in top corporate executive departures primarily focuses on chief executive officer (CEO) turnover events and present little investigation surrounding chief financial officer (CFO) changes. The purpose of our study is to measure the effects of CFO turnover events in the post- Sarbanes-Oxley Act of 2002 (hereafter SOX) period on shareholder wealth.

The motivation of this paper is derived from the enactment of SOX that sheds light on the changing role of CFO in corporate financial reporting and in setting market expectations. Section 302, paragraph (a) of SOX identifies two parties who are required to certify the accuracy of the annual and quarterly financial statements. And, these parties are “principal executive officer or officers” and “the principal financial officer or officers” of the firm. Integrity of financial reporting is not only of concern to investors in United States but also has global implications regarding the optimal flow of capital. More recent financial meltdown triggered by US financial institutions' excessive risk taking calls for the need of high quality corporate governance mechanisms. This in turn makes our study much more timely and pertinent for regulators and policy maker as additional regulations are contemplated.

II. Literature Review

Prior research primarily focuses on the impact of corporate restatements. And we know that the chief financial officers have a direct hand in preparing these corporate financial filings. Defond and Jiambalvo (1991) provide evidence that firms who restate experience far poor financial performance than are firms who do not restate. Palmrose et al. (2004) find that restating firms experience significant wealth loss around the restatement disclosures events. Some studies argue that firms who restate do manage and manipulate accounting numbers in order to appear more profitable and less risky. The motivation for these firms is to reduce borrowing cost or to impress capital markets [Richardson, Tuna and Wu, 2002; Erickson, Hanlon, and Maydew, 2004].

A related stream of research links firm performance with top management changes and provides evidence that CEOs are replaced subsequent to poor financial performance [see e.g., Parrino, 1997; Denis and Denis, 1995; Gilson, 1989]. More recently, researchers have started

WaQar Ghani, Ph.D and Rajneesh Sharma, Ph.D are accounting and finance professors, respectively at the Haub School of Business, Saint Joseph's University, Philadelphia PA. 19131. They can be contacted at wghani@sju.edu and rsharma@sju.edu

focusing on the link between financial performance and CFO turnover. A major impetus for this investigation comes from reporting requirements under SOX which in turn has given rise to unprecedented restatements of financial filings by the corporate world. For example, Denton et al. (2008) provide evidence that CFO of restating firms experience higher turnover and that this turnover rate has become more pronounced after the enactment of SOX.

There is only one known pre-SOX study; a seminal work by Mian (2001) providing empirical evidence that poor financial performance is the primary determinant of CFO turnover. He links his findings to the hypothesis that labor markets impose severe penalties on poor performing CFOs and those CFO removals are disciplinary in nature. He tests the impact of CFO turnover events to market performance and finds that shareholders experience significant negative wealth effects for a year leading up to these events. Mian (2001) did not find any negative effects around event dates with the exception of the CFO dismissal event. His test period only includes pre-SOX years. We are not aware of any research that has examined the relationship between CFO turnover and market reaction in the post-SOX period. Therefore, our study examines the market reaction to CFO turnover in the post-SOX periods.

III. Sarbanes-Oxley Act of 2002 and CFO Departure Events

The last ten years of U.S. corporate environment has experienced some of the most egregious examples of recklessness, greed, and disregard for stakeholders (shareholders, suppliers, customers, employees, etc.) interests in the form of accounting manipulation and fraud. Some examples that come abruptly to mind are of Enron, Tyco, Adelphia, Computer Associates, and Health South among many. The enactment of Sarbanes-Oxley Act in 2002 is a direct result of failures of corporate governance. The primary purpose of this Act is to restore investors' confidence in financial reporting of public companies.

Toward that end, the SOX rules have not only changed the listing requirements of the major exchanges but has also drastically altered internal and external monitoring landscape of a public enterprise. The act has moved to institute the formation of Public Companies Accounting Oversight Board (PCOAB). The PCOAB's job is to monitor external auditors' practices and corporate governance mechanisms in order to strengthen the integrity of corporate financial reporting.

More importantly, SOX has fundamentally changed the responsibilities of top management (CEO, CFO) regarding corporate financial reporting. There are key sections of SOX where CFO is held accountable. For example, Section 302 requires CFO to certify (by signing) that the financial statements (both annual and quarterly) have presented fairly the economic activities of the company. Under this section, the CFO is also "responsible for establishing and maintaining internal controls"; Section 304 stipulates that CFO has to forfeit all bonuses earned due to misstated financial numbers; Section 802 assesses criminal sanctions against the CFO if the financial statements are misstated or are misleading. Under this section, certifying a false statement can lead to a fine of \$5 million and an incarceration of up to 20 years.

A. Stock Market Reaction to Guidance events - Hypothesis Development

Prior research has shown that top executive turnover events are value relevant and market participants do take these events in to account in setting asset prices. More importantly, SOX

has put tremendous responsibility on the shoulder of CFO in terms of assuring the integrity of corporate financial reporting. Thus, any departure of CFO from the company (due to any purported reason) can create significant uncertainty for investors in the post-SOX environment. We expect this uncertainty to be reflected in share prices.

Thus, the CFO turnover events are expected to have a significant wealth effect on shareholders of the affected firms in turn resulting in a negative stock price reaction. We measure both the market reaction to CFO turnover in the post-SOX and formulate and test the following hypothesis:

H1a: *CFO turnover has negative impact on the average security returns (AR) of affected firms.*

It is fairly likely that value relevant information regarding CFO departure is impounded in stock prices some days before the news release. In fact, prior evidence in financial literature supports this *information-leakage* phenomenon (see more on this in Xi & Heidle, 2005; Mac 2002). The use of the cumulative abnormal returns (CAR) metric provides us the opportunity to pick abnormal activity (if there is any) over multiple trading intervals. The CAR can be interpreted as the firms' average deviation of returns from their normal market relationship. We expect CAR to be equal to zero on average. A non zero and significant and positive/negative CAR over different selected intervals would show that investors experienced significant wealth gain/loss over these intervals around test events as proposed below:

H1b: *CFO turnover has negative impact on the average cumulative security returns (CAR) of the affected firms.*

B. Sample Selection

Table 1

CFO Departures – Reasons as Reported

The following chart describes the CFO turnover as identified in the texts of the news reports in the ABI/INFO Database.

Event	Reasons identified	Number of Firms
1	Join another company or start own business	37
2	Personal reasons (Personal or Pursue other interests)	61
3	Retire	64
4	Accounting Irregularity and Fraud	24
5	Performance	7
6	Promotion	2
7	Shakeup Restructuring	6
8	All other reasons (including unidentified)	43
Total		244

We searched ProQuest Research Library for all news items related to CFO's termination of employment for years 2003 through 2007 using the search words that include "firings", "terminations", "resignations", "retirements", "demotions", and "promotions". We treated "stepping down" of CFO as "resignation." The search results contained various sources such as *The Wall Street Journal* and the *New York Times*. In cases where news related to an event was published on two or more days, the date of the first news article was considered as an *event date*. The ProQuest Research Library is owned and managed by ProQuest.

Next, in order to identify a precise event date, we deleted any news articles that specify a month or a year only. We further restricted our sample by the availability of data in The Center for Research in Security Prices (CRSP). Our screening resulted in a total of 244 events for our sample. We divided the events into eight sub categories. Table 1 reports the number of events per subcategory. The highest number of events (64) is for "Retire". The lowest number of events (2) is for "Promotions".

IV. The Market Model - The Event Study Methodology

We use the *standard* event study methodology similar to one elaborated in Dodd and Warner (1983) and Travalos (1987) in which the *market model* presents a linear relationship between the daily stock return of firm i and the returns on a market portfolio using ordinary least square regression (OLS). The use of market portfolio (equally weighted or value weighted index) in the regression model *controls* for the market-wide movement in returns of all securities that take place at the same time but may not be associated to the test event (Schwert 1981). In fact, by its very design, the market model provides explicit controls for unrelated events by using all of the securities traded on the NYSE and AMEX in the regression equation. Our approach is in conformity with the practice of other researchers in the economics and finance areas where they do not use a control sample in studies that examine the stock market effects of value relevant events. Some examples include Fraser et al. (1997) on the wealth effects of interstate branching regulation, Gupta (1997) on the value of regulatory seal of approval, Carow and Larsen (1997) on the effect of FDICIA regulation on bank holding companies, and Madura et al. (1993) on market reaction to the thrift bailout, etc.

We use "Eventus®" software and CRSP data from Wharton Research Data Services (WRDS) for analysis. Eventus® is used to extract raw data and conduct analysis. Eventus® user guide (Cowan, 2007) provides a detailed description of the methodology and statistics reported in this paper. In the market model, the stock returns are modeled as a single index model

$$R_{it} = \alpha_i + b_i R_{mt} + \varepsilon_{it} \quad (1)$$

Where, R_{it} is the returns of security i on day t , R_{mt} is the return on the index on day t and b_i is the sensitivity of the stock to the index. First, an ordinary least square regression model is used to estimate coefficients of the model over the estimation period.

The estimation period is composed of the past *ex post* returns. The 'estimation period' selected for our purpose starts 150 trading days before the event date (day 0) and ends 31 trading days before the event date ($t = -150$ to $t = -31$). Next, we use the estimated model to generate the unexpected (abnormal) returns during the prediction period (event period) for the trading days -5,

0, and +5, where day 0 is the test date.

It is possible that an information leakage may take place before the event date. In that case, a contamination is likely to be introduced into the estimation of the coefficients if we include days near the event period in estimating the OLS model. To avoid such a possibility, we end the estimation period 31 trading days prior to the event date.

Hence, the abnormal stock returns are calculated by taking the difference between the actual and expected returns from the market model for a sample of N firms as follows:

$$AR_t = \frac{1}{N} \sum_{i=1}^n [R_{it} - \hat{\alpha}_i - \hat{b}_i R_{mt}], t = -1, \dots, +1 \quad (2)$$

Where,

AR_t = abnormal return for period;

R_{it} = return on security i for period t;

R_{mt} = return on the value-weighted market portfolio for period t; and

$\hat{\alpha}_i, \hat{b}_i$ = ordinary least-squares estimates of the market-model parameters.

The average cumulative abnormal returns (CAR_{T1,T2}) are calculated by summing the AR_t's over different intervals ranging from day -5 to day +5 or a larger interval where necessary. The expected values of AR_t and CAR_{T1,T2} are assumed to be zero.

V. Abnormal Returns Test and Wealth Effects - Empirical Results

We examine a sample of 2444 CFO turnover events that are expected to impact daily abnormal returns (AR) and the percentage of negative returns for announcement periods -5 to +5 relative to a particular event day (t = 0). We also report the cumulative average abnormal returns (CAR) and the percentage of negative cumulative average abnormal returns over various trading intervals. The Generalized Sign Z statistic is used to test whether the fraction of positive abnormal returns and cumulative abnormal returns around the event date are significantly different from estimation period. In the next section, we report wealth effects of selective events.

CFO Turnover in Post-SOX Period (2003-2007) – Full Sample Results

Table 2

Daily Average Abnormal Returns (AR), Proportions of Negative Returns, Cumulative Average Abnormal Returns (CAR), and Proportions of Negative Returns of Firms Effectuated by CFO Turnovers for Years 2003-2007

Event: All CFO Turnovers (N = 244)

Daily Average Abnormal Returns (AR) and Proportions of Negative Returns

Event Day	AR%	Gen Sign Z	% Negative
-5	0.13%	0.727	49.79%
-4	-0.36%	-0.044	52.26%
-3	0.37%	1.626	46.91%

-2	-0.08%	-0.943	55.14%
-1	-0.62%	-2.484**	60.08%**
0	-0.82%	-3.639**	63.79%***
1	-0.35%	-2.869**	61.32%**
2	-0.03%	1.626	46.91%
3	-0.12%	-0.814	54.73%
4	-0.06%	1.948*	45.87%
5	0.24%	0.661	50.00%

Cumulative Average Abnormal Returns (CAR), and Proportions of Negative Returns

Trading Interval	CAR%	Gen Sign Z	% Negative
(-10,0)	-1.78%	-2.155*	59.02%
(-5,0)	-1.38%	-0.686	54.32%
(-10,+10)	-2.27%	-1.515\$	56.97%
(-5,+5)	-1.69%	-1.071	55.56%
(-2,+2)	-1.90%	-4.025**	65.02%**
(-1,0)	-1.44%	-2.355**	59.67%*
(-1,+1)	-1.79%	-3.382**	62.96%**
(0,+1)	-1.17%	-3.511**	63.37%**
(0,+5)	-1.14%	-1.071	55.56%
(0,+10)	-1.32%	-1.713*	57.61%

*Significant at $p \leq .05$.

**Significant at $p \leq .01$.

Table 2 results are based on a sample of 244 CFO departure events in the post-SOX period. Table 2 shows the average daily abnormal returns (AR), the percentage of negative returns and cumulative average abnormal returns for the CFO departure events. As shown in Table 2, the average abnormal returns of the firms on day 1 and +1 are negative and highly significant at the 0.01 or better levels. More importantly, day 0 abnormal returns are negative with a Z-value of 3.639 and are significantly different from zero at the 0.01 level or better. On this day, a significantly higher percentage of returns are negative (day 0 = 63.79 %) with a p-value of greater than 0.01. Overall, the results are highly negative and significant in the post-SOX period.

Next, we examine CFO departure events using CAR over various trading intervals to detect the effect of these managerial changes. As shown in Table 2, the sample firms experience negative CAR for most trading intervals (e.g., -2, +2; -1, 0; -1, +1). The results suggest that market responded very negatively to changes in CFO of sample firms. Next section reports test of subsamples based on Table 1 classification.

Event 1: Joined another firm - Test Results**Table 3**

Daily Average Abnormal Returns (AR), Proportions of Negative Returns, Cumulative Average Abnormal Returns (CAR), and Proportions of Negative Returns of Firms Effected by CFO Turnovers for Years 2003-2007

Event: CFO joined another firms (n = 37)

Event Day	AR%	Gen Sign Z	% Negative
-5	-0.65%	-2.175*	70.27%
-4	0.58%	0.129	51.35%
-3	0.35%	-0.2	54.05%
-2	0.52%	1.117	43.24%
-1	-0.53%	-0.529	56.76%
0	-0.17%	-1.517	64.86%
1	-0.49%	-1.846*	67.57%
2	0.04%	0.129	51.35%
3	-0.33%	-0.859	59.46%
4	-0.65%	-1.188	62.16%
5	0.31%	0.458	48.65%

Cumulative Average Abnormal Returns (CAR), and Proportions of Negative Returns

Trading Interval	CAR%	Gen Sign Z	% Negative
(-10,0)	-0.57%	-0.859	59.46%
(-5,0)	0.10%	0.129	51.35%
(-10,+10)	-4.21%	-0.859	59.46%
(-5,+5)	-1.02%	-0.859	59.46%
(-2,+2)	-0.63%	-2.175*	70.27%
(-1,0)	-0.70%	-0.529	56.76%
(-1,+1)	-1.19%	-1.846*	67.57%
(0,+1)	-0.66%	-1.846*	67.57%
(0,+5)	-1.29%	-1.188	62.16%
(0,+10)	-3.82%	-3.163**	78.38%**

*Significant at $p \leq .05$.

**Significant at $p \leq .01$.

Table 3 reports the results of event 1, when a CFO joins another firm. We expect stock prices of these sub-sample firms to be negative around this event. The average abnormal returns of the firms on day 1 are negative and significantly different from zero at the .05 level with a Z-value of -1.846. The abnormal returns on day 0 are insignificant but have a negative sign. Next, we examine Event 1 using CAR over various trading intervals. As shown in Table 3, the sub-sample firms experience significant negative CAR for various trading intervals. For example, the CAR for trading interval (-2, +2) is significantly negative at -0.63 percent ($Z = -2.175$; significant at the .05 level). The overall results suggest that information about a CFO departure to join another firm had an adverse wealth effect for the sample firms.

Event 2: Personal reasons (personal or pursue other interests) - Test Results

Table 4

Daily Average Abnormal Returns (AR), Proportions of Negative Returns, Cumulative Average Abnormal Returns (CAR), and Proportions of Negative Returns of Firms Effected by CFO Turnovers for Years 2003-2007

Event: *Resigned for Personal or Pursue Other Interest (61)*

Event Day	AR%	Gen Sign Z	% Negative
-5	0.46%	0.793	47.54%
-4	-1.58%	0.023	52.46%
-3	0.39%	-0.746	57.38%
-2	-0.47%	-1.772*	63.93%
-1	-0.56%	-2.284*	67.21%
0	-0.90%	-1.772*	63.93%
1	0.66%	0.28	50.82%
2	-0.35%	0.793	47.54%
3	-0.22%	-0.233	54.10%
4	-0.42%	1.049	45.90%
5	1.02%	0.536	49.18%

Cumulative Average Abnormal Returns (CAR), and Proportions of Negative Returns

Trading Interval	CAR%	Gen Sign Z	% Negative
(-10,0)	-4.85%	-2.541**	68.85%
(-5,0)	-2.67%	-1.002	59.02%
(-10,+10)	-3.49%	-1.515	62.30%
(-5,+5)	-1.99%	-0.49	55.74%

(-2,+2)	-1.62%	-1.515	62.30%
(-1,0)	-1.45%	-1.259	60.66%
(-1,+1)	-0.80%	-0.746	57.38%
(0,+1)	-0.24%	-0.746	57.38%
(0,+5)	-0.22%	0.536	49.18%
(0,+10)	0.46%	0.28	50.82%

*Significant at $p \leq .05$.

**Significant at $p \leq .01$.

Our Event 2 is when a CFO leaves the company for personal reasons or to pursue other interests. Table 4 presents the results for Event 2. As shown in Table 4, the average abnormal returns on day -2, day -1 and, day 0 are negative and significantly different from zero at the .05 level.

Table 4 reports the CAR for various trading intervals surrounding event 2. The CAR for trading interval (-10, 0) is negative and highly significant at the .01 level with a Z- value of -2.541. The results suggest that significant leakage of information occurred prior to the event date and that market participants revised downward their assessment regarding future values of the firms.

Event 3: CFO Retires - Test Results

Table 5

Daily Average Abnormal Returns (AR), Proportions of Negative Returns, Cumulative Average Abnormal Returns (CAR), and Proportions of Negative Returns of Firms Effected by CFO Turnovers for Years 2003-2007

Event: CFO Retired ($n = 64$)

Event Day	AR%	Gen Sign Z	% Negative
-5	0.20%	0.599	48.44%
-4	0.16%	0.849	46.87%
-3	-0.18%	-0.152	53.12%
-2	0.34%	0.849	46.87%
-1	0.31%	-0.152	53.12%
0	-0.05%	-0.903	57.81%
1	-0.29%	-2.404**	67.19%**
2	-0.02%	0.348	50.00%
3	0.06%	0.599	48.44%
4	0.32%	2.100*	39.06%
5	-0.07%	-0.653	56.25%

Cumulative Average Abnormal Returns (CAR), and Proportions of Negative Returns

Trading Interval	CAR%	Gen Sign Z	% Negative
(-10,0)	0.45%	0.348	50.00%
(-5,0)	0.78%	0.348	50.00%
(-10,+10)	0.53%	0.348	50.00%
(-5,+5)	0.79%	0.348	50.00%
(-2,+2)	0.30%	-0.403	54.69%
(-1,0)	0.26%	0.348	50.00%
(-1,+1)	-0.03%	0.098	51.56%
(0,+1)	-0.34%	-0.653	56.25%
(0,+5)	-0.04%	0.098	51.56%
(0,+10)	0.03%	0.849	46.87%

*Significant at $p \leq .05$.

**Significant at $p \leq .01$.

Table 5 presents the results of event 3, when a CFO retires from the firm. The average abnormal returns of the firms on day 1 are negative and highly significantly different from zero at the .01 level with a Z-value of -2.404. The abnormal returns on day 0 are insignificant but have a negative sign. In addition, a higher percentage of returns are negative (67.19%) on day -1 with a significance of .05 or better.

Next, we examine Event 1 using CAR over various trading intervals. As shown in Table 5, the sub-sample firms experience insignificant CAR for various trading intervals.

Event 4: CFO Departure due to Accounting Irregularity and Fraud - Test Results**Table 6**

Daily Average Abnormal Returns (AR), Proportions of Negative Returns, Cumulative Average Abnormal Returns (CAR), and Proportions of Negative Returns of Firms Effected by CFO Turnovers for Years 2003-2007

Event: *Accounting Irregularities and Fraud (n =24)*

Event Day	AR%	Gen Sign Z	% Negative
-5	0.57%	1.930*	30.43%

-4	-0.13%	-0.572	56.52%
-3	0.10%	1.513	34.78%
-2	-0.06%	-0.155	52.17%
-1	-2.07%	-1.406	65.22%
0	-1.77%	-1.824*	69.57%
1	-0.58%	-0.572	56.52%
2	0.47%	0.679	43.48%
3	-0.07%	-0.572	56.52%
4	0.78%	1.096	39.13%
5	-0.11%	0.679	43.48%

Cumulative Average Abnormal Returns (CAR), and Proportions of Negative Returns

Trading Interval	CAR%	Gen Sign Z	% Negative
(-10,0)	-3.20%	0.463	45.83%
(-5,0)	-3.35%	-0.155	52.17%
(-10,+10)	-3.63%	0.871	41.67%
(-5,+5)	-2.88%	-0.572	56.52%
(-2,+2)	-4.02%	-2.241*	73.91%*
(-1,0)	-3.84%	-1.406	65.22%
(-1,+1)	-4.42%	-2.241*	73.91%*
(0,+1)	-2.35%	-0.989	60.87%
(0,+5)	-1.29%	-0.155	52.17%
(0,+10)	-2.21%	-0.155	52.17%

*Significant at $p \leq .05$.

**Significant at $p \leq .01$.

Table 5 reports the results of event 43, when a CFO departs due to accounting irregularity and fraud. We expect stock price to significantly decrease for these sub-sample firms around this event. The average abnormal returns of the firms on day 0 are negative (-1.77%) and highly significant and different from zero at the .05 level with a Z-value of -1.824. The results suggest that the affected firms experience significant wealth loss around this event.

Table 6 also reports the analysis of Event 4 using CAR over various trading intervals. As shown in Table 6, the sub-sample firms experience significant negative CAR for various trading intervals. For example, the CAR for trading interval (-1, +1) is significantly negative at -4.42 percent ($Z = -2.241$) with a significance level of .05 or better. The overall results suggest that information about a CFO departure due to accounting irregularity and fraud triggers an adverse wealth effect for the sub-sample firms.

Sub-sample Tests

Table 1 provides a list of reasons behind CFO departures. We discussed test results of four events in the prior section. We also conducted tests for the remaining four events but did not report the results because either the sample size was too small (Event 5, 6 or 7) or the reason

cited for CFO departure was unrelated to the events of interest or not identified (event 8).

VI. Conclusion

This study investigates the impact of CFO turnover on shareholder wealth in the post-SOX period. Our tests are based on a sample of 244 firms who announced the departure of their CFO in the post-SOX (2003-2007) period. Our empirical results, based on the full sample and sub-samples, show that market reaction to CFO turnover was significantly negative in the post-SOX period. . Prior Pre-SOX research (only known study by Mian, 2001) showed no significant market reaction around most CFO departure events with the exception of a sudden CFO departure event. Thus, our results indicate that SOX has influenced market participants' perception of CFO turnover event to be value relevant. We provide evidence that supports existing literature that CFO turnover is disciplinary in nature.

The main impetus of this paper comes from the enactment of SOX that highlights the changing role of CFO in corporate financial reporting and in managing capital market expectations. Section 302, paragraph (a) of SOX establishes the role of two parties in certifying the accuracy of the annual and quarterly financial statements. And, these parties are "principal executive officer or officers" and "the principal financial officer or officers" of the firm. Integrity of financial reporting system is not only of value to market participants in United States but also has world-wide implications as to the optimal flow of financial capital. More recent financial fiasco spearheaded by US financial institutions' excessive risk taking necessitates the establishment of high quality corporate governance framework. This in turn makes our research much more relevant for regulators and policy maker as tightening of existing or formulation of entirely new regulations are contemplated.

VII. Implications for Future Work

This study investigates the impact of CFO turnover on shareholder wealth in the post-Sarbanes-Oxley Act period and has implications for future research. Recent financial industry debacles caused untold loss to the wealth of millions of shareholders not only in the United States but also around the globe. This makes market participants even more wary about the custodial function of top management. Undoubtedly, the role of CFO comes under increased scrutiny and the cry for increased regulation or better implementation of existing regulation becomes even more pronounced and urgent. In light of the above, the utility, effectiveness, and value relevance of accounting and corporate governance reforms under Sarbanes-Oxley Act necessitates continued investigation. Our study examines the impact of a CFO turnover on stock market assessment of shareholder wealth and does not analyze the characteristics of the affected firms. Further examination of the link between firm-specific variables and CFO turnover in the post Sarbanes-Oxley Act warrants further examination. Such an investigation will help us preempt potential blow outs before they occur and provide additional credence to the disciplinary nature of the stock market response.

References

- Cowan, A.R. (2007), Eventus®,” *Eventus® User’s Guide: Software Version 8.0*, Standard Edition 2.1, Cowan Research L.C.
- DeFond, Mark L.; Jiambalvo, James. (1991) “Incidence and Circumstances of Accounting Errors.” *Accounting Review*, Vol. 66 Issue 3, p643-655
- Denis, D. J., and D. K. Denis. 1995. "Causes of Financial Distress Following Leveraged Recapitalizations." *Journal of Financial Economics* 37 (2): 129-57.
- Denton, Collins; Masli, Adi; Reitenga, Austin L.; Sanchez Juan M.; (2009) “Earnings Restatements, the Sarbanes-Oxley Act and the Disciplining of Chief Financial Officers.” *Journal of Accounting, Auditing and Finance*, Vol. 24, No. 1, p 1-34
- Dodd, Peter; Warner, Jerold B. (1983) “On Corporate Governance.” *Journal of Financial Economics*, Apr83, Vol. 11 Issue 1-4, p401-438
- Erickson, M., Hanlon, M., & Maydew, E. (2004). How Much Will Firms Pay for Earnings That Do Not Exist? Evidence of Taxes Paid on Allegedly Fraudulent Earnings. *Accounting Review*, 79(2), 387-408
- Fraser, Donald R., Hooton, Jerry L., Kolari, James W. and Reising, Joseph J., (1997), “The wealth effects of interstate branching” *Journal of Banking & Finance*, 21, issue 5, p. 589-611.
- Gilson, Stuart C. (1989) “Management Turnover and Financial Distress” *Journal of Financial Economics*, Dec89, Vol. 25 Issue 2, p241-262
- Li, Xi and Heidle, Hans G., (May 27, 2004) “Information Leakage and Opportunistic Behavior Before Analyst Recommendations: An Analysis of the Quoting Behavior of Nasdaq Market Makers.” AFA 2004 San Diego Meetings. Available at SSRN: <http://ssrn.com/abstract=423840> or doi:10.2139/ssrn.423840
- Mac, Chi T., (September 10, 2002) “The Effects of Regulation Fair Disclosure on Information Leakage.” Available at SSRN: <http://ssrn.com/abstract=329632> or doi:10.2139/ssrn.329632
- Mian, Shehzad (2001) “On the choice and replacement of chief financial officers.” *Journal of Financial Economics* 60 (2001) 143-175
- Palmrose, Zoe-Vonna; Richardson, Vernon J.; Scholz, Susan. (2004) “Determinants of market reactions to restatement announcements.” *Journal of Accounting & Economics*, Vol. 37 Issue 1.
- Parrino, Robert. *CEO turnover and outside succession: A cross sectional analysis*. Journal of Financial Economics; November 1997; Vol. 46, Iss. 2; pg. 165, 33 pgs
- Richardson, Scott A., Tuna, A. Irem and Wu, Min, Predicting Earnings Management: The Case of Earnings Restatements (October 2002). Available at SSRN: <http://ssrn.com/abstract=338681>
- Schwert, G.W. (1981) “Measuring the Effects of Regulation: Evidence from the Capital Markets.” *Journal of Law and Economics*, Vol. 25, pp. 121-145.
- Travalos, N. (1987) “Corporate Takeover Bids, Methods of Payment, and Bidding Firm’s Stock Returns,” *Journal of Finance*. 42 (4), 943-62

Forecasting Future Sales of Manufacturing Firms

Reza Espahbodi, Pouran Espahbodi, and Hassan Espahbodi

Abstract

This paper develops a model to forecast sales for manufacturing firms one year in advance. The methodology utilized is regression analysis. The regression model includes firm-specific variables as well industry and economic-wide factors that affect future sales and explains a considerable percentage of the variation in future sales. We find that consumer confidence index; property, plant & equipment; and advertising and research & development cost in excess of the industry average are positively related to future sales while discount rate is negatively related with sales. The model may be used by management and others (such as investors and creditors) to forecast sales one year ahead. It is not however intended to replace the users' judgment; rather, the model is intended to add an objective dimension to the process of forecasting sales.

I. Introduction

Everyone agrees that forecasting sales is not easy, as sales depend on economy-wide and industry factors as well as the firm-specific actions/attributes. Yet, forecasting sales is essential, particularly for:

1. Strategy formulation and implementation. Overestimating sales (demand) has been the cause of many unnecessary expansions (or new entries into certain industries), and subsequent failures.
2. Planning and budgeting systems. Accurate sales forecast are needed for effective planning/budgeting purposes. Sales budget is the basis of all other operating budgets. An inflated sales budget (either as a result of optimism or forecasting errors) results in unnecessary material and other resource procurements, increasing the risks and costs (such as the risk of obsolescence and inventory carrying cost) to the company. A deflated sales budget (either as a result of conservatism or forecasting errors) results in rush orders, interruptions in production schedules, backlogs, and customer dissatisfaction. An accurate sales forecast can result in reducing costs and increasing profits.
3. Performance-dependent reward systems. In general, tying employee compensation to meeting or exceeding a sales forecast may not be desirable. Employees trying to protect/increase their performance-dependent rewards may try to argue for lower sales target, and/or come up with excuses for not meeting sales target if company policy allows adjustments to the target after the budgets are approved. Tying the compensation to sales forecast accuracy may be a better strategy, but employees can still lowball the budget and slow down sales effort once the target is achieved.

This paper develops a regression model to forecast sales one year ahead. The model is neither intended to replace experts' judgment nor automate the forecasting process. Rather, it is intended

Reza Espahbodi is a professor of accounting at the School of Business and Economics, Indiana University South Bend, South Bend, IN 46634-7111. Pouran Espahbodi is an emeritus professor and Hassan is a professor of accountancy, both at the College of Business and Technology, Western Illinois University, Macomb, IL 61455-1390. Hassan can be contacted by phone (309-298-1455) or email (h-espahbodi@wiu.edu).

to add an objective dimension to the forecasting process and complement other methods of sales forecasting such as using expert judgments.

II. Sample, Model, and Variables

The sample includes all manufacturing firms (SIC codes 2000-3999) listed on the Compustat database in each year over the period of 2001 to 2006 that have the required data. A total of 2890 firm/years satisfy these conditions. Limiting the sample to all manufacturing firms avoids heterogeneity and at the same time allows for variations across different industries. Choosing a single industry would nullify the industry effect (does not allow for variation in sales among industries). On the other hand, including all industries (especially financial institutions and utilities) in the sample would introduce heterogeneity and increase the standard error of regression substantially (even though the R-squared may still be very high).

Regression analysis is used to develop a model to forecast sales one year ahead. The dependent variable is the following year's sales (years 2002 through 2007). Independent variables are factors that are expected to affect future sales and are grouped into three categories: (1) economy-wide factors; (2) industry-wide factors; and (3) firm-specific variables. These variables are measured as of the current year (years 2001 through 2006). Seasonality should not be a factor as all variables are measured over a year.

The economy-wide factors (category 1 variables) are basically leading indicators of future economic activities that can affect all companies' sales. An economic downturn has a negative impact on every company's sales as consumer spending or income goes down. We use the consumer confidence index and the discount rate as leading economic indicators, although there are alternative measures. Both of these variables are measured as of approximately three months after each company's fiscal year-end to approximate the timing of audited annual reports' release and thus the availability of data on the dependent and other independent variables.

Category 2 variables represent factors that affect all firms' sales in a particular industry in the same way; and also the actions of competitors to increase their market shares, which negatively influence the sales of other firms in the same industry. We use the average market-to-book ratio of all the firms in a given industry, as measured by a specific two-digit SIC code, as a determinant of market's expectation of future sales in that industry. To account for competitors' actions, we use the average advertising and research & development costs by companies with the same two-digit SIC code.

Group 3 variables are those that affect each firm's sales differently. For this category, we use the market-to-book ratio (a measure of growth); advertising; research & development cost; and property, plant & equipment, as the major factors that affect a firm's future sales.

To reduce the negative impact of correlation among the variables (multicollinearity) on their estimated coefficients, we combine the three common variables in Groups 2 and 3 (market-to-book ratio, advertising cost, and research and development cost) and measure them as the differences between their values for each company and averages in the same industry, as measured by a specific two-digit SIC code. A list of the variables and their expected signs are shown in Table 1. There are six variables: two leading indicators of economic activity, one pure firm-specific variable (property, plant and equipment), and three combined industry and firm-

specific variables. All variables, except for the discount rate, are expected to be positively associated with future sales as explained in the results section.

There are obviously many more variables that could be considered for inclusion in the model, some being qualitative such as the quality of a company's products. There are also alternative measures (e.g., replacement cost of property, plant, and equipment) that may be more appropriate. Our objective, however, is to keep the number of variables to a manageable size (and to reduce multicollinearity mentioned above, as economic data are highly correlated) and use only variables that can be objectively measured.

III. Results

Regression results are reported in Table 2. The R-Square is .923, meaning that the regression model is explaining 92.3% of the variation in future sales. The F-statistic is significant at the .000 level, indicating that at least one of the independent variables explains a significant portion of the variation in future sales.

The estimated coefficients of the variables, their t-values, significance levels indicating their importance in explaining the variation in future sales, and variance inflation factors, are reported in Table 3. The t-statistics and significance levels show that all variables, except the excess market-to-book ratio, are statistically significant (at less than .01 level; .05 for the discount rate) in explaining the variation in future sales. [While the market-to-book ratio is a measure of growth and market's expectation of increase in future sales, the market expectation is generally long-term so sales may not necessarily increase in the following year. This argument can also be made for research and development or advertising; however, these costs can have both fairly immediate and long-term benefits.] The constant term is not significant, implying that the model includes all the variables that explain a significant portion of the variation in sales (i.e., there is no omitted variable).

Table 3 also shows that all the estimated coefficients have their expected sign and the highest variance inflation factor is about 2.5, indicating that the estimated coefficients are reliable and are not significantly affected by correlation among the independent variables (multicollinearity). [As a rule of thumb, a variance inflation factor of 10 or above indicates a severe multicollinearity problem.] As expected, all the variables, except the discount rate, have a positive relation with future sales. A low discount rate is expected to result in further expansion of economic activities and thus increase in sales for all companies. On the other hand, a higher consumer confidence level means more spending by consumers and thus increased sales by companies. Also, higher advertising and research and development cost by a company, relative to the industry, should increase the company's sales. Finally, an increase in property, plant, and equipment, whether or not induced by a low discount rate, should increase sales.

IV. Conclusion

This paper developed a model to forecast sales for manufacturing companies. The model seems to be very effective in predicting sales one year ahead. However, the model should be used as one objective method of forecasting sales. All statistical models assume that the relationships observed in the past continue in the future. To the extent new relationships are expected, the model's projection has to be adjusted based on expected market conditions in the

future (overall economic condition, and customers' ability/willingness to purchase company's products through market research or survey of major customers about their purchase intentions). Also, management should utilize expert judgments (inside experts and those of the supply-chain) to corroborate the model's projections (Geurts and Whitlark, 1999/2000; Ismail and Ahamad, 2003). Top management, however, should exercise care in allowing middle-level managers adjust the model's projections without reasonable substantiation, as many managers may be biased in their forecasts. For example, marketing managers are generally overoptimistic or simply want to ensure every product is available in substantial quantities to maximize sales (Barash, 1994; Chase, 1993). Obviously, one has to balance the risk of backlogs and stock-outs against inventory buildups (thus increased cost of inventory carrying costs and obsolescence risk), but such risks can be modeled. On the other hand, when sales forecast is used to set the target for performance evaluation purposes, some managers will want to adjust the forecast downward because of the fear of losing their bonuses or jobs. These biases can be reduced or removed by having different targets for resource planning as opposed to performance evaluation. The target for performance evaluation should be higher to motivate managers to work harder.

Table 1

List of Variables and Their Expected Sign in Forecasting Sales

Variable Name	Variable Definition ^a	Expected Sign
Confidence index	Conference Board Consumer Confidence Index (1985 = 100)	+
Discount rate	Federal Reserve Board Discount Rate	-
Property, plant & equipment, net	Property, plant, and equipment (net)	+
Excess market-to-book ratio	Market-to-book ratio minus the average market-to-book ratio for all the firms in a given industry and year, as measured by a specific two-digit SIC code	+
Excess advertising	Advertising expense minus the average advertising expense for all the firms in a given industry and year, as measured by a specific two-digit SIC code	+
Excess research and development	Research and development expense minus the average research and development expense for all the firms in a given industry and year, as measured by a specific two-digit SIC code	+

^a Consumer confidence index and discount rates are measured as of approximately three months after each company's fiscal year-end to approximate the timing of audited annual reports' release and thus the availability of data on the dependent and other independent variables. All other independent variables are measured as of the end of fiscal years 2001 through 2006. The dependent variable (revenues) is measured as of the end of fiscal years 2002 through 2007.

Table 2
Regression Results

Summary Statistics:

R-Squared = .923

Adjusted R-Squared = .923

F-Value = 5742.571

Significance Level = .000

Table 3
The Estimated Coefficient, T-Value, Significance
Level, and Variance Inflation Factor, of Variables in Forecasting Sales

Variables ^a	Estimated Coefficient	T-Value	Significance Level	Variance Inflation Factor
Constant	-314.931	-.496	.620	
Confidence index	23.680	2.930	.003	1.913
Discount rate	-180.812	-2.224	.026	1.912
Property, plant & equipment, net	2.483	103.807	.000	2.077
Excess market-to-book ratio	.304	.148	.882	1.000
Excess advertising	3.228	12.697	.000	2.154
Excess research and development	3.382	19.534	.000	2.518

^a Variables are defined in Table 1.

References

- Barash, M. (Fall 1994), "Eliciting accurate sales forecasts from market experts", *The Journal of Business Forecasting: Methods and Systems*, Vol. 13, No. 3, pp. 24-26.
- Chase, Jr., C. W. (Fall 1993), "Ways to improve sales forecasts", *The Journal of Business Forecasting: Methods and Systems*, Vol. 12, No. 3, pp. 15-17.
- Geurts, M. D. and Whitlark, D. B. (Winter 1999/2000), "Six ways to make sales forecasts more accurate", *The Journal of Business Forecasting: Methods and Systems*, Vol. 18, No. 4, pp. 21-23, 30.
- Ismail, Z. H. and Ahamad, M. H. (Summer 2003), "Delphi improves sales forecasts: Malaysia's electronic companies' experience", *The Journal of Business Forecasting: Methods and Systems*, Vol. 22, No. 2, pp. 22-23, 28-29
- .

Loan Delinquencies and Bank Stock Returns

William Lepley

Abstract

This paper examines the statistical relationship between bank stock returns and two fundamental banking variables: (1) changes in net interest margin (NIM), and (2) changes in the loan delinquency rate. Motivated by passage of the Gramm-Leach-Bliley Act (GLBA) in 1999, as well as the significant loan problems witnessed during 2007-09, we examine two separate time periods. For the period following passage of GLBA, bank stock returns are positively related to NIM changes, and negatively related to delinquency changes. But for the pre-2000 period, these statistically significant relationships disappear.

I. Introduction

The basic theme of this paper is how bank loan problems relate to bank stockholder returns. Truth be told, the research started with a statistical “fishing expedition” of sorts. In 2007 and 2008, bank loan problems were becoming increasingly apparent. The ensuing recession brought dramatic consequences for bank profitability, and naturally, for bank stock returns. Hence, the motivating question of the paper presented itself: could we explain, statistically, the returns to bank stockholders by using some basic bank performance measures? And, given the high-profile loan problems associated with the recession, how were *loan delinquencies* associated with bank stock returns?

To foreshadow key results from our “fishing expedition”: we did *catch a big fish*—finding that loan delinquencies display a significantly *negative* relationship to bank stock returns since the year 2000. But *catching that big one* doesn’t tell the whole story. When we extended our examination to the pre-2000 period—notably, prior to the Gramm-Leach-Bliley Act—we found very different results. When this paper concludes, you might say we’re “taking our line out of the water,” yet recognize ample motivation for more *fishing expeditions*.

II. Background: performance measures, stock returns, and the literature

We expect that a firm’s “fundamentals” will have important implications for profitability, and ultimately, for returns to shareholders. Here, we’ll focus on a small set of *bank* fundamentals, or performance measurements, and examine their relationship to bank stockholder returns.

The literature on bank performance measures is large. For those unfamiliar with such measures, a good starting point would be a paper from the Federal Reserve Bank of Atlanta (Hein, Koch, and McDonald, 2005). This piece distinguishes the performance characteristics of smaller, *community banks*, from those of their large-bank brethren. The authors rely on a number of measures. Some are “general purpose” performance measures, applicable to any business—like *return on assets* and the *equity multiplier*. But more important for our purposes are bank-specific measures, such as *net interest margin* and *nonperforming loans*.

Net interest margin (NIM) is a widely-used bank performance measure. It is geared to

the traditional business of banking: borrowing funds (primarily from depositors) and deploying those funds (in loans or securities). Specifically, NIM is *net interest income* divided by the bank's *earning assets*. And net interest income—i.e., the *total interest income* minus the *total interest expense*—encompasses a large portion of the typical bank's income statement. NIM captures information roughly analogous to that provided by a retail firm's *markup*. So a *bigger* NIM is viewed as “good news” for the bank—suggesting a *bigger* reward for bank stockholders.

While a bigger NIM is generally a good thing, it does not tell us about loan *quality*. Timely payback can be an issue. Economic events in 2007 and 2008 drew special attention to nonperforming loans at lending institutions. Hence, we bring in another measure, one designed to capture such problems: loan delinquencies. A higher rate of *loan delinquency* is “bad news” for the bank—implying *lower* returns to bank stockholders.

Our analysis follows a considerable stream of research examining bank returns and bank fundamentals. One prominent piece by Cooper, *et al.* examined the stock returns and fundamentals for a sample of 213 bank holding companies over the period 1986-1999 (Cooper, Jackson, and Patterson, 2003). Specifically, they found that “variables related to non-interest income, loan-loss reserves, earnings, leverage, and standby letters of credit” are important in forecasting bank stock returns (page 817). A more recent paper by Ryan Stever examines bank equity risks and loan portfolio characteristics with data from 1986 to 2003 (Stever, 2007). Stever draws some interesting contrasts between large and small banks. In particular, *betas* of large banks are two to five times higher than those of small banks. Further analysis suggests that the more restricted diversification opportunities of smaller banks induces them to seek out loans with lower credit risk.

We note that most of the data examined in these two papers came from the period prior to passage of the Gramm-Leach-Bliley Act (GLBA). GLBA was passed in November of 1999, and took effect in March, 2000. It permitted U.S. banks to move towards a “universal banking” model—allowing them to operate in the securities and insurance businesses, as well as in traditional banking. And as one might expect, researchers have been examining various dimensions of bank performance, relative to passage of GLBA.

Yeager, *et al.* examined financial statement data on *bank holding companies* (BHCs) and *financial holding companies* (FHCs) between 1996 and 2004 (Yeager, Yeager, and Harshman, 2007). *Financial* holding companies are basically the banking institutions that moved into non-traditional banking activities, like insurance or securities underwriting, under GLBA. According Yeager, *et al.*, GLBA aimed to provide financial firms with added “revenue efficiencies and economies of scale and scope by becoming universal banks.” The authors looked for evidence of performance differences—particularly, differences attributable to a change from *bank* holding company status to *financial* holding company status. In their own words, the authors found that “banking organizations that ultimately became FHCs in the post GLBA era showed little change in condition, profitability, and revenue productivity relative to their performance as BHCs” (Yeager, Yeager, and Harshman, 2007, page 327).

A more recent paper by Geyman and Yeager was also motivated by passage of GLBA (Geyfman and Yeager, 2009). Whereas the Yeager, *et al.* study limited itself to financial

statement data, Geyfman and Yeager examined market return data. In particular, using data from 1990 to 2007, they compared return and risk characteristics of traditional bank holding companies with those companies involved in broader, universal banking activities. They find that “universal banks had similar systematic risk but sharply higher total and unsystematic risk than more traditional banks. Universal banks did achieve modest risk diversification benefits in the post GLBA era....” (page 1667). Geyfman and Yeager’s time period ended in 2007—on the doorstep of what turned out to be a deep recession. However, the authors were careful to acknowledge the potential significance of what was starting to appear, no doubt just as their paper entered the publication review pipeline. As they conjecture: “We suspect that even this risk reduction [from above-mentioned diversification benefits] may disappear as researchers update the sample period to include more of the subprime financial crisis that began in 2007 because the crisis hit universal banks much harder than other banks” (Geyfman and Yeager, 2009, page 1667).

The preceding two papers are indicative of the importance of the GLBA in the banking environment—and especially, the scrutiny devoted by researchers to its impact. And the motivation for our analysis here is very much the same. But at this juncture, we have the added benefit of being able to look at more of the *post-GLBA* period—which, as we know now, includes a period of dramatic loan problems.

III. Data

Our goal is to explain movements to bank stock returns—or, more precisely, to determine if two fundamental bank performance measures will contribute to a *statistical explanation*. To capture bank stock returns, we used publicly-available bank stock index data. Professor Kenneth French’s online data library provides monthly, industry-based stock returns, based on CRSP data (French, 2010). The returns employed here are *value-weighted* index returns for the banking industry. In addition, we compounded the French monthly returns to construct our own series of *quarterly* returns; this was done to achieve consistency with loan data, which are compiled *quarterly* by Federal bank regulators.

The Federal Reserve’s quarterly *loan delinquency rate* data were used to capture loan quality problems (Board of Governors, 2010). These data, for *all loans*, have been published since 1985. Formally, the series tracks delinquent loans and leases, defined as those past-due thirty days or more. These include both loans accruing interest and those in nonaccrual status. The Fed publishes delinquency rates for *three categories of banks*: (a) the *100 largest*, measured by asset size, (b) those *smaller than the 100 largest*, and (c) *all banks*. **Figure I** shows delinquency rates for *all loans*—from 1985 through the first quarter of 2009—contrasting rates for the largest 100 banks with rates for other banks. We note the obvious negative impact of *recessionary* episodes: in the early 1990s, in the early 2000s, and during 2007-09. While the two series plotted in Figure I are positively correlated, there clearly have been more dramatic changes in the “100 largest bank” series.

Quarterly net interest margin (NIM) data, for different size categories of banks, is published by the FDIC in its *FDIC Quarterly*. The FDIC defines its NIM series as “the difference between interest and dividends earned on interest-bearing assets and interest paid to depositors and other creditors, expressed as a percentage of average earning assets.” A

computer-readable version of the NIM series is available at the website of the Federal Reserve Bank of St. Louis. **Figure II** contrasts two separate NIM series, from 1985 through the first quarter of 2009, for: (a) banks of *at least \$15 billion* in asset size, and (b) *all banks*. Clearly, the *largest* banks have shown lower NIMs than banks as whole. One other result discernable from Figure II: for all banks, NIM has been on a fairly consistent “downward march” since the mid-1990s.

The nature of the NIM and delinquency data—especially in view of the plots in Figures I and II—raises the statistical issue of *stationarity*. Applying regression analysis to *nonstationary* data can give misleading results. As indicated by C.W.J. Granger, “few series met with in business or economics appear to be stationary, but rather most contain either trends or long swings...” (Granger, 1980, page 65). And concerning the use of *levels* of economic variables, Granger notes that “such variables often need to be differenced to achieve stationarity. Using them in an indifferenced form can easily lead to spurious regressions....” (Granger, 1980, page 113). Consequently, for the analysis that follows, we transformed the NIM and loan delinquency data. We used one-quarter *changes* in each of these variables.

Finally, our analysis was subject to the constraints of available data. While *NIM* is available from the first quarter of 1984, the *delinquency rate* series started with the first quarter of 1985. And because we “differenced” the data, our first possible observation was for the *second quarter* of 1985.

IV. Empirical method and results

The value-weighted bank index returns (R) were regressed on two independent variables: (1) the one-quarter *change* in the loan delinquency rate (ΔDelinq) and (2) the one-quarter *change* in net interest margin (ΔNIM). In essence, we solved for *slope* coefficients (the betas) in the following equation:

$$R_t = \beta_0 + \beta_1 \Delta\text{Delinq}_t + \beta_2 \Delta\text{NIM}_t + \varepsilon_t.$$

Table I reports results for regressions where: (1) ΔDelinq was the delinquency rate change for *all loans and all banks*, and (2) ΔNIM was change in net interest margin for *all banks*. The *first row* of results in Table I presents output for 2000/Q1 through 2009/Q1. Recall that the year 2000 was the first full year following passage of Gramm-Leach-Bliley. The coefficients display anticipated signs: increasing loan delinquency *hurts* bank stock returns, while increased NIM *enhances* such returns. And the p-values (in parentheses) indicate a high degree of significance.

But what happens when we look back, prior to the year 2000? It turns out that the same kind of regression, applied to the period from 1985/Q2 through 1999/Q4 provides very different results. Consider the *bottom row* of output in **Table I**. The signs of the coefficients are reversed. In addition, p-values on *both* coefficients suggest *no* significant relationship between the independent variables and bank stock returns.

Table II presents the same kind of results— but now, with *large bank* measures employed for each of the independent variables. The dependent variable remains as before:

value-weighted bank stock index returns. Conceptually, this may represent a more suitable “matching” of independent and dependent variables, since the bank index returns are value-weighted, and hence, more reflective of *large bank* results. In these regressions: (1) ΔDelinq is the delinquency rate for *all loans, but only at the largest 100 banks* (by asset size), and (2) ΔNIM is net interest margin at banks with *at least \$15 billion in assets*.

These *large bank* results tell a story similar to what we observed before. Looking at the top row of Table II—for the post GLBA period—the coefficients for ΔDelinq and ΔNIM display the same signs as in Table I. The coefficient on ΔDelinq is highly significant, while the coefficient on ΔNIM is less so (at the 10% significance level). And again, turning to the bottom row of Table II—results for the 1985-1999 period—signs on the coefficients are reversed and statistically *insignificant*.

V. Concluding comments

As suggested in the introduction, we’ve “taken our line out of the water”—at least temporarily—but no doubt, there is more to our “fish story.” Results for 2000-09 are striking. The statistical associations—of loan delinquency changes and NIM changes, relative to bank stock returns—seems to sit well with our financial intuition. But extending our examination to the pre-2000 period raises questions about consistency of these results, and prompts us to ponder the true *driving* forces. We’re left with a puzzle. It is unfortunate that data limitations do not permit an examination of years prior to 1985.

We have treated the year 2000 as a crucial and potentially interesting *break point*—primarily because of the Gramm-Leach-Bliley Act (GLBA), which was passed near the end of 1999. Yet, one could argue that a number of the changes codified in GLBA were already a reality for bank holding companies prior to the Act’s passage. Starting in the 1980s, the Federal Reserve began interpreting the Glass-Steagall Act in an increasingly “liberal” manner. Bank holding companies were gradually permitted to engage in underwriting activities, through so-called “Section 20” subsidiaries. In addition, the banking industry has exhibited tremendous consolidation over recent decades. The Riegle-Neal Act of 1994 brought about interstate banking, no doubt motivating some of the recent consolidation activities.

On the surface, one could argue that larger, more diversified banking organizations would be *less* vulnerable to movements in fundamentals like loan delinquencies or NIM. Obviously, our analysis does not confirm this. And in this regard, we can view our results as being consistent with the conjecture, noted earlier, in the 2009 Geyfman and Yeager paper.

We end with one last observation. The period from 2000 to 2009 is a notable one, but *not just because* it is in the *post-GLBA* era. It was also a decade characterized by *two significant recessions*. By contrast, the earlier 1985-1999 period displayed just one economic slowdown—and a rather mild one (in the early 1990s). It *could* be that bank fundamentals have an asymmetric impact, as we move from booming to recessionary time periods. It is possible that the high-profile change in U.S. banking law near the end of 1999 may have been an “accompanying event,” rather than the primary “causal event,” in the explanation of bank stock returns.

Figure I

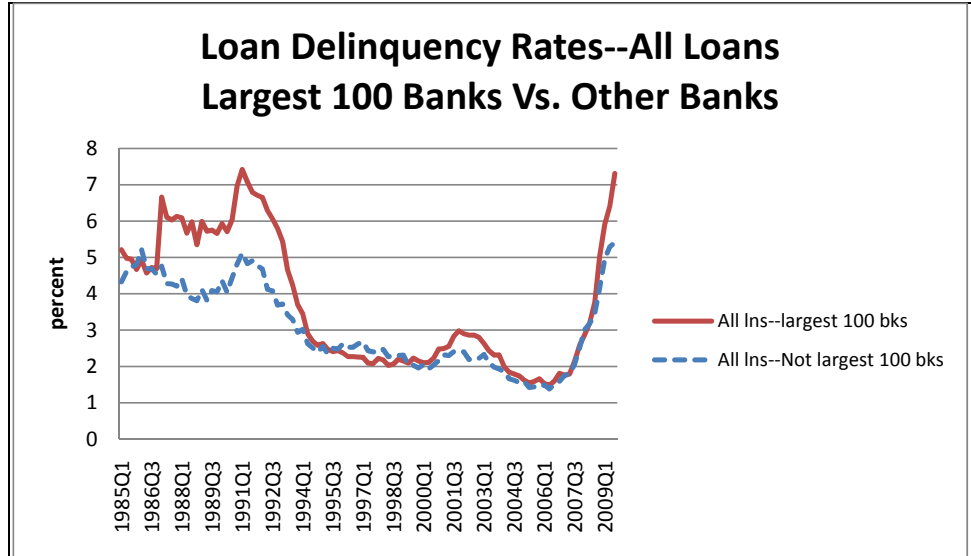


Figure II

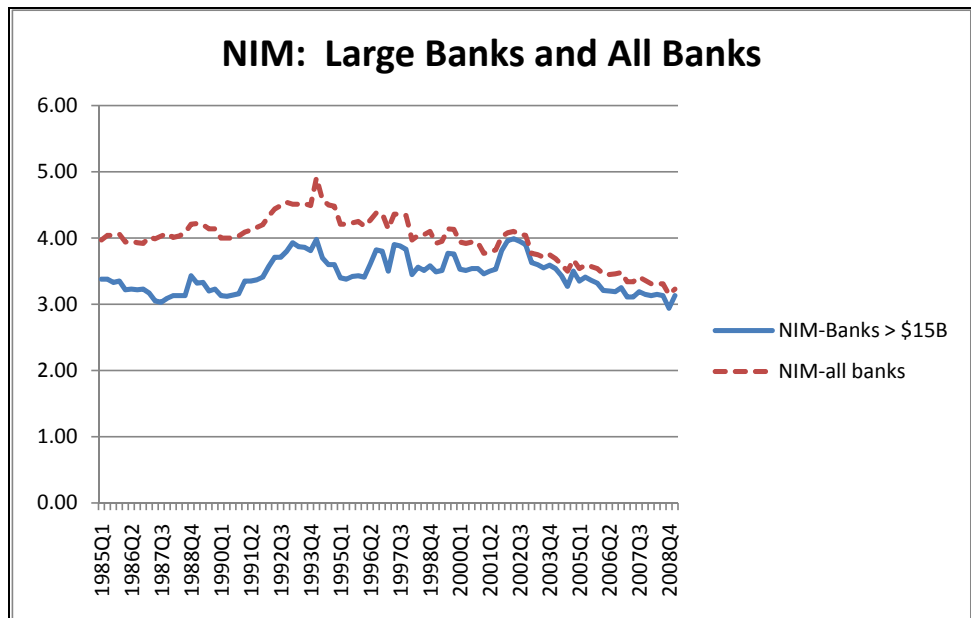


Table I “All Bank” Results $R_t = \beta_0 + \beta_1 \Delta \text{Delinq} + \beta_2 \Delta \text{NIM}_t + \varepsilon_t$ R_t: Value-weighted stock index returns, CRSP banks (p-values in parentheses)			
Time period	β_1 ΔDelinq <i>all loans, all banks</i>	β_2 ΔNIM <i>all banks</i>	n
2000/Q1-2009/Q1	-27.1197^{***} (0.0000257)	14.1278^{**} (0.02897)	37
1985/Q2-1999/Q4	3.4699 (0.5089)	-7.0049 (0.5828)	59
^{***} Significant at the 1% level. ^{**} Significant at the 5% level.			

Table II “Large Bank” Results $R_t = \beta_0 + \beta_1 \Delta \text{Delinq}_t + \beta_2 \Delta \text{NIM}_t + \varepsilon_t$ R_t: Value-weighted stock index returns, CRSP banks (p-values in parentheses)			
Time period	β_1 ΔDelinq <i>all loans, largest 100 banks</i>	β_2 ΔNIM <i>banks > \$15B</i>	n
2000/Q1-2009/Q1	-24.7395^{***} (0.0000577)	26.5544[*] (0.0720)	37
1985/Q2-1999/Q4	2.3919 (0.5367)	-1.2488 (0.9138)	59
^{***} Significant at the 1% level. ^{**} Significant at the 5% level. [*] Significant at the 10% level.			

References

- Board of Governors of the Federal Reserve System, *Statistics and Historical Data, Charge-Off and Delinquency Rates on Loans and Leases at Commercial Banks*, 2010, and periodically updated, retrieved at: <http://www.federalreserve.gov/econresdata/releases/statisticsdata.htm>.
- Cooper, Michael J., Jackson III, William E., and Patterson, Gary A., Evidence of predictability in the cross-section of bank stock returns, *Journal of Banking and Finance*, 27, 2003.
- French, Kenneth R., *Data Library*, 2010, and periodically updated, retrieved at http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html
- Geyfman, Victoria, and Yeager, Timothy J., On the riskiness of universal banking: evidence from banks in the investment banking business, pre and post-GLBA, *Journal of Money, Credit, and Banking*, 41, December, 2009.
- Grainger, C.W.J., *Forecasting in Business and Economics*, Academic Press, 1980.
- Hein, Scott, Koch, Timothy, and S. Scott MacDonald, On the uniqueness of community banks, *Economic Review*, Federal Reserve Bank of Atlanta, 90, No. 1, First Quarter, 2005, retrieved at: <http://www.frbatlanta.org/filelegacydocs/Hein%20article-final.pdf>
- Stever, Ryan, Bank size, credit, and the sources of bank market risk, *BIS Working Papers*, No. 238, November, 2007, retrieved at <http://www.bis.org/publ/work238.pdf?noframes=1>
- Yeager, Timothy J., Yeager, Fred C., and Harshman, Ellen, The Financial Services Modernization Act: evolution or revolution?, *Journal of Economics and Business*, 59, 2007.

Improvements in NYSE Trading and Information Technology: 1878-1984

Joan C. Junkus

Abstract

Improvements in the technology of information flow and execution/clearing at the New York Stock Exchange between 1878 and 1984 were examined for their effects on price volatility and trading volume. Overall, price volatility was found to decrease after an improvement in trading technology, while both volume and intra-day volatility increased after an improvement in information flow. Noise traders may be attracted by faster information flow, even in the absence of new information, and bring additional volatility to the market. Solutions to the problem of such noise traders might involve increasing the ease of trading, and thus liquidity, to dampen price volatility.

I. Introduction

One of the most profound changes in the operation of capital markets is the introduction of the internet. Investors now have access to vast amounts of information in real time, and more importantly, can act on that information and trade more quickly than ever before. Improvements in telecommunications, combined with the ability to use smart systems to analyze information and algorithmically trade based on this analysis, have led to a veritable explosion of innovations in asset trading and price discovery. However, while investors demand real-time information and on-line execution, concerns about excess volatility have led to calls to control trading through a variety of means including circuit breakers, taxes on short-term trading, and short selling restrictions.

What happens to a market as new technology allows faster information flow or cheaper trade execution? This paper examines the effect of several historical improvements in information and trade technology on the volatility of stock prices and returns and the volume of trading. Ten changes in the technology of information delivery and/or of the efficiency of trading on the New York Stock Exchange (NYSE) are analyzed. Analysis of these historical effects, ranging in date from 1878 to 1984, can provide a useful insight into the possible short- and long-term effects of more recently introduced technology changes. Based on these results, the implications for policy to control the effects of noise trading are discussed.

II. Theoretical models

The question of whether technological change impairs the functioning of capital markets has profound policy implications. Securities markets perform the vital societal functions of allocating scarce capital, facilitating risk management, and processing information on investment assets for investors. Two models of investor behavior draw vastly different conclusions about the effects of changing securities market operations and propose sharply different policy prescriptions to deal with these changes. Those who subscribe to the noise model (Black 1986 and DeLong *et al.* 1989; 1990a,b; 1991) believe that many investors trade irrationally, acting on the basis of “noise” rather than on fundamental information (Cipriani *et al.* 2005). Such speculation can move prices away from fundamental values for long time periods. Such noise

Joan C. Junkus, Ph.D., is Associate Professor of Finance at DePaul University, Chicago, IL 60604. She can be contacted at: jjunkus@depaul.edu

traders are not quickly dispatched by their rational counterparts, and additional systematic risk is created, increasing the volatility of capital markets. Those subscribing to this model will logically propose various schemes to impede the working of the financial markets, to "throw sand in the gears" (Tobin 1984). Impeding the flow of orders or information is antithetical to those who believe in the alternative efficient markets hypothesis (EMH). (See Fama 1965; Ross 1989.) In this model, speculators add liquidity to the market. Noise traders will be quickly eliminated by rational arbitrageurs, driving prices to fundamental values. Thus, there should be as few impediments to trading as possible. A number of empirical studies have tested the DeLong version of the noise model against the EMH (see, for instance, Palomino 1996 on small markets, Brown 1999 on closed-end investment funds, and Sanders *et al.* 1997 on futures markets).

III. Technology

There are two basic ways that technology can change operations in the trading arena. Technology can speed information flow by making prices or news available faster. Technology can also change the trading process itself, making it easier or cheaper to trade. These two changes will have different effects. In an efficient market, increases in the speed of information flow should have little effect on prices. The price of a financial asset should remain close to its equilibrium level until significant new information arrives to change that equilibrium level (Fama 1965); speeding the arrival of information does not increase the amount of news, nor volatility. By contrast, making trading itself more efficient can be expected to increase trading by bringing in additional traders or by increasing the amount of trading done. It is here that the efficient market and noise models part company. Critics of the current operation of US markets argue that the additional traders are not information traders, who value stocks based on a rational interpretation of all available information, but are rather noise traders, who buy and sell on the basis of price trends rather than values (Black 1986). Since noise traders, attracted by innovations that lower transactions cost, will make markets inefficient and give rise to what has been labeled "excess volatility" (Edwards 1988), such innovations must be examined for possible harmful effects, and if harmful, must be controlled. Such controls include circuit breakers currently in place, and proposals to add a tax on short-term securities transactions (Schwert *et al.* 1993). Examples of such policy proposals, formulated after the large decline in stock prices at the end of the 1980s, include Stiglitz 1989 and Summers *et al.* 1989. More recent efforts to deal with increased volatility and large declines in stock prices include calls for the reinstatement of the uptick rule and the prohibition of short-selling in various classes of financial stocks.

While readily embracing improvements in information systems, the NYSE has been slower to change the way the auction market itself works, and alternative trading venues such as ECNs have proliferated to compete by supplying markets attuned to different investor preferences for best price, instantaneous execution, liquidity, and other criteria. While the NYSE has attempted to respond to this competition, the trading system is still overlaid on a specialist system and a method of order execution that remains almost identical to that developed at the turn of the 20th century.

This paper seeks to answer two questions. First, does a change in the technology of the marketplace, either in information flow or in trade execution, change market volatility?

Secondly, does a change in technology attract noise traders? Ten historical technology events are examined. Four of these innovations in technology involve the transmission of transaction price data, and are considered information flow events, and six involve changes in trade execution.

Changes in Information Flow:

(1) Ticker speed (December 1, 1964): ticker speed increased from 500 to 900 characters per minute. With this change, the ticker could report both volume and price on all trades; previously, volume was omitted if the ticker fell behind by more than two minutes.

(2) Automation (February through December, 1966): transmission of transactions data from the specialist posts to the ticker and quote services was automated. "Automation" involved the preparation of a coded computer card at the specialist post with the relevant transaction information. This was submitted immediately to the system, where it was read by a computer and transmitted to information vendors and the tape. Previously, transaction information was written on paper by the specialist, transmitted through a pneumatic tube to a tape-punch operator, and from there the transaction would be reported. According to the Wall Street Journal (12/20/66), this technology change had the effect of reducing the transmission time of price and volume from minutes to seconds. The system was introduced gradually: the first posts were automated in February, 1966, and the last 18 trading posts in December, 1966.

(3) High speed transmission (January 19, 1976): On this date, a new high-speed transmission line began transmitting market data from the NYSE to desktop quotation devices at speeds of up to 36,000 characters per minute, thus allowing anyone with such a device to receive current price information even if the ticker or tape was delayed.

(4) CQS (August 8, 1978): The NYSE inaugurated the Consolidated Quote System which allowed brokers and customers to receive bid and ask quotes, with size, in listed stocks for all US markets. This change increased the price information available to brokers and institutions, Order information, that is, current price information on a stock from all the exchanges on which it was listed, gave traders more price information than the "historic" price information of executed trades included in the consolidated tape.

Changes in Trade Execution:

(5) Telephone (November 13, 1878): On this date, the NYSE trading floor was equipped with telephones. Although the introduction of the telephone may appear to be an information event, its primary effect was to increase the speed of order flow to the Exchange (Sobel 1965). Prior to the telephone's introduction, an order could be executed for a customer only through his physical presence or by means of a messenger. Thus, the main effect of the telephone was that an investor need no longer be physically present in order to buy or sell stocks.

(6) Central clearing (May 17, 1892): Prior to 1892, the NYSE had no clearing procedure. Settlement was left to individual brokers involved in the trade, and without a centralized clearing function, all stock trades resulted in delivery of securities and payment. On this date, the NYSE instituted daily centralized clearing in the four most actively traded stocks (accounting for 1/3 of the total volume on May 16th (Bradstreet's, May 21, 1892)). Four additional stocks were added

the next week. The clearinghouse operated by comparing the daily transactions in stocks submitted to it by member firms, and by 10 AM the next morning delivering to the firms orders regarding the balance of securities to be delivered and the amount of settlement checks required. Bradstreet's (4/9/1892) characterized the clearinghouse as "the most radical innovation which it (the Exchange) has ever introduced into its business methods".

(7) Stock Clearing Corp. (April 26, 1920): The Stock Clearing Corporation was established on this date, replacing the NYSE Clearinghouse. In addition to improving the procedures for stock clearing, the corporation was designed to facilitate loans for members of the NYSE. As evidence of the improvement in clearing procedures, the Financial Chronicle (5/1/20) estimated that the new system would save the drawing of 3,000 checks daily and treble the efficiency of the messenger system.

(8) DOT (March 1, 1976): The Designated Order Turnaround system enables member firms to transmit small-size orders electronically to the NYSE's posts for automatic execution. A market order transmitted to the NYSE receives a "reference price" when it is received by the DOT system. At its introduction, if the specialist did not report execution of the order within three minutes, the order was executed at this reference price for the specialist's own account.

(9) ITS (April through December, 1978): The Intermarket Trading System was the NYSE's electronic linkage to the other two national exchanges (AMEX and NASD) and to the 5 major US regional exchanges. After an initial 11 stocks with dual listings were linked, issues were added periodically so that by the end of 1978 the system included all stocks listed on more than one exchange. At its inception, ITS displayed the price quotes on firm commitments (good for 2 minutes) from the market makers in all seven of the exchanges extant at that time, and included an electronic linkage for intermarket execution. With ITS, a broker on the floor of the NSYE can choose to trade at the specialist's quote or take the ITS order displayed on the specialist's screen.

(10) SuperDOT (November 16, 1984): The SuperDOT system for larger orders was introduced. At the time, the automated order system could handle 95 order transmissions per second and the limit on the number of shares for 3-minute execution was 2,099 (Brady 1988). SuperDOT is still used at the NYSE.

Table I summarizes the ten historical technology events.

Table I
Technology Events

<u>Information Flow Events</u>	<u>Date of Event</u>
(1) Ticker Speed—faster ticker (900 characters)	Dec. 1, 1964
(2) Automation to tape reporting	Feb – Dec 1966
(3) HiSpeed Transaction data to vendors	Jan 19, 1976

(4) Consolidated Quote System Execution Events	Aug 8, 1978
(5) Telephone introduced	Nov 13, 1878
(6) Central clearinghouse established	Mar 17, 1892
(7) Stock Clearing Corp. established	Apr 26, 1920
(8) DOT system inaugurated	Mar 1, 1976
(9) Integrated Trade System installed	Apr – Dec, 1978
(10) Super DOT system commences	Nov 16, 1984

IV. Data and Methods

Daily levels for the Dow-Jones Index are taken from the Dow-Jones Averages: 1885-1985 for 90 days prior to and after the event. (Since it appears that a technology is used as soon as it is available (Garbade *et al.* 1978), 90 days is consistent with substantive incorporation of the technology.) The index levels for events after 1900 are for the Dow-Jones Industrial Average of 30 stocks. For 1892, the broadest Dow-Jones Index available is the Dow-Jones 20 (18 railroad and 2 industrial stocks). For the 1878 telephone event, only monthly indexes are available (from Cowles 1939), and monthly levels are taken for a period of two years prior to and after the event. For “split” events (the 1966 and 1978 events involved a gradual introduction of the technology change), index levels were for 90 days prior to the first introduction and 90 days after completion of the innovation. For events after 1892, daily volume figures are given by Dow Jones, and for events after 1920, daily high and low prices are available as well. Returns, r_t , are calculated as the natural logarithm of index levels, I_t : $r_t = \ln(I_t / I_{t-1})$.

Statistical Tests:

Autocorrelation of returns. A significant change in the price formation process should affect the autocorrelation structure of returns. If information is incorporated slowly over a period of days, there should be significant autocorrelation between days. This autocorrelation should decrease after the technology change if the change affected information incorporation.

Volatility. Variances for each before-and-after period, and the F statistics testing equality of variance between periods, were calculated. In addition, z statistics testing equality of mean return between periods were estimated. If market returns increase, then the variance of returns is expected to increase as well. This variance test involves closing prices. High and low prices also contain information on market volatility, so a second estimate of volatility uses the high and low for the trading day. The natural log of the high and low price was calculated, normalized, averaged over the periods before and after, and tested for equality of variance between periods. (See Bookstaber 1991.)

Volume. Average volume was calculated for the period before and after the event, and

equality of mean volume tested between periods.

Market movement. To measure market movement before and after, two measures were used. The mean market return, before and after, was calculated and in addition, the mean Dow Jones index value was calculated; equality of means was tested between periods using a z statistic.

V. Results

Confirmation of the Effect of Technological Change:

Table II shows the average autocorrelation for the nine events for which daily index information is available for lags 1 through 15 before and after technological change. There is a sizeable decrease in the autocorrelation structure for 12 of the 15 lags after the change in technology. The probability of this result occurring by random chance is .00139%. This indicates that there was, indeed, an increase in the speed of information incorporation into prices: the technological changes were significant information events.

Table II
Return Autocorrelations Averages for Lags 1 through 15

Lag	Before Event	After Event
1	0.1029	0.0323*
2	0.0100	0.0082*
3	0.0551	-0.0115*
4	-0.0045	-0.0370*
5	-0.0316	-0.0310
6	0.0052	-0.0294*
7	-0.0196	-0.0263*
8	-0.0292	-0.0036*
9	-0.0604	-0.0494
10	-0.0175	-0.0449*
11	0.0858	0.0027*
12	-0.0283	-0.0433*
13	0.0056	-0.0287*
14	-0.0305	-0.0359*
15	0.0302	-0.0334

* = indicates smaller autocorrelation average after technology event

Effect of Historical Changes in Technology: In comparing the effects of information flow events to those of trade execution events, we look at volatility, volume, and market movement. Tables IIIa and IIIb list the major statistical results for the 10 events.

(1) Does a change in the technology of the market change market volatility? While it is noted that the statistical data have limitations, particularly for the earlier time periods, several

intriguing indications can be gathered from the volatility tests. (See Table IIIa.) Under the standard volatility test, almost all of the trade execution events (Events 5 through 10) indicate a decrease in volatility (the exception is the ITS (Event 9), a split event). From this result, it would appear that making trading easier or cheaper may actually decrease trading volatility, particularly over the long run. In comparing the expectations of the noise versus the EMH model, easier entry into the marketplace may serve to speed the work of rational traders, allowing them to more easily arbitrage away the price differences due to irrational traders.

Table IIIa
Volatility Results
Result Summary

	Variance Increase Or Decrease *	High-Low ^(a) Increase or Decrease *
<u>Information Flow Events</u>		
(1) Ticker Speed (1964)	D	I
(2) Automation (1966)	I*	I*
(3) HiSpeed (1976)	D	I*
(4) CQS (1978)	I	I
Execution Events		
(5) Telephone (1878)	D	n/a
(6) Central clrnghse (1892)	D	n/a
(7) Stock Clrng Corp (1920)	D*	n/a
(8) DOT (1976)	D	D*
(9) ITS (1978)	I*	I*
(10) SuperDOT (1984)	D	I

Numerical Results

<u>Information Flow Events</u>	Variance estimate		High-low		Variance estimate	
	Var1	Var2	F	H/L1	H/L2	F
(1) Ticker Speed (1964)	.000016	.000014	1.1232	.006854	.007140	1.0854
(2) Automation (1966)	.000018	.000033	1.8293*	.007132	.010758	2.275*
(3) HiSpeed (1976)	.000092	.000069	1.3355	.010401	.017079	1.642*
(4) CQS (1978)	.000066	.000102	1.5339	.008867	.010026	1.2784

Execution Events

(5) Telephone (1878)	.001371	.001195	1.1467	n/a		
(6) Cntrl clrnghse (1892)	.000038	.000034	1.1036	n/a		
(7) Stck Clrng Corp (1920)	.000194	.000111	1.7522*	n/a		
(8) DOT (1976)	.000080	.000050	1.3555	.01532	.00920	1.672*
(9) ITS (1978)	.000054	.000102	1.8949*	.008168	.010246	1.613*
(10) SuperDOT (1984)	.000080	.000062	1.2759	.009932	.010015	1.0168

$$(a) \text{ High-low estimator} = \frac{t}{S} = \frac{\sum_{n=1} 0.601 \ln(H_t / L_t)}{n=1}$$

* = significant at the 5% level

$$F \text{ statistic} = (s_2)^2 / (s_1)^2$$

Table IIIb
Volume and Return Results
Results summary

	<u>Volume</u>		<u>Market Return or Average</u>	
	Volume Increase Or Decrease *	% change in volume Decrease*	Market Avg Increase or or Decrease*	Market Ret Increase
<u>Information Flow Events</u>				
(1) Ticker Speed (1964)	I*	6.86	I*	I
(2) Automation (1966)	I*	81	D*	I
(3) HiSpeed (1976)	I*	44	I*	D
(4) CQS (1978)	I*	10	I*	D
Execution Events				
(5) Telephone (1878)	n/a	n/a	I*	I*
(6) Cntrl clrnghse (1892)	n/a	n/a	D*	D
(7) Stck Clrng Corp (1920)	I*	-46	D*	D
(8) DOT (1976)	D*	-22	I*	D
(9) ITS (1978)	I*	53	I*	D
(10) SuperDOT (1984)	I*	17.7	I*	D

Numerical Results

<u>Information Flow Events</u>	Before	<u>Volume</u>	z stat	Market Average z stat	Market Return z stat
		After			
(1) Ticker Speed (1964)	5005.1	5348.5	-2.6070	-4.6398*	-0.1217
(2) Automation (1966)	5430.8	9836.5	-17.6008*	13.7859*	-1.3678
(3) HiSpeed (1976)	18008	2609.6	-7.0902*	-33.3433*	0.8071
(4) CQS (1978)	30870	3400.8	-2.1489*	-11.2556*	1.7241

Execution Events

(5) Telephone (1878)	n/a	n/a	n/a	-8.9255*	-2.1639*
(6) Cntrl clrnghse (1892)	n/a	n/a	n/a	17.1449*	0.5160
(7) Stck Clrng (1920)	1047.7	556.4	12.5588*	12.5588*	0.3468
(8) DOT (1976)	25499	19932	-10.3270*	-10.3269*	1.1882
(9) ITS (1978)	21734	33276	-26.9916*	-26.9916*	0.6700
(10) SuperDOT (1984)	89749	105650	-2.1594*	-2.1594*	0.2344

* = significant at the 5% level

Using a second volatility measure, high-low price volatility, it appears in contrast to the above that speeding information flow (Events 1 through 4) may lead to increased intra-day volatility. Examination of price movements within the day shows that there is more volatility when traders receive information more quickly. All four events lead to increased volatility; in two cases, the increase is significant at the 5% level or better.

Why would the speed of information flow increase the volatility of intra-day prices? One explanation is that faster information flows trigger additional and more concentrated trading. Noise traders are attracted to trade, not by new information, but by the appearance of increased market activity. Such a concentration of trading activity leads, in turn, to greater order imbalances and larger price moves. Thus, market liquidity may be a concern when information becomes available to the market more quickly. This finding can help to explain the apparent increase in volatility experienced more recently in the wake of the SEC ruling on company announcements to analysts. As companies have announced information to the general market at the same time that they release it to stock analysts, these announcements have generated much larger changes in stock prices than occurred previously. The information flow has led to more concentrated trading on that flow as everyone trades on that information at the same time.

Does technology change affect market volatility? We may tentatively conclude that information flow events may increase intra-day volatility, while trade execution events may decrease daily volatility.

(2) Does a change in technology lead to an increase in the volume of trading and noise trading? For all of the information flow events (Events 1 through 4), volume increased

significantly after the change (see Table IIIb). Faster information flow seems to lead to increased trading. This may indicate that noise traders are attracted to trade by the increased availability of information, even in the absence of new information.

Examination of trade execution events (Events 5 through 10), on the other hand, indicates that noise traders are not necessarily attracted to trading if it is made easier for them. Making trades easier or cheaper did not have a clear effect on the subsequent volume of trading. Sometimes volume increased (as with the ITS and SuperDOT improvements), at other times it did not (as with the DOT and clearing corporation improvements). Thus, interfering with the trading process itself may not be an effective remedy for excess volatility. Since noise traders do not necessarily increase their trading when the process is made easier or cheaper, they may not be so easily discouraged by making trading slower or more expensive.

Further, the direction of volume change after trade execution improvement was not closely correlated with a bull or bear market. This is an interesting result in that it shows that even when the market average increases significantly, facilitation of trading does not necessarily attract more trading. Thus, in a rising market, attempts to avoid speculative bubbles by “throwing sand in the gears”, making trading more expensive or more difficult, may not in fact address the mechanism by which such bubbles begin.

Does technology change influence volume of trading? We may conclude that information flow events seem to increase market volume, while trade execution events may not have such a direct effect. Again, these results are subject to the limitations of the statistical tests.

(3) Does an increase in trading caused by technology change increase the volatility of stock returns? The answer, again subject to the limitations of these statistical tests, is yes. Price volatility appears to follow volume changes very closely (Table IIIc.) Significant decreases in volatility are associated with the largest decrease in trading, and significant increases in volatility are associated with the largest volume increases. This is consistent with the results in Schwert (1989), who, like many others, found a significant relation between stock market volatility and trading volume reaching back to 1857. (For a review of the research on volume and volatility in stock prices, and models proposed to explain the relationship, see Karpoff 1987.) Thus, changes that affect volume of trading have the most impact on market volatility.

Table IIIc
Volume and Volatility Results

	High-Low Increase or Decrease *	% change in volume
I. DOT (1976)	D*	-22
(1) Ticker speed (1964)	I	6.86
(4) CQS (1978)	I	10

(10)	SuperDOT (1984)	I	17.7
(3)	Hi-speed trans (1976)	I*	44
II.	ITS (1978)	I*	53
(2)	Automation (1964)	I*	81

* = significant at the 5% level

VI. Implications

What attracts noise traders to the market? It appears that increasing the speed of information flow—without providing new information to the market—leads to increased trading and increased market volatility. The EMH postulates that only new information can lead to a change in market prices, while the noise model argues irrational investors acting on the basis of something other than fundamental information can change prices. As we see here, it appears that at least some investors are trading in response to a substitute for new information—an increase in the speed of information flow.

Given this result, it would seem then that such ‘excess volatility’ could be addressed directly through the slowing of information flow to the market. However, current regulatory philosophy, at least in the United States, would find such an impediment to the free flow of information to markets unappealing to say the least.

If the information flow to the market is not subject to restrictions, should the trading process itself be controlled to discourage noise traders? The evidence from the execution events suggests that the answer is no. It is the volume of trading that exerts the strongest effects on volatility. Noise traders do not necessarily increase their trades when trading is made easier. Since trade execution does not have a direct effect on the volume of trading, it is difficult to argue that noise traders would necessarily be discouraged from trading were trading made harder to do.

More importantly, the execution events studied here also show that it is precisely when trade execution is made easier or cheaper that price volatility seems to decrease. It appears that ease of execution may make it possible for speculators to defeat noise traders more easily as the EMH asserts that they will. Calls for impeding trade execution might actually defeat this adjustment process, or at least slow it considerably. Rather than diminish volatility, trading restrictions could actually increase it.

VIII. Conclusion

Historical events can shed valuable light on current issues in the market. In looking at past technology changes and their effects on market volatility, volume, and returns, several results stand out. First, technological innovations which increase the speed of information lead to greater trading volume and to higher returns volatility. As noise theory maintains, it would appear that noise traders are attracted to trade in the absence of new information, and bring

additional volatility to the market when they do.

Secondly, technological innovations which facilitate trade execution seem to lead to decreased market volatility, but not necessarily increased volume, even in a rising market. This is consistent with the EMH argument that easier entry into the market facilitates the work of rational traders in diminishing the movement of prices away from fundamental values. At the same time, there is little evidence that changes in trade execution technology affect noise traders' willingness to trade. We have thus argued that solutions to the problem of noise traders should be approached through an effort to increase liquidity and attract rational investors rather than through slowing trading for all.

Finally, the effect of the latest technological innovations at the NYSE, such as the internet, can be expected to increase the speed of information flow dramatically. Based on past changes in technology examined here, such improvements may in turn increase both volume and volatility in the market. Given the continual improvement in the speed of new technology, the problem of excess market volatility--and the need for regulators to fashion a workable solution--can be expected to persist and indeed to grow.

References

- Black, F. "Noise." *Journal of Finance* 41 (1986), 529-43.
- Brady, N.F. (1988) *Report of the Presidential Task Force on Market Mechanisms*, Commerce Clearing Corp.
- Bookstaber, R.M. (1991) *Option Pricing and Investment Strategies*, Probus Publishing.
- Brown, G. W. "Volatility, Sentiment, and Noise Traders." *Financial Analysts Journal* 55 (1999), 82-90.
- Cipriani, M. and A. Guarino. "Noise Trading in a Laboratory Financial Market: A Maximum Likelihood Approach." *Journal of the European Economic Association* 3 (2005), 315-21.
- Cowles, A. (1939) *Common Stock Indexes, 1871-1937*, Principia Press.
- DeLong, J.B., A. Shleifer, L.H. Summers, and R.J. Waldmann. "The Size and Incidence of the Losses from Noise Trading." *Journal of Finance* 44 (1989), 681-96.
- DeLong, J.B., A. Shleifer, L.H. Summers, and R.J. Waldmann. "Noise Trader Risk in Financial Markets." *Journal of Political Economy* 98 (1990a), 703-38.
- DeLong, J.B., A. Shleifer, L.H. Summers, and R.J. Waldmann. "Positive Feedback Investment Strategies and Destabilizing Rational Speculation." *Journal of Finance* 45 (1990b), 379-95.
- DeLong, J.B., A. Shleifer, L.H. Summers, and R.J. Waldmann, "The Survival of Noise Traders in Financial Markets." *Journal of Business* 64 (1991), 1-19.
- Edwards, F.R. "Policies to Curb Stock Market Volatility." *Center for the Study of Futures Markets Working Paper* (1988) #176.
- Fama, E. "The Behavior of Stock Market Prices." *Journal of Business* 38 (1965), 34-105.
- Garbade, K.D. and W.L. Silber. "Technology, Communication and the Performance of Financial Markets: 1840-1975." *Journal of Finance* 33 (1978), 819-32.
- Karpoff, J.M. "The Relation between Price Changes and Trading Volume: A Survey." *Journal of Financial and Quantitative Analysis* 22 (1987), 109-126.
- Palomino, F. "Noise Trading in Small Markets." *Journal of Finance* 51 (1996), 1537-50.
- Pierce, P. (1986) *The Dow-Jones Averages: 1885-1985*, Dow Jones-Irwin.
- Ross, S.A. "Information and Volatility: the No-Arbitrage Martingale Approach to Timing and Resolution Irrelevancy." *Journal of Finance* 44 (1989), 1-17.
- Sanders, D.R., S.H. Irwin, and R.M. Leuthold. "Noise Traders, Market Sentiment, and Futures Price Behavior." *University of Illinois Office for Futures and Options Research Working Paper* (1997) #97-02.
- Schwert, G. W. "Why Does Stock Market Volatility Change Over Time?" *Journal of Finance* 44 (1989), 1115-1153.
- Schwert, G.W. and P.J. Sequin, "Securities Transaction Taxes: An Overview of Costs, Benefits, and Unresolved Questions." *Financial Analysts Journal* 49 (1993), 27-35.
- Sobel, R. (1965) *The Big Board: A History of the New York Stock Exchange*, Macmillan.
- Stiglitz, J.E. "Using Tax Policy to Curb Speculative Short-Term Trading." *Journal of Financial Services Research* 3 (1989), 101-15.
- Summers, L.H. and V.P. Summers, "When Financial Markets Work Too Well: A Cautious Case for a Securities Transactions Tax." *Journal of Financial Services Research* 3 (1989), 261-86.
- Tobin, J. "On the Efficiency of the Banking System." *Lloyds Bank Review*. (1984).

Is APV Better than WACC for Non-Stationary Debt Ratio?

Howard Qi and Guangsen Han

Abstract

The WACC method is normally considered suitable for firms maintaining a constant debt ratio; while the APV method is more convenient when debt policy and tax rate are more complex. However, we show that this is incorrect in that the APV method actually requires knowledge about more variables (than the WACC method does) in order to implement accurately. On top of this, the central issue (with the APV method) regarding the discount rate for the tax shields is still an open question to a large extent, which makes the APV method even more unreliable.

The two-year example provided in this study is set up in a style as general as possible. This allows for an easy extension to more general and realistic situations. Therefore, we clarify a widespread yet mistaken notion about the WACC and the APV method. Not only does it correct a longstanding misconception in academics, but it also has useful implications in practice.

Introduction

It is a widespread belief that the WACC (weighted average cost of capital) valuation method is valid only when the firm continuously rebalances its capital structure to maintain a constant debt ratio, while the APV (adjusted present value) method, proposed by Myers (1974), is more robust and can be used more conveniently for firms not having a specific target debt ratio and/or firms in emerging economies where leverage decisions are a matter of opportunistic nature and the tax legislation can change frequently. For example, Sabal (2007) asserts that the APV method is more appropriate for firms in emerging markets because the tax shields can fluctuate due to a variety of uncertainties such as new tax legislations and opportunistic leverage decisions. By the same token, Sabal also claims that the WACC method is a good approximation for firms in industrialized economies where they tend to maintain a target leverage ratio. These views are fairly representative (see for example, Pereiro 2002). In this study, we analyze whether the claim of the APV's superiority (over the WACC method) is indeed theoretically sound and practically feasible.

The reason that the APV method appears to be more flexible than the WACC method is mostly based on two points. First, suppose the WACC method does require constant debt ratio and constant tax rate, then the tax shields cannot be arbitrary but a fixed proportion of the total firm value, which is a very restrictive condition. Second, if the tax shields over different periods of time become irregular due to changing tax rate and/or uncertainty in debt policy, the APV method is still applicable because it does not impose any restrictions on the tax shields. In other words, the APV method requires the correct forecasts of the future tax shields, while the WACC method requires certain pattern of the forecasted tax shields as well. However, a careful examination of these two points seems to cast serious doubts on their accuracy as well as the validity of some of their implications we usually encounter.

Howard Qi is an Assistant Professor of Finance at Michigan Technological University. Guangsen Han is a senior research scientist and engineer at the Institute of Agricultural Mechanical Engineering of Shanxi Province, China. Contact address: School of Business and Economics, Michigan Technological University, 1400 Townsend Drive, Houghton, MI 49931. Email: howardqi@mtu.edu; fax: 906-487-2994.

The first point about constant debt ratio as a necessary condition for the WACC method to be valid can be shown to be incorrect. For example, Johnson and Qi (2008) demonstrate that the WACC method at least is also applicable for the fixed-debt scenario where the leverage ratio may vary period by period. In addition, Qi (2010) argues that it is not a reliable belief that most firms in industrialized economies tend to maintain a constant debt ratio. On the contrary, it is normally harder for large firms to frequently change their debt level to meet the target they do have one, and there is ample evidence in support of this view. For example, Fischer, Heinkel and Zechner (1989) find that firms operate within a wide range of leverage ratio because they do not continuously rebalance their capital structure. Graham and Harvey (2001) collect evidence that a large number of managers do not rebalance their capital structure in response to equity market movements because the presence of adjustment costs prevents firms from rebalancing continuously. Hittle, Haddad and Gitman (1992) show that only a small percentage of the large US firms set a target leverage ratio. Alternative theories such as the pecking order theory has demonstrated to have considerable explanatory power as to why firms may not have a well defined target ratio (see e.g., Myers 1993; Liesz 2003; Byoun and Rhim 2003; and Titman and Wessels 1988). Study by Frank and Goyal (2003) finds that the pecking order theory works much better especially in the 1970s and 1980s.

The second point about the superiority of the APV method (compared with the WACC method) because it can handle arbitrary tax shields seems to be a plausible notion. It is normally understood that the main difficulty with the APV method is to determine the appropriate discount rate for the tax shields in order to calculate the present value of the tax shields. Sabal (2007) demonstrates with his well-designed numerical example that this issue has been resolved by Fernández (2004) by defining the present value of the tax shields as the difference between the value of the taxes paid by the levered firm and by the unlevered firm, respectively. This, if true, would finally make the APV method practically feasible and theoretically correct, and thereby validate the notion of APV's superiority over the WACC method. However, Qi (2010) shows that this claim is not warranted because some internal inconsistencies and errors hidden in the example offered in Sabal (2007) necessarily invalidate it as a logical sequitur. What Qi (2010) shows is that APV's superiority, however perhaps true, is not really proved in studies such as Sabal (2007) and Pereiro (2002). This leaves the APV's superiority still an open question.

In this investigation, we fill the gap by directly showing that the notion of APV superiority over the WACC method is a fallacy even though it does appear to be quite appealing. For more details in this line of research, see for example, Cooper and Nyborg (2006), Brealey et al (2005), Johnson and Qi (2008), Qi (2010), Sabal (2007), Pereiro (2002), Booth (2002, 2007), Ruback (2002), and Modigliani and Miller (1958, 1963). This study is organized as follows. Section I reviews the literature and explains the current status of the research about this topic, which leads to the question we set out to answer. Section II uses an example of two-year project to illustrate algebraically (in a very general sense) the basics about the APV and the WACC methods, and the issues facing their implementation. Section III analyzes and compares the two methods. This section categorically refutes the APV's superiority over the WACC method. Section IV concludes.

II. Project Valuation – A Case of Two-Year Project

Suppose we have a two-year business project whose free cash flows (*FCFs*)²⁴ are

²⁴ Free cash flow is defined as the cash amount available for distribution to all investors of the business if no debt

forecasted to be FCF_1 and FCF_2 in the first and the second year after the business is started. In other words, we simplify the situation by making two assumptions – (1) the first profit comes exactly 1 year after the business starts; (2) The business is scrapped after two years with a net scrapping value of zero.

At first glance, these two assumptions seem to be quite restrictive. Nevertheless, they do not hamper us from generalizing the result for more common projects and firms. The simplicity actually helps to highlight the underlying principles. It is quite easy to extend it to multiple-year projects, say n years. For example, we can still assume the scrapping value to be zero and let FCF_2 absorb the sale price of the business; or we can let the scrapping value be the business value at time $t = 2$, i.e., V_2 which represents the value of cash flows from year 3 to year n , and keep FCF_2 intact. We find the former approach to be technically a bit easier and cleaner, thus we always assume a zero scrapping value in this study. For a corporation whose business life is unlimited, we may simply make a further yet trivial extension by letting $n \rightarrow \infty$. To put it differently, our case of the 2-year business allows us to make some generalized conclusions about more realistic and normal situations. Table 1 shows the relevant cash flow streams.

Table 1. Cash flows from a two-year project with zero scrapping value

	Year 0	Year 1	Year 2
Free cash flows (FCF)	0	FCF_1	FCF_2
Tax shield (TS)	0	$R_{D1}D_1T_{C1}$	$R_{D2}D_2T_{C2}$
Total available cash flows (C)	0	$FCF_1 + R_{D1}D_1T_{C1}$	$FCF_2 + R_{D2}D_2T_{C2}$
Value of the business project (V)	V_0	V_1	V_2

It is worth clarifying that our two-year setup provides technical simplicity without harming theoretical generalization. Another way to see this point is to note that our framework links three points in time by finding present values for future cash flows in both year 1 when the firm is running and year 2 when the project is scrapped. This careful setup can establish a recursive valuation procedure for projects of a life of any number of periods.²⁵

Here we assume in year 1 and 2, respectively, cost of debt is R_{D1} and R_{D2} , corporate tax rate is T_{C1} and T_{C2} , and debt amount adopted by the firm is D_1 and D_2 . We note that this setup is very general since we do not impose any restrictions on these variables. In other words, the tax shields are as flexible as they can be.²⁶ Also notice that for year 0, we neglect any relevant

were used. The true cash flow available for a levered firm’s investors is equal to the free cash flow plus the tax shield.

²⁵ We thank the anonymous referee for raising the importance of the feasibility of extending the two-year scenario to the general situations where the project has an arbitrary length of life. Indeed, without this critical extendibility, our two-year scenario would offer little value. Therefore, we emphasize once again that in this study we are actually using a device of technical simplicity to address a profound and quite general topic with full validity. Rigorous mathematical proof of this claim is readily available upon request.

²⁶ However, we note that for risky business cash flows, the realized tax shields may be less because of various reasons leading to full or partial loss of tax shield, such as alternative minimum taxes, the existence of non-debt tax shields, etc. These would reduce the realized tax shields by a certain proportion and we can accommodate this effect by adopting an effective corporate tax rate, which does not really affect our analysis in this study. See for example

cash flows such as the initial investment outlay. This is because these cash flows are already in present value. If we want to calculate the net present value, we simply subtract the initial outlay; otherwise, we may ignore it if we just wish to price the business project rather than its NPV. The total cash flow $C_t = FCF_t + R_{Dt}D_tT_{Ct}$ is more commonly called capital cash flow (CCF) as in Ruback (2002)²⁷ which represents the after-tax cash amount available for distribution to all the equityholders and bondholders of the project or the firm. In other words, we treat the free cash flow (FCF) as the baseline and adjust it by adding the tax shield $R_{Dt}D_tT_{Ct}$. Given this setup, the goal of pricing this business project is to determine its value at time $t = 0$, i.e., V_0 .

The way to determine V_0 is to work backwards from V_2 to V_0 . Notice at $t = 2$, the project's value is exactly the total final cash flow it can generate, that is

$$V_2 = FCF_2 + R_{D2}D_2T_{C2} \quad (1)$$

Next, we determine V_0 through two approaches, the WACC and the APV methods.

III.1. The WACC Method

At time $t = 1$, the project's value is then given by discounting the weighted average cost of capital over the second year, i.e., $WACC_2$ defined as

$$WACC_2 = \frac{D_2}{V_2} \times R_{D2} \times (1 - T_{C2}) + \frac{V_2 - D_2}{V_2} \times r_{E2} \quad (2)$$

where r_{E2} is the return on equity over the second time period. This is the standard definition except it recognizes that all the variables do not have to be constant over time. Then the business value at $t = 1$ is

$$V_1 = \frac{FCF_2 + R_{D2}D_2T_{C2}}{(1 + WACC_2)} + [FCF_1 + R_{D1}D_1T_{C1}] \quad (3)$$

Thus, by the same token, we have

$$V_0 = \frac{\frac{FCF_2 + R_{D2}D_2T_{C2}}{(1 + WACC_2)} + [FCF_1 + R_{D1}D_1T_{C1}]}{(1 + WACC_1)} \quad (4)$$

where $WACC_1$ is defined similarly as in (2) except that the time index is changed from 2 to 1. Combining (1) and (2), one can easily see that in order to compute V_0 , one must have information about FCF_t , D_t , R_{Dt} , T_{Ct} , as well as r_{Et} for both time periods. In theory, precise

Qi, Liu and Johnson (2010) and Graham (2000) for the loss of tax shields.

²⁷ Ruback (2002) proposes an alternative valuation method called the CCF approach which is a variation of the APV method. In this study we do not address issues related to the CCF method. For details about the CCF method, see for example, Ruback (2002), Qi (2010), Johnson and Qi (2008), and Booth (2002, 2007).

predictions of them may not be possible. In reality, one may make some practice assumptions to simplify the issue. For example, if the firm is known to keep the same debt, then $D_2 = D_1 = D_0$ and D_0 is observable; if cost of debt does not vary too much, then we can approximate $R_{D2} = R_{D1} = R_{D0}$ and R_{D0} is observable. Cost of equity r_{Et} can be extracted from market data as an approximated forecast. FCF_t may be predicted using the pro forma method. On the other hand, if the firm constantly rebalances its debt ratio to a constant target, then we may have a different approximation, i.e., FCF_t and D_t are proportional to each other. After all, without some additional information to allow us to make some simplifications and sensible approximations, the WACC method would be basically infeasible.

III.2. The APV Method

The APV method, proposed by Myers (1974), separates the total cash flow into two streams – free cash flows and tax shields – and then discounts them with appropriate discount rates as follows

$$V_1 = \left\{ \frac{FCF_2}{(1+R_{A2})} + \frac{R_{D2}D_2T_{C2}}{(1+R_{TS2})} \right\} + [FCF_1 + R_{D1}D_1T_{C1}] \quad (5)$$

The first two terms represent the discounted cash flows from $t = 2$, where R_{A2} and R_{TS2} are asset return²⁸ and the proper discount rate for the tax shield in time period 2. However, to get V_0 , we need to maintain the separation of the cash flow streams from $t = 2$ to $t = 0$ shown below

$$V_0 = \left\{ \frac{FCF_1}{(1+R_{A1})} + \frac{FCF_2}{(1+R_{A2})(1+R_{A1})} \right\} + \left\{ \frac{R_{D2}D_2T_{C2}}{(1+R_{TS2})(1+R_{TS1})} + \frac{R_{D1}D_1T_{C1}}{(1+R_{TS1})} \right\} \quad (6)$$

where R_{A1} (R_{A2}) and R_{TS1} (R_{TS2}) are asset return and the proper discount rate for the tax shield in time period $t = 1$ ($t = 2$). The first part of Eq. (6) represents the present value of the business project if it were all-equity financed. The second part is the present value of the tax shields. These discount rates may be considered as forward rates because they cover future time periods. Of course, we may also use the spot rates rather than forward rates to discount these cash flows. In order to arrive at V_0 , we need information about all the variables appearing on the right-hand side of (6). Again, as with the earlier WACC case, theoretically it is impossible to correctly foresee these variable's future values. Practically, one may impose more restrictions if we have extra information. This is similar to what happens with the WACC method. For example, if the tax shields can be guaranteed (based on how the contract is designed) as risky as the corporate loan (bond), then the proper discount rate for the tax shields should be equal to cost of debt, i.e., $R_{Dt} = R_{TSi}$. Normally, if debt D_t and the corporate tax rate T_{Ct} do not change over

²⁸ It is also called the opportunity cost of capital which is the after-tax return generated by the firm's assets when the firm is all-equity financed. This discount rate is used to discount the firm's $FCFs$.

time for sure, then the proper discount rate for tax shields may be the riskfree rate r_f ²⁹

To correctly determine the discount rate R_{TS} for the tax shields is not a trivial issue. Here we do not get into the specifics concerning what value R_{TS} should take. Instead, we point out that this issue is still open to debate and far from closure as claimed in Sabal (2007), Fernández (2004) as well as most recently in Liu (2009) and Qi (2011). For example, studies by Harris and Pringle (1985), Ehrhardt and Daves (2002), Ehrhardt (2005) believe R_{TS} should be equal to asset return R_{Ar} regardless of the debt policy. Miles and Ezzell (1980) modify the this approach by changing R_{Ar} to r_f for the first tax shield in period 1 on the basis that this tax shield is known at $t = 0$. MM (1958, 1963) and Brealey et al (2005) use $R_{TS} = R_{Dt}$, while Cooper and Nyborg (2006) argue these choices are all correct depending on whether the firm chooses fixed-debt or constant-leverage capital structure policy.

Furthermore, not only is the discount rate for the tax shields still an open question, but also asset return R_{Ar} is not observable. Normally, R_{Ar} is assumed to be constant (for no reason except for simplicity) and backed out by using the simplest MM's Debt-Irrelevance Theorem,³⁰ which is subject to many real-world flaws. Taken together, the APV method provides a conceptually different framework to price a business project. However, it does require quite an amount of information, perhaps more than it appears to need behind its seeming simplicity.

IV. Compare the WACC and the APV Methods

The two valuation methods price the same business project from different perspectives. They are theoretically equivalent. This equivalence relationship is vividly described by Booth (2002, 2007) as “you can always get there from here”.

However, in practice, there is considerable amount of differences which originate from how much knowledge we must have about the variables appearing on the right-hand-side of equations (4) and (6). Still using our two-year project to carry out the comparison, we specifically list those variables that must be correctly assessed (or forecasted) before the WACC or the APV method can be practically implemented. Table 2 lists these must-know variables for each method.

Table 2. The must-know variables for the WACC and the APV method.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Panel (A): WACC method requires knowledge of:											
	FCF_1	FCF_2	R_{D1}	R_{D2}	T_{C1}	T_{C2}	D_1	D_2	r_{E1}	r_{E2}	

Panel (B): APV method requires knowledge of:

29 Cooper and Nyborg (2006) specifically argues that in this case, $R_{TS} = R_{Dt} = r$,

30 See for example Brealey et al (2005).

FCF₁ FCF₂ R_{D1} R_{D2} T_{C1} T_{C2} D₁ D₂ R_{A1} R_{A2} R_{TS1} R_{TS2}

Panel (A) of Table 2 shows that in order to implement the WACC method successfully, one need to forecast future values for 9 variables. Panel (B) shows a reliable implementation of the APV method requires knowledge of 11 variables. The two methods share 7 common variables (see columns 1 to 7). Correctly forecasting these variables is very difficult. In addition, the WACC method also requires future equity returns r_{E1} and r_{E2} (in columns 8 and 9) which are not easy to forecast, and the APV method requires future asset return and discount rates for the future tax shields, R_{A1} , R_{A2} , R_{TS1} and R_{TS2} (in columns 8-9), respectively. Based on the number of must-know variables, the WACC has clear superiority over the APV method.

If we focus on the difficulty of forecasting the values in Table 2 instead of counting the number of the must-know variables, we find the WACC method may still be superior over the APV method. This is because if the firm is expected to continue the business as usual, one may approximate future equity returns r_{E1} and r_{E2} as today's and recent historical (observable) equity return. In comparison, the APV method also hinges on the correct estimation of (unobservable) R_{A1} , R_{A2} , R_{TS1} and R_{TS2} . Even extracting current asset return R_{A0} from the market data can be unreliable since it must assume some underlying theory (such as the MM Irrelevance Capital Structure Theorem and the correct tax shields' value), let alone future asset returns. As to discount rates for the tax shields, R_{TS1} and R_{TS2} , it involves even more ambiguities because it is still unclear what value they should take given so much on-going debate. The issue is far from being settled as we explained earlier. Therefore, the WACC method may have a slight edge over the APV method since at least the market can provide accurate information of the current and historical equity return r_E .

In sum, both the WACC method and APV method are subject to a variety of uncertainty sources. However, from the number of must-know variables in order to reliably implement a method, the WACC method clearly is more convenient since it only requires to forecast for 9 variables, and the APV method, 11 variables. From the difficulty of the forecasting, the WACC method still has a slight edge over the APV method. Taken together, it is unambiguously that it is incorrect to assert APV's superiority over the WACC method (see e.g., Sabal 2007; Pereiro 2002). Our investigation shows that it is most likely the other way around.

V. Conclusions

It is widely believed that the WACC method is suitable for firms maintaining a constant debt ratio which is the case for most firms in industrialized economies; while the APV method is more convenient and suited for valuing firms going through significant capital structural changes as well as firms in emerging markets where tax legislation is more uncertain and firms choose the debt ratio on an opportunistic basis. However, we use a project of two-year horizon to (1) illustrate the two methodologies; (2) show that "the above believes" are not only incorrect, but also it turns out that the APV method is not more convenient than the WACC method. Using a direct one-by-one comparison, we make this point clear that the APV method requires knowledge about more variables (than the WACC method does) in order to implement

accurately. On top of this, what is even more troublesome is that the central issue (with the APV method) regarding the discount rate for the tax shields is still an open question to a large extent, which makes the APV method even more unreliable.

The two-year example provided in this study is set up in a style as general as possible. This allows for an easy extension to more general and realistic situations. Therefore, we clarify a widespread yet mistaken notion that the WACC method only applies to the constant leverage scenario while the APV method is more convenient and accurate than the WACC method and can apply to situations where tax rate and debt policy are not fixed.

VI. Acknowledgement

We are very grateful to an anonymous referee and the Editor Monzurul Hoque for helpful comments and guidance. We also thank Ling Zhang, Julia Qi and participants of the SBE Research Seminar at Michigan Tech and the participants of the 2010 Annual Academy of Finance conference for useful comments. All remaining errors in this paper are our own.

References

- Booth, Laurence, 2002, “Finding value where none exists: pitfalls in using adjusted present value”, *Journal of Applied Corporate Finance*, 15, 8-17.
- Booth, Laurence, 2007, “Capital cash flows, APV and Valuation”, *European Financial Management*, 13, 29-48.
- Brealey, R. A., S. C. Myers, and F. Allen, 2005, *Principles of Corporate Finance*, 8th Edition, McGraw-Hill/Irwin Series in Finance, Insurance, and Real Estate, New York.
- Byoun, S., and J. C. Rhim, 2003, “Tests of the pecking order theory and the tradeoff theory of optimal capital structure”, *Proceedings of the Midwest Business Economics Association*.
- Cooper, I. A., and K. G. Nyborg, 2006, “The value of tax shields is equal to the present value of tax shields”, *Journal of Financial Economics*, 81, 215-225.
- Ehrhardt, M., 2005, “Incorporating Competition into the APV Technique for Valuing Leveraged Transactions”, *Journal of Applied Corporate Finance* 17, 79-88.
- Ehrhardt, M., and P. R. Daves, 2002, “Corporate Valuation: The Combined Impact of Growth and the tax Shield of Debt on the Cost of Capital and Systematic Risk”, *Journal of Applied Finance* 12, No. 2, 31-38.
- Fernández, P., 2004, “The value of tax shields is not equal to the present value of tax shields”, *Journal of Financial Economics*, 73, 145–165.
- Fischer, E., R. Heinkel, and J. Zechner, 1989, “Dynamic capital structure choice: Theory and tests”, *Journal of Finance* 44, 19-40.
- Frank, M. Z. and V. K. Goyal, 2003, “Testing the pecking order theory of capital structure”, *Journal of Financial Economics* 67, 217-248
- Graham, J. R. and C. Harvey, 2001, “The theory and practice of corporate finance: Evidence from the field”, *Journal of Financial Economics* 60, 187-243.
- Harris R. S., and J. J. Pringle, 1985, “Risk-Adjusted Discount Rates Extensions from the Average Risk Case”, *Journal of Financial Research* 8, 237-244.
- Hittle, L. C., K. Haddad, and L. J. Gitman, 1992, “Over-the-counter firms, asymmetric information and financing preferences”, *Review of Financial Economics*, 81-92.
- Johnson, D. and H. Qi, 2008, “WACC misunderstandings”, *Journal of Academy of Finance* 6, No. 1, 32-40.
- Liesz, T. J., 2003, “Why pecking order theory should be included in introductory finance courses”, working paper, School of Business and Professional Studies, Mesa State College, Grand Junction, Colorado.
- Liu, Y.-C., 2009, “The slicing approach to valuing tax shields”, *Journal of Banking and Finance* 33, 1069-1078.
- Miles, J., and J. R. Ezzell, 1980, “The weighted average cost of capital, perfect capital markets, and project life: a clarification”, *Journal of Financial and Quantitative Analysis* 15, 719–730.
- Modigliani, F. and M. H. Miller, 1958, “The cost of capital, corporation finance and the theory of investment”, *American Economic Review* 48, 261-297.
- Modigliani, F. and M. H. Miller, 1963, “Corporate income taxes and the cost of capital”, *American Economic Review* 53, 433-443.
- Myers, S., 1974, “Interactions of corporate financing and investment decisions – implications for capital budgeting”, *Journal of Finance* 29, 1-25.
- Myers, S. C., 1993, “Still searching for optimal capital structure”, *Journal of Applied Corporate Finance* 39, 4-14.

- Pereiro, L. E., 2002, *Valuation of Companies in Emerging Markets, A Practical Approach*, John Wiley & Sons, Inc., 111 River Street, Hoboken, NJ, USA.
- Qi, H., S. Liu, and D. Johnson, 2010, "A model for risky cash flows and tax shields", *Journal of Economics and Finance* (23 November 2010), 1-14.
- Qi, H., 2010, "Valuation methodologies and emerging markets", *Journal of Business Valuation and Economic Loss* 5 (1), Article 2.
- Qi, H., 2011, "Value and Capacity of Tax Shields: An Analysis of the Slicing Approach", *Journal of Banking and Finance* 35, Issue 1, 166-173. (ISSN: 0378-4266)
- Ruback, S. Richard, 2002, "Capital cash flows: a simple approach to valuing risky cash flows", *Financial Management*, 31, no. 2, 5-30.
- Sabal, J., 2007, "WACC or APV?", *Journal of Business Valuation and Economic Loss Analysis* 2, Iss. 2, Article 1.
- Titman, S., and R. Wessels, 1988, "The determinants of capital structure choice", *Journal of Finance* 43, 1-19.

Investing Your Own Endowment Fund like Harvard Invests

Timothy G. Peterson

Abstract

This paper describes the investment strategy pursued by Harvard in managing their endowment fund. The Harvard Endowment Fund pursues extreme diversification in the asset class mix in their investment portfolio. The endowment portfolio deemphasizes US equities and fixed income and substitutes these asset classes with investments in real estate, commodities, private equity, emerging market equities, and developed foreign equities. The returns from the Harvard Endowment Fund have exceeded benchmark indexes substantially over the last 25 years.

This paper illustrates creating your own endowment fund using exchange traded funds and index mutual funds representing various asset classes. The paper shows which funds can be used as a proxy for the underlying asset class. A simulated model portfolio invested in exchange traded funds is created and the historical returns from that portfolio are computed and compared against the returns from the Harvard Endowment Fund and the S&P 500 Index for the same period.

I. Introduction

One of the tenets of modern portfolio theory is that the portfolio return can be maximized with a fixed level of risk or the risk can be minimized with a fixed portfolio rate of return. These optimal combinations of risk and return exist on what is called the efficient frontier. The portfolio must be diversified across different asset classes but true diversification can only be achieved when the returns from the assets in the portfolio are properly correlated with each other. The optimal combinations of risk and return can only be achieved when the risky assets in the portfolio have low or negative correlations with each other. If the returns from the assets in the portfolio have correlation coefficients close to zero or negative the assets are correctly correlated to generate the optimal risk and return combinations that would be located on the efficient frontier.

In David Swensen's book [A Fundamental Approach to Personal Investment](#) he makes the case for including more diverse asset classes in the typical portfolio. Swenson also makes the case for the importance of rebalancing the portfolio regularly if stable portfolio returns are to be generated. Swensen also makes the case for not including precious metals or currencies in the portfolio. Swensen manages the Yale Endowment Fund and his philosophy and approach mirror the philosophy and approach of the Harvard Endowment Fund.

This paper attempts to construct a model portfolio that includes several diverse asset classes that have lower correlations with each other than the conventional investment portfolio. Exchange traded funds bring exposure to asset classes that in the past has been difficult to access for the typical institutional or retail investor. Many of these now accessible asset classes have correlations with equities that are lower than other asset classes. Correlations between the various exchange traded funds were considered in the construction of the simulated portfolio.

Timothy G. Peterson, MBA, CPA (inactive), CMA, is Assistant Professor at Gustavus Adolphus College, St. Peter, MN 56082. He can be contacted at tpeterso@gustavus.edu.

II. Harvard Endowment Fund

The Harvard Endowment Fund has generated annual returns over the past 20-25 years that have exceeded the benchmarks in each of their invested asset classes. The endowment has exceeded the endowment performance of the smaller endowments of other colleges and universities.

Table One
Performance Data of Harvard Endowment Fund

The annual returns of the Harvard Endowment Fund are listed below for the years 1990 thru 2008. June 30 is the fiscal year end. The Endowment Fund has averaged 14.6% per year with a standard deviation of 8.9% over this time span.

Year	Return	Year	Return	Year	Return	Year	Return	Year	Return
2008	8.6	2004	21.1	2000	32.2	1996	26.0	1992	11.8
2007	23.0	2003	12.5	1999	12.2	1995	16.8	1991	1.1
2006	16.7	2002	(0.5)	1998	20.5	1994	9.8	1990	7.5
2005	19.2	2001	(2.7)	1997	25.8	1993	16.7		

There are various reasons why the Harvard Endowment Fund has generated these high market returns. First, the endowment practices extreme diversification in the portfolio composition of the various asset classes. The portfolio is composed of numerous asset classes that are either non-existent or grossly underweighted in the typical university endowment portfolio. Not only is the typical institutional portfolio underweighted in these asset classes, but so are most portfolios suggested or created for individual retail investors. Most recommended portfolios are primarily comprised of the three basic asset classes of equities, fixed income, and cash. The endowment at Harvard has expanded beyond these basic asset classes and includes alternative asset classes that are routinely invested or traded but seldom appear in the typical institutional or individual investment portfolio. The Harvard Endowment Fund is over weighted in these alternative asset classes and underweighted in the basic asset classes.

Second, the endowment has a long term investing horizon. The investing horizon may span many years. This long term holding horizon allows the endowment to invest in asset classes without regard to near term liquidity needs and invest in illiquid assets such as natural resources, more specifically timber lands. At one time Harvard had as much as 30 percent of its portfolio invested in raw timber. Most studies of any asset class show that the probability of economic loss is inversely related to the length of the investing holding period. Investing in alternative asset classes is feasible for the individual investor by using exchange traded funds (ETF) in an investment portfolio as numerous ETSs have emerged that invest in commodities, currencies, natural resources, metals, real estate, energy, and timber. There are also specialized mutual funds that have emerged that invest in these alternative classes or undertake specific non typical investing strategies.

Third, the Harvard Endowment Fund rebalances their portfolio on a consistent and regular basis. Rebalancing ensures that the target portfolio allocations are maintained during the year. Failure to maintain the target allocations would increase the probability that the actual

returns would deviate from the target portfolio returns. It is this strict disciple of rebalancing that helps the endowment to sell its winners and buy its losers, in other words sell high and buy low. Rebalancing can be replicated by individual investors.

Fourth, the endowment uses the best hedge fund managers and money managers. The endowment undertakes a rigorous and in depth analysis of money managers and subjects these money managers to a due process ensures that these endowments hire only the best and brightest. The endowment hires these money managers for their hedge fund, private equity, and absolute return components of their portfolio. Much of the success of the endowment performance is due to the ability to employ the best money managers and to nurture long term relationships with these money managers. Unfortunately hedge funds and private equity are areas that are hard to access for the individual investor.

Fifth, there is an overweighting in equity type asset classes with corresponding underweighting in fixed income asset classes. Approximately 70 per cent of the assets are invested in equity type investments: stocks, real estate, commodities, private equity. Equity type investments are used to provide the growth energy of endowment portfolio.

The endowment target asset allocations of Harvard are presented in the following table. The Harvard endowment is relatively less invested in domestic equities and bonds and more invested in real assets. The table shows the changing asset class mix over the last fifteen years.

Table Two
Asset Class Allocation of Harvard Endowment Fund
Harvard Management Company
Policy Portfolio Evolution

	<u>2010</u>	<u>2005</u>	<u>1995</u>
Domestic Equity	11%	15%	38%
Foreign Equity	11%	10%	15%
Emerging Markets	11%	5%	5%
Private Equity	13%	13%	12%
Total Equity	46%	43%	70%
Absolute Return	16%	12%	0%
Commodities	14%	13%	6%
Real Estate	9%	10%	7%
Total Real Assets	39%	35%	13%
Domestic Bonds	4%	11%	15%
Foreign Bonds	2%	5%	5%
High Yield Bonds	2%	5%	2%
Inflation-Indexed Bonds	5%	6%	0%
Total Fixed Income	13%	27%	22%
Cash	2%	(5%)	(5%)

Total 100% 100% 100%
 Source: Harvard Management Company Annual Report

Table Three
 Harvard Endowment Fund Performance by Asset Class

Annualized Ten-Year Performance by Asset Class		
	Actual	Benchmark
Total Endowment	8.9%	4.5%
Public Market Equities	4.1%	2.0%
Private Equity	15.0%	5.1%
Absolute Return	10.6%	3.8%
Real Assets	10.2%	6.0%
Fixed Income	12.2%	6.1%

Source: Harvard Management Company Annual Report 2009

The Harvard Endowment Fund is based upon adherence to modern portfolio theory and informed market judgment. Returns, standard deviations, and correlations are projected for each component of the various asset classes and then inputted into a model that maximizes the risk return tradeoff. The resulting outputs are tempered and adjusted by the subjective assessments of the endowment investment managers to arrive at the asset allocations and projected target returns of each component. With these projected returns and allocations the portfolio target return is established.

III. Risks and Rewards of Various Asset Classes

Each asset class entails certain economic characteristics that warrant its inclusion in an investment portfolio. Some of these characteristics are common to multiple asset classes and others are unique to a specific asset class. When adding assets to a portfolio the question of what incremental risk is the portfolio being exposed to needs to be addressed and what additional benefits are obtained. Including in the portfolio assets that have a low correlation with each other reduces the risk of the portfolio. Risk reduction leads to stability in portfolio returns and a closer symmetry between projected returns and actual returns.

Table Four
 List of the economic risks and desirable attributes of each asset class.

Asset Class	Desirable Attribute	Undesirable attribute - risk
Equities	Potential for superior returns relative to bonds Increased valuations due to inflation in the long term Foreign equities gain from decrease in value of US dollar	General market risk due to suboptimal economic conditions Inflation in the short term
Fixed Income	Potential for enhanced purchasing power cash flows	Inflation Higher interest rates

	during deflation and current income.	Low inflation adjusted historical returns
Real estate	Current cash flows Protection against inflation Returns are uncorrelated with stocks and bonds Potential for high returns	Returns are volatile
Natural Resources	Protection against inflation Returns are uncorrelated with stocks and bonds Potential for high returns	Returns are volatile
Private Equity	Potential for superior returns relative to bonds	Volatile returns Dependent upon competence of money manager
Absolute Return	Stable returns Low correlation to stocks and bonds Outperform in bear markets	Underperform in strong bull markets

IV .Available Exchange Traded Funds and Mutual Funds as Proxies for Various Asset Classes

The following table lists selected exchange traded funds and mutual funds that could be used to represent the asset classes represented in the Harvard Endowment Fund.

Table Five
List of Exchange Traded Funds

Asset Class	ETF	Mutual Fund
US Stocks	VTI,SPY,IVV,IWB,ISI,IYY,OEF,MDY,IWR,IWC,IWM,IJR, IWF,IWV, IJH,IJK,IWP,IWD,IVE,IWS,VIG,VTV,VUG ,VO,VB,MGC	VFINX,VLACX, VIMSX,FUSVX, FSMAX
Foreign Developed Market Equities	EPP,EZU,ILF,VPL,EFA, IOO,EFG,VEU,VEA,SCZ	VDMIX,VTWSX, VGTSX,VPACX, VEURX,FUSEX, FPBFX
Emerging Market Equities	EEM,VWO,EFV,EFG,BKF, EZU,ILF,EPP,DGS	VEIEX
US Corporate Fixed Income	BND,BIV,BLV,CSJ, CFT,LQD,HYG,AGG	VBMFX,VBIIX, VBISX,VBLTX
US Treasuries	SHY,IEI,IEF,TLH,TLT,BSV,BIV,BLV,BIL, LAG,ITE,TLO	FIBAX,FLBAX, FSBAX
US Inflation Indexed Securities	IPE,TIP	FINPX

Foreign Fixed Income	EMB,ISHG,IGOV	
Real Estate	ICF,VNQ,FTY,URE,IYR,RWX,DRW,IFNA,IFGL,WPS,FIO,RWR,XHB,ITB	
Natural Resources/Commodities	DJP,GSG,DBA,USO,GLD,DBC,IAU,IYE,WOOD,CUT,HAP	FSAGX,FSDPX,FSENX,FSNGX,RYMF
Private Equity	PSP	
Absolute Return	ALT	ALPHX,BETAX,ASFAX,PRPF,ARBFX,MERFX

Source: www.Yahoo.Finance.com and www.Fidelity.com

Exchange funds are the preferred investment vehicle for the construction of an investment portfolio primarily for their exposure to alternative asset classes. The following exchange traded funds representing various asset classes are shown in the following two correlation matrixes.

<u>ETF</u>	<u>Name</u>	<u>Asset Class</u>
CSJ	iShares Lehman 1-3 Yr Credit Bond	Fixed Income
DBA	PowerShares DB Agriculture	Commodities
DBC	PowerShares DB Commodity Index Tracking	Commodities
EFA	iShares MSCI EAFE Index	Emerging Market
GLD	SPDR Gold Trust	Precious Metals
IFGL	iShares FTSE EPRA/NARETT Global Real Estate ex-US Index	Real Estate
UHN	United States Heating Oil	Natural Resources
URE	ProShares Ultra Real Estate	Real Estate
IVV	iShares S&P 500 Index	US Equity
IWC	iShares Russell Microcap Index	US Equity
IWD	iShares Russell 1000 Value Index	US Equity
IWF	iShares Russell 1000 Growth Index	US Equity
PSP	Powershares Private Equity Portfolio	Private Equity
TIP	iShares Barclays TIPS Bond	US Fixed Income
USO	United States Oil LP	Natural Resources
VNQ	Vanguard REIT	Real Estate
VTI	Vanguard Total Stock Market	US Equity
EEM	iShares Emerging Markets Index	Emerging Market
LQD	iShares iBoxx Investment Grade	US Fixed Income

V. Correlation Matrixes of Various Exchanged Traded Funds

The following matrix shows the correlation coefficient between exchange traded funds representing the asset classes represented in the Harvard Endowment Fund.

Table Six
 Correlation Coefficients of Exchange Traded Funds Representing Major Asset Classes
 Correlation Matrix of Major Asset Class ETFs

	CS J	DB A	DB C	EF A	GL D	IFG L	UH N	UR E	IV V	IW C	IW D	IW F	PS P	TI P	US O	VN Q
CSJ	1.00															
DBA	.03	1.00														
DBC	.08	0.68	1.00													
EFA	.12	0.48	0.68	1.00												
GLD	.14	0.37	0.56	0.59	1.00											
IFGL	0.03	0.44	0.62	0.89	0.49	1.00										
UHN	0.09	0.43	0.60	0.86	0.41	0.79	1.00									
URE	.03	0.38	0.55	0.81	0.35	0.74	0.96	1.00								
IVV	.10	0.41	0.59	0.91	0.46	0.82	0.95	0.92	1.00							
IWC	.04	0.36	0.51	0.78	0.34	0.72	0.91	0.97	0.90	1.00						
IWD	0.11	0.44	0.62	0.90	0.45	0.83	0.95	0.91	0.99	0.89	1.00					
IWF	.08	0.37	0.55	0.90	0.45	0.81	0.94	0.90	0.98	0.88	0.94	1.00				
PSP	.12	0.45	0.58	0.82	0.38	0.75	0.85	0.81	0.86	0.81	0.87	0.83	1.00			
TIP	.18	0.10	0.12	0.02	0.10	0.01	0.08	0.04	0.02	0.00	0.01	0.05	0.06	1.00		
USO	.10	0.54	0.88	0.61	0.46	0.59	0.52	0.48	0.53	0.44	0.56	0.50	0.53	0.16	1.00	
VNQ	0.07	0.32	0.51	0.69	0.28	0.71	0.83	0.80	0.79	0.76	0.82	0.77	0.78	0.08	0.45	1.00

Correlations based upon 6 months of daily trading days ending January 20, 2010.
 Source: www.ETFScreen.com

VI. Composition of Simulated Portfolio of Exchange Traded Funds

A simulated portfolio was created composed of exchange traded funds and mutual funds. The model portfolio has asset class allocations similar to those of the Harvard Endowment Fund. Foreign and high yield bonds were omitted because of their inconsequential contribution to the

total portfolio. The exchange traded funds JNK and HYG could be invested for the asset class high yield bonds. These exchange traded funds were not included in the simulated portfolio because they have been in existence less than three years. Absolute return is represented by a mutual fund because no exchange traded fund could be found for this asset class. A REIT exchange traded fund VNQ represents the real estate asset class. Private equity is represented by the exchange traded fund PSP which has been in existence since October 2006. A constant investment in PSP was assumed prior to October 2006 for PSP. Absolute returns are represented by the mutual fund ALPHX which employs many of the strategies used by hedge funds. Domestic equity, foreign equity, and emerging market equity are represented by exchange traded funds. Commodities (natural resources) are represented by an exchange traded fund WOOD and the exchange traded fund DBC representing a commodities index. The exchange traded fund WOOD representing timber and forestry products is not a pure proxy for timber as the fund holds stocks in the timber and forestry products industries. Harvard owns significant timber land interests. These asset class target allocations are similar to those of the Harvard Endowment Fund.

Table Seven

The simulated portfolio was created using the following exchange traded funds and the portfolio target asset class allocation for each is listed below.

Asset Class	Percentage	Exchange Traded Fund
Domestic Equity	10%	VTI
Foreign Equity	10%	EFA
Emerging Markets	10%	EEM
Private Equity	15%	PSP
Absolute Return	15%	ALPHX
Commodities	15%	DBC
Real Estate	10%	VNQ
Domestic Bonds	8%	LQD
Inflation-Indexed Bonds	5%	TIP

The following matrix shows the correlation coefficients between the exchange traded funds represented in the simulated portfolio.

Table Eight
Correlation Matrix of Exchange Funds in Simulated Portfolio

	DBC	EEM	EFA	LQD	PSP	TIP	VNQ	VTI
DBC	1.00							
EEM	.61	1.00						
EFA	.61	.89	1.00					
LQD	(.05)	(.07)	(.09)	1.00				
PSP	.61	.87	.94	(.10)	1.00			
TIP	.06	0.1	(.01)	0.71	(.04)	1.00		
VNQ	.50	.64	.66	.01	.68	0.03	1.00	
VTI	.62	0.86	0.91	(.16)	0.93	(.11)	0.78	1.00

Correlations based upon 126 of daily trading days ending February 2, 2011.
 Source: www.ETFScreen.com

VII. Simulated Exchange Traded Fund Portfolio Results

The initial portfolio was created with a beginning amount of \$100,000 on July 1, 2005 with amounts allocated to various exchange traded funds and one mutual fund ALPHX. The portfolio value was determined every six months on the dates July 1 and January 1 based on the market prices of the exchange traded funds on those dates. The dollar holding period return for each six month period was calculated as the difference in market values of the fund and the total portfolio dollar holding period amount was then calculated as summed total dollar return of the various funds. The fiscal year ends June 30.

The portfolio was rebalanced every six months to bring harmony between the target asset allocations and the market asset allocations by selling and acquiring various funds to bring the asset allocations back to their target percentages.

Table Nine
 Simulated Yearly Portfolio Results

Fiscal Year 2006

<u>ETF or</u>	<u>Value</u>	<u>Holding</u>	<u>Non</u>	<u>Value</u>	<u>Holding</u>	<u>Non</u>	<u>Value</u>	<u>Percentage</u>
<u>Mutual</u>	<u>of</u>	<u>Period</u>	<u>Annualized</u>	<u>of</u>	<u>Period</u>	<u>Annualized</u>	<u>of</u>	<u>Percentage</u>
<u>Fund</u>	<u>Investment</u>	<u>Gain or</u>	<u>Percentage</u>	<u>Investment</u>	<u>Gain or</u>	<u>Percentage</u>	<u>Investment</u>	<u>Annual</u>
	<u>7/1/2005</u>	<u>Loss</u>	<u>Return</u>	<u>1/1/2006</u>	<u>Loss</u>	<u>Return</u>	<u>7/1/2006</u>	<u>Return</u>
VTI	10,000	509	5.09%	10,509	89	0.83%	10,851	5.92%
EFA	10,000	2,096	20.96%	12,096	522	4.85%	11,283	25.81%
EEM	10,000	3,354	33.54%	13,354	(499)	(4.63)%	10,263	28.90%
PSP	15,000	0	0.00%	15,000	0	0.00%	16,142	0.00%
ALPHX	15,000	786	5.24%	15,786	283	1.75%	16,425	6.99%
DBC,	15,000	0	0.00%	15,000	0	0.00%	16,142	0.00%
VNQ	10,000	896	8.96%	10,896	1,389	12.90%	12,150	21.87%
LQD	8,000	(37)	(0.46)%	7,963	207	2.41%	8,816	1.95%
TIP	5,000	(11)	(0.23)%	4,989	28	0.53%	5,409	0.30%
Cash	2,000	20	1.00%	2,020	20		2,172	1.00%
	\$100,000	\$7,614	Total	107,614	\$2,040	Total	\$109,654	9.65%

Fiscal Year 2007

<u>ETF or</u> <u>Mutual</u> <u>Fund</u>	<u>Value</u> <u>of</u> <u>Investment</u> <u>7/1/2006</u>	<u>Holding</u> <u>Period</u> <u>Gain or</u> <u>Loss</u>	<u>Non</u> <u>Annualized</u> <u>Percentage</u> <u>Return</u>	<u>Value</u> <u>of</u> <u>Investment</u> <u>1/1/2007</u>	<u>Holding</u> <u>Period</u> <u>Gain or</u> <u>Loss</u>	<u>Non</u> <u>Annualized</u> <u>Percentage</u> <u>Return</u>	<u>Value</u> <u>of</u> <u>Investment</u> <u>7/1/2007</u>	<u>Percentage</u> <u>Annual</u> <u>Return</u>
VTI	10,965	1,678	15.30%	12,643	312.19	2.60%	12,333	17.90%
EFA	10,965	1,924	17.55%	12,890	757.36	6.30%	12,778	23.85%
EEM	10,965	2,452	22.36%	13,417	1,920.54	15.98%	13,941	38.34%
PSP	16,448	0	0.00%	16,448	(1,491.80)	(8.27)%	16,539	(8.27)%
ALPHX	16,448	761	4.62%	17,209	1,435.91	7.96%	19,467	12.59%
DBC	16,448	(400)	(2.43)%	16,048	1,650.56	9.15%	19,682	6.72%
VNQ	10,965	3,173	28.94%	14,138	(2,281.18)	(18.98)%	9,739	9.96%
LQD	8,772	739	8.42%	9,511	179.37	1.87%	9,796	10.28%
TIP	5,483	205	3.73%	5,687	326.11	5.43%	6,336	9.16%
Cash	2,193	22		2,215	22		2,426	1.0%
	\$109,654	\$10,553	Total	\$120,206	\$2,831	Total	\$123,038	12.21%

Fiscal Year 2008

<u>ETF or</u> <u>Mutual</u> <u>Fund</u>	<u>Value</u> <u>of</u> <u>Investment</u> <u>7/1/2007</u>	<u>Holding</u> <u>Period</u> <u>Gain or</u> <u>Loss</u>	<u>Non</u> <u>Annualized</u> <u>Percentage</u> <u>Return</u>	<u>Value</u> <u>Of</u> <u>Investment</u> <u>1/1/2008</u>	<u>Holding</u> <u>Period</u> <u>Gain or</u> <u>Loss</u>	<u>Non</u> <u>Annualized</u> <u>Percentage</u> <u>Return</u>	<u>Value</u> <u>of</u> <u>Investment</u> <u>7/1/2008</u>	<u>Percentage</u> <u>Annual</u> <u>Return</u>
VTI	12,304	(437)	(3.55)%	11,867	(600.93)	(4.64)%	12,354	(8.19)%
EFA	12,304	(404)	(3.28)%	11,900	(1,065.40)	(8.22)%	11,890	(11.51)%
EEM	12,304	753	6.12%	13,056	(816.63)	(6.30)%	12,138	(0.19)%
PSP	18,456	(1,160)	(6.29)%	17,295	(2,764.50)	(14.23)%	16,668	(20.51)%
ALPHX	18,456	476	2.58%	18,932	(331.05)	(1.70)%	19,101	0.88%
DBC	18,456	5,560	30.13%	24,016	4,733.53	24.36%	24,166	54.49%
VNQ	12,304	(88)	(0.71)%	12,216	417.47	3.22%	13,372	2.51%
LQD	9,843	950	9.65%	10,793	(460.63)	(4.44)%	9,903	5.20%
TIP	6,152	837	13.60%	6,989	122.11	1.89%	6,600	15.49%
Cash	2,461	25		2,485	25		2,510	1.00%
	\$123,038	\$6,512	Total	\$129,549	(\$741)	Total	128,702	4.60%

Peterson – Investing Your Own Endowment Fund

Fiscal Year 2009

<u>ETF or</u>	<u>Value</u>	<u>Holding</u>	<u>Non</u>	<u>Value</u>	<u>Holding</u>	<u>Non</u>	<u>Value</u>	
<u>Mutual</u>	<u>of</u>	<u>Period</u>	<u>Annualized</u>	<u>of</u>	<u>Period</u>	<u>Annualized</u>	<u>of</u>	<u>Percentage</u>
<u>Fund</u>	<u>Investment</u>	<u>Gain or</u>	<u>Percentage</u>	<u>Investment</u>	<u>Gain or</u>	<u>Percentage</u>	<u>Investment</u>	<u>Annual</u>
	<u>7/1/2008</u>	<u>Loss</u>	<u>Return</u>	<u>1/1/2009</u>	<u>Loss</u>	<u>Return</u>	<u>7/1/2009</u>	<u>Return</u>
VTI	12,870	(4,320)	(33.57)%	8,550	1,855	22.71%	10,025	(10.86)%
EFA	12,870	(5,163)	(40.12)%	7,707	2,906	35.57%	11,075	(4.55)%
EEM	12,870	(5,850)	(45.45)%	7,020	4,931	60.35%	13,100	14.90%
PSP	19,305	(11,793)	(61.09)%	7,512	4,388	35.81%	16,643	(25.27)%
ALPHX	19,305	(4,992)	25.86%	14,313	1,399	11.41%	13,653	(14.44)%
DBC	19,305	(9,310)	48.23%	9,995	1,688	13.78%	13,943	(34.45)%
VNQ	12,870	(5,791)	45.00%	7,079	1,485	18.17%	9,654	(26.82)%
LQD	10,296	370	3.59%	10,666	712	10.89%	7,248	14.49%
TIP	6,435	(183)	(2.84)%	6,252	244	5.97%	4,329	3.13%
Cash	2,574	26		2,600	26		2,626	1.00%
	\$128,702	(47,007)	Total	81,695	19,634	Total	102,295	(20.52)%

Data Source: www.Yahoo.Finance.com

Table Ten
Summarized Simulated Portfolio Performance Results

	Simulated	Portfolio		
Fiscal Year	Dollar	Annualized	Harvard Endowment	S&P 500 Index
	Return	Percentage Return	Fund	
2006	9,654	9.65 %	16.7%	7.19%
2007	13,384	12.21%	23.0%	19.1%
2008	5,565	4.60%	8.6%	(15.79)%
2009	(26,407)	(20.52)%	(27.3)%	(28.19)%
Average	\$549	1.48%	5.25%	(4.42)%

VIII. Conclusion

The simulated portfolio results were substantially less than the Harvard Endowment Fund results but better than the performance of the S&P 500 Index over the four year time span from July 1, 2005 thru July 1, 2009. The simulated portfolio had an absolute positive return in three of the four years but a significant drawdown in the fourth year resulted in a meager return over the four year time span. The introduction of stop losses or the use of put options could have prevented some of the devastating drawdown in the fourth year.

The main purpose of this study was to show the relevance and desirability of introducing

various asset classes into the portfolio to provide for more diversification than the typical portfolio comprised primarily of equities and fixed income affords. The simulated portfolio represented here is easily constructed for the typical retail investor in a tax deferred retirement account using exchange traded funds. The Harvard Endowment Fund is an innovative approach that adheres to modern portfolio theory more than the typical investment portfolio because it includes more asset classes that show little or no correlation between other asset classes. This paper shows that it can be done using exchange traded funds as the investment vehicle representing different asset classes.

References

- Bodie, Kane, Marcus, Essentials of Investments, Eighth Edition, McGraw Hill, 2010, pp 109-135.
- Faber, Mebane T, “A Quantitative Approach to Tactical Asset Allocation,” *The Journal of Wealth Management*, Spring 2007.
- Lydon, Tom, ETF Trend Following Playbook, Pearson Education, 2010, pp 1-76.
- Swensen, David F, Unconventional Success A Fundamental Approach to Personal Investment, Free Press, 2005, pp. 1-91, 313-337

Demand for Foreign Currency Reserves in Emerging Market Countries: Is Herding Applicable?

Maru Etta-Nkwelle

Abstract

This paper examines the possibility of herding behavior in the demand for foreign currency reserves in 90 emerging market countries. A cross sectional absolute deviation model is utilized to detect herding by examining the volatility in the growth rates in reserves in the individual countries compared to the regional average. In addition, for comparison purposes, a contemporary model is utilized to measure the magnitude of herding. In general the results of the herding detection model exhibit herding behavior amongst Asian and Latin American and Caribbean countries, but not in Africa. Interestingly, the Asian countries show a greater tendency to herd than Latin American countries and Africa. We also observe that countries with greater monetary policy autonomy have a greater tendency to herd, while countries that belong to monetary unions are less likely to herd.

I. Introduction

The meeting of the G-20 nations in the fall of 2010, has once again highlighted the strategic importance of exchange rate policy on world trade patterns and the growth of the global economy at large. Implicit in the discussions of the G-20 nations was the economic growth in foreign currency reserves ensuing from large trade surpluses enjoyed by some emerging market countries such as China, Japan, Singapore and Taiwan. Interestingly, the surge in trade surpluses and growth in foreign currency reserves by the aforementioned emerging market countries has been attributed to a development strategy that has emphasized export led growth to the detriment of domestic demand led growth.

Economic theory suggest that foreign currency reserves (also known as international reserves) have traditionally being regarded as an instrument through which governments could accumulate sufficient buffer funds to bridge gaps in their balance of payment accounts. However, over the last decade, there has been a growing trend by emerging market countries to accumulate quantities of foreign exchange reserves beyond the three to four months of imports (5-20 percent of M2) considered by the International Monetary Fund (IMF) as optimal for balance of payment purposes. For example, in the 1980s, the reserves of emerging countries stood at 6.0 percent of GNP. But by 2007 they were reported at about 20 percent of GDP (Obstfeld, Shambaugh and Taylor, 2007). Figure I illustrates the rapid rise in foreign currency reserve holdings of emerging market countries while that in the advance countries have remained relatively flat over the last decade. The surge is even more pronounced in the emerging market countries of China and India where reserve growth rates exceeded 30 percent of GDP between 2001 and 2003 (Terada-Hagiwara, 2005).

Recognizing the important role that foreign currency reserves play in mitigating financial and economic crisis in emerging market countries, we seek in this paper not to emphasize the surge but the potential for existing demand determinants not yet investigated. In other words, in this study we posit that, there is still a consensus that the existing evidence has not exhausted the

Maru Etta-Nkwelle, Ph.D., is Assistant Professor of Finance and International Business at Howard University School of Business, Washington, D.C. 20059. She can be contacted at metta@howard.edu.

factors propelling the demand for foreign currency reserves in emerging market nations (Bird and Rajan, 2002; Flood and Marion, 2002; and Aizenman and Rierra-Crichton, 2007). And thus in this study we employ an interdisciplinary approach and attempt to bridge this gap with the application of herding behavior.

The practice of herding which originated from the animal world is seen everywhere today in human life, especially in investment decisions (Ming-Ming Lai, 2004). In finance it is typically defined as the behavioral tendency for investors to follow the actions of others (Banerjee, 1992; Graham, 1999; Chang et al, 2000; Welch, 2000, and Tan et. al. 2005). Similarly, this study views herding behavior in foreign currency reserves as the tendency for nations to imitate effective and sustainable policy directions of their neighbors. That is, nations may decide to increase their foreign currency reserves beyond expected levels without necessarily receiving adverse news about macroeconomic fundamentals but because they have observed their neighbors doing so and want to catch up to them.

This tendency to engage in imitative behavior could also be influenced by expert advice. Advice from development experts could encourage convergence or herding characteristics in reserve growth rates as professionals share experiences on what has worked in addressing development problems in other countries. Furthermore, emerging market nations that have gone through a crisis (high inflation, real exchange rate overvaluation, speculative attacks etc.) have been advised by development institutions to adhere to certain economic policy conditions including a minimum quantity of foreign currency reserves (buffer stock). In fact 'follow thy neighbor's best practice' is actually encouraged by development institutions such as the World Bank and International Monetary Fund and may be one of the explanations for the surge in reserve accumulation in emerging market nations. Therefore, this study posits that in the same way that agents in the financial market would make investment decisions based on the actions of other agents, there is a tendency for sovereign nations to do the same. After all, governments like the financial markets are made up of agents (in this case the agents are appointed / elected officials) supposedly acting in the best interest of their constituents.

The rest of the paper is organized as follows. Section 2 provides a brief literature review. The models, methodology and data are described in section 3. Section 4 reports the results, analysis and implications. And section 5 presents the conclusion.

II. Literature Review

A review of the literature that have examined the motivations for international reserve accumulation by emerging market countries, found none that has investigated the presence of herding behavior. Interestingly, in international finance, studies that have applied herding behavior seem to have concentrated mostly at the micro level (Graham, 1999; Welch, 2000; Lobao and Serra, 2002; Tan, Chiang, Mason, and Nelling, 2008). That is, existing empirical evidence on herding behavior has been done predominantly on financial markets activities in advanced countries. In fact, the literature points out that more empirical work needs to be done on developing nations' activities also, where a greater tendency to herd is likely to occur because of weak reporting requirements, lax enforcement of regulations, and costly information acquisition (Sushil Bikhchandani and Sunil Sharma 2001). Hence, this study is timely and will

contribute to the existing literature on the demand for foreign currency reserves by supplying empirical evidence on herding behavior at the macro level for 90 countries covering three geographic regions.

Exploring additional determinants of the demand for foreign currency reserves in emerging market countries is particularly important for several reasons: first, empirical evidence suggest that developing countries are prone to shocks (internal and external) that are three times that of advanced countries (Aizenman and Riera-Crichton 2007). Given that most emerging market countries are price takers in the international market for their commodities, they frequently face uncertainties such as terms of trade shocks, sudden stops in capital inflow, poor crop yields and capital flight. The financial and economic destabilization caused by these shocks requires that governments have ready mechanism to cushion them as they emerge. Fisher (2001) adds that in an era of capital mobility, countries with greater reserves are better equipped to handle current and capital account shocks than countries with smaller reserves. In fact, empirical evidence found reserves to be an effective mitigating tool against terms of trade shocks especially for emerging market countries with limited access to global capital markets (Aizenman and Riera-Crichton, 2007). Second, it has been observed that capital accumulation may cause growth in developing countries (Berthelemey and Sodeerling, 2001). Since capital accumulation and growth are positively related, then reserve accumulation beyond buffer stock levels should be encouraged, as over time if the country does not deplete its reserves to offset adverse shocks, such funds could be utilized for investment activities that promote growth. And third, traditionally, advanced countries have served as the major source of capital inflow for developing countries. However, the global financial crisis of 2008-2009 has imposed liquidity constraints on many advanced countries forcing them to reduce the flow of credit to developing countries. The reduction in capital inflow would have imposed severe hardship on emerging market countries had they not learned from the sudden stop experience of the 1980s and 1990s and accumulated reserves in the post crisis years. The ability to draw on these reserves has certainly reduced their vulnerability to the reduced flow of capital from advanced countries.

Furthermore, the increased integration of trade and investment activities around the world has also compelled nations to be mindful of global trends especially regarding the reserve levels of their neighbors, competitors or countries with whom they share the same characteristics (level of development, natural resources, export commodity, size, population etc.). For example, it is well documented that the financial crisis which began in Thailand in 1997, soon spilled over to other neighboring countries such as South Korea, Indonesia, Japan, Malaysia, Singapore and the Philippines (Charles Hill, 2011). Therefore, when a neighbor such as South Korea that has gone through a financial crisis begins to accumulate reserves to mitigate its risks of sudden stop of capital inflow, other nations in the region may follow suit so that they are not left behind. Therefore, the susceptibility of emerging market countries to similar types of shocks from external sources certainly requires these countries to be mindful of what is going on in their neighboring countries. That is the strategic behavior of one country tends to attract the attention of others especially if the action provides a benefit to the neighbor. In fact, some studies have found evidence of herding behavior in equity markets of South Korea and Taiwan in the aftermath of the Asian financial crises (Chang et al, 2000). This type of herding in financial markets has been coined as rational herding (Scharfstein and Stein, 1992). The authors theoretically explain that because of the principal- agent problem, managers have a tendency to

imitate the actions of others, completely ignoring their own private information in order to maintain their reputational capital in the market. In contrast, some theoretical explanations suggest that herding behavior relies on the psychology of the market and information asymmetry (i.e. the irrational view by Devenow and Welch, 1996). That is, there is a tendency for market participants to exhibit irrational behavior and follow the direction of the market consensus. An increase in information asymmetry they argue can increase the gap between those who know and those who do not know, resulting in herding. However, other studies caution that the link between information asymmetry and herding behavior is ambiguous at the micro level (Gelos and Wei 2002). Existing research on how transparency affects herding tendency of international investment funds, found no evidence that improvements in transparency implies a reduction in investor herding. Therefore, given the general lack of consensus of the influence of herding behavior at the micro level, in this study we deviate from institutional finance and examine herding at the macro level using models that have traditionally been applied to detect and measure this phenomenon in investment decisions.

III. Models

The theoretical foundation for the models used in this analysis is based on the notion that the tendency for emerging market countries to herd in their demand for foreign currency reserves is similar to the income convergence theory posited by the traditional neoclassical growth theory (Robert Solow, 1956). The neoclassical growth model suggests that incomes in regions with similar capital-labor-ratios have a tendency to converge. Recently, several authors (such as Obstfeld and Rogoff, 2000; and Flood and Rose, 2002) have applied the convergence theory to interest rates and they postulates that in an integrated world with no capital flow barriers, arbitrage should encourage convergence in real interest rates on assets with identical risks in any financial market regardless of the location. Following the same reasoning, this study predicts convergence in the foreign currency reserve growth rates of developing countries in the same geographic region that have gone through a financial crisis (i.e. have similar characteristics). The convergence hypothesis is used as a preliminary test of herding behavior by employing the panel unit root technique to investigate the presence of common trends in reserve accumulation of the countries in the respective regions. Stationarity in the cross country differences of the macroeconomic variable (in this case the growth rate in reserves) exhibits conditional convergence which we interpret as preliminary evidence of convergence / common trends (Li and Papell, 1999).

Next, to add robustness in our analysis, we apply a more powerful cross sectional absolute deviation model with slight modifications (Chang, Cheng and Kharana, 2000). The cross sectional absolute deviation (CSAD) is an extension of the cross sectional standard deviation (CSSD) traditionally used to detect herding behavior in equity markets (Christie and Huang, 1995). The authors (Christie and Huang, 1995) suggest that during periods of severe market volatility, uncertainty regarding investment outcome increases. Therefore, investors have a tendency during such times to ignore their abilities and base their investment decisions on the collective actions in the market. This tendency for investors' actions to converge during periods of market stress usually results in returns that cluster around the market return. Similarly, this study argues that following the financial and debt crisis of the 1990s, emerged a period of economic uncertainty for emerging market countries. Economic uncertainty, coupled with rising oil prices of the mid 2000s facilitated the herding tendency proposed in this study.

Prior to applying the CSAD model, we use the Granger causality technique to test for correlations between the dependent and independent variables in the model. We then proceed with the application of the CSAD model in the detection of herding behavior and examine the relationship between the volatility in the growth rate of foreign currency reserves in the individual countries relative to the regional mean. The assumption is that emerging market countries are all mindful of each others reserve accumulation trend and given their past experiences with sudden stops of capital inflow, their actions regarding reserve accumulation seem to be moving in the same direction over a period of time. This tendency for the growth rate in reserves of these countries to cluster around the regional mean should result in a lower volatility in reserve growth rates amongst the countries which suggests herding behavior. Of course, a notable shortcoming of this model is that it is only useful for detecting herding and not for measuring the extent of herding. Therefore, this study goes a step further and employs a herding measurement model - the Lakonishok, Shleifer and Vishny, (1992) model (henceforth LSV) to compare the proportion of countries in a region that increased their reserves during each quarter with the proportion expected if no herding existed. If the proportion of nations in a region with positive growth rates in reserves is greater than the expected proportional growth rate for the region, then herding exist.

A. Methodology

As discussed in the theoretical foundation above, the econometric procedure for the detection of herding behavior in this paper uses three major tests. First, we test the convergence hypothesis using panel unit root test (Li and Papell, 1999). A model similar to the Augmented Dickey Fuller (ADF) test is run:

$$\Delta(R_{i,t} - R_{r,t}) = \alpha_1 + \alpha_2(R_{i,t-1} - R_{r,t-1}) + \sum_{z=1}^{L_i} \beta_{i,z} \Delta(R_{i,t-z} - R_{r,t-z}) + \xi_{i,t} \tag{1}$$

where $R_{i,t}$ is the growth rate in reserves in country i at time t , $R_{r,t}$ is the weighted average growth rate in reserves for the region, $I = 1 \dots N$ (number of countries in the region) and $t = 1 \dots T$ (number of years). Li and Papell (1999) explain that testing the convergence hypothesis entails a test of whether the series $(R_{i,t} - R_{r,t})$ exhibits a unit root, because as $R_{i,t}$ catches up to $R_{r,t}$, $(R_{i,t} - R_{r,t})$ should become an $I(0)$ or level stationary.

Next, the cross sectional absolute deviation (CSAD) is used to examine the relationship between the volatility in foreign currency reserve growth rates in the individual countries in each region relative to the regional average (as in Christie and Huang, 1995 and Chang et al 2000). The analysis begins with a cross sectional average deviation of growth rate equation specified as:

$$CSAD_t = \frac{1}{N} \sum_{i=1}^N |R_{it} - R_{rt}| \tag{2}$$

where CSAD is the cross sectional absolute deviation – a measure of reserve growth rate volatility and R_{it} represents the growth rate in reserves in the individual countries in each region. R_{rt} is the weighted average growth rate in reserves for the region and N is the total number of countries in the respective regions. Next, since herding is most likely to occur during periods of economic stress, the CSAD regression specification was modified with a dummy variable to represent the uncertainty in international markets in the post crisis era. The uncertainty dummy (dr) takes a value of 1 if R_{it} moves in the same direction as R_{rt} and zero otherwise. That is, the non-linear equation expressing the relationship between CSAD and R_{rt} was estimated as:

$$CSAD_t = \alpha + \lambda_1 R_{r,t} * dr + \lambda_2 R_{r,t}^2 * dr + \lambda_3 R_{r,t} * R_{r,t}^2 + \zeta_t \quad (3)$$

A negative and significant λ_2 suggests the presence of herding.

The next step in this analysis involves the measurement of the extent of herding. For this purpose, the model posited in LSV (Lakonishok, Shleifer and Vishny, 1992)) is employed. At the micro level the LSV model defines herding as the tendency for firms to trade a given security together and in the same direction more often than would be expected if they were trading randomly and independently (Lobao and Serra, 2002). Applying this definition at the macro level yields the following equation:

$$H(it) = |p(i,t) - p(t)| - AF(i,t) \quad (4)$$

where

$$p(i,t) = \frac{B(i,t)}{N}$$

$$p(t) = \frac{\sum_{i=1}^N p(i,t)}{N}$$

$$AF(i,t) = E \left[|p(i,t) - E(p(i,t))| \right]$$

where p_{it} is the ratio of the number of nations that had positive growth rates in reserves during the quarter to the total number of nations (N) in the region; p_t is the expected value (E) of the proportion of nations that should have positive growth rates if they were acting independently; and B_{it} represents the nations (i) whose growth rates in reserves were positive during quarter t . AF is an adjustment factor which allows the model to capture the random variation of p_{it} around its expected value, under the null hypothesis of independent actions and assuming B_{it} has a binomial distribution with parameter $p=p(t)$ * (Labao and Serra, 2000). Under the null hypothesis, if $H_{it} = 0$, then herding is absent in the international reserve accumulation of these nations. Deviations from p_t above the adjustment factor AF suggest the extent of herding.

Although the LSV method is considered a standard measure of herding behavior, it has its shortcomings(see Laboa and Serra, 2000 and Sushil and Sunil, 2001). The most notable of these shortcomings is that the measure uses volume or number of activities rather than the value of these activities. The problem here is that the measure may fail to exhibit herding if the total value of positive growth rates in reserves far exceeded the total value of negative growth rates.

B. Data

This study uses quarterly foreign exchange reserve data for 90 countries from 1997q1 to 2008q4. The data was retrieved from the International Monetary Fund's International Financial Statistics (2009) database. The data represents the post crisis years for the respective regions. Chang and Valesco's (1998) classification of crisis episodes in emerging market countries were used to determine dates for the post crisis years in each region. For Africa (34 nations) the post

crisis period spanned from 1997q1 to 2008q3, Asia (28 nations) from 1999q1 to 2008q4 and Latin America and Caribbean (28 nations) from 1999q1 to 2008q4.

IV. Results and Analysis

The investigation of whether conditional convergence exist using the ADF panel unit root test is reported on Table I. Based on the test results (Table I) we can reject the null hypothesis of a unit root in all the countries in the panel at the 1% level. This suggests that there is a possibility of common trends in the accumulation of foreign currency reserves in all the three geographical areas in the sample during their respective post crisis periods.

Next, Granger causality tests were also conducted to assess whether the independent variables in equation 3 cause volatility in the growth rates of foreign currency reserves (CSAD). These results are reported on Table II. In Asia and Latin America, we can strongly reject the null hypothesis that the weighted average regional growth rate in reserves R_r and the square of the reserve growth rate in each country $R^2_{r,t}$ does not granger cause CSAD based on the F-statistics. We infer from this that, volatility in the growth rates in foreign currency reserves at the regional level and that of the individual countries are correlated and may be moving toward a regional norm. However, in the case of Africa, the results of the causality test do not confirm the existence of any correlations. This is so because the F-statistics suggest that we cannot reject the null hypothesis that R_r and $R^2_{r,t}$ does not granger cause CSAD.

The estimation of the herding detection model (equation 3) which is based on the cross sectional average deviation of the growth rates in reserves in the respective regions commenced using the ordinary least square method with no fixed effects and the results for all the three regions are presented in Table III. The growth rate in foreign currency reserves for the individual countries is represented by the variable λ_j . The results of the summary statistics show that on an average, the foreign currency reserves of the individual Asian countries grew faster than the other two regions at 6.3%. This finding is not surprising. Economic theory suggests that foreign currency reserves are necessary in order to maintain a peg. As many of the countries in the region have adopted a soft or hard peg to the U.S. dollar, they have also had to increase their holdings of the anchor currency in order to maintain the peg. In addition, some authors have suggested that the strategy of the Asian countries to promote export led growth is a major driver of the demand for foreign currency reserves in the region (Dooley et al, 2003). Foreign currency reserve they argued is used to promote exports through competitive exchange rates. In fact, in the meeting of the G-20 nations in South Korea in the fall of 2010, market driven exchange rates were emphasized as opposed to policies that promote currency undervaluation for competitive purposes. In Latin America, although some of the individual countries had positive average growth rates, their λ_j coefficient is negative and significant. In contrast, the African λ_j coefficient is positive but negligible.

Looking at the non-linear term, which is the variable of interest – λ_2 , we find support for the Granger causality test reported on Table II above. The coefficient λ_2 is negative and significant at the 1% level for Latin America. This suggests that reserve accumulation trends in Latin America have been moving in the same direction over a period of time which exhibits herding behavior. Similarly, the coefficient λ_2 is negative and significant at the 1% level for Asia suggesting that herding behavior may be a determinant of the demand for foreign currency

reserves in this region as well. However, in Africa, as predicted by the Granger causality test, growth rates in reserve accumulation do not seem to be converging over time. The results of the herding detection model show λ_2 to be positive, negligible and insignificant. Further examination of the herding detection results suggest that although herding exists in Latin America and Asia, its influence is minimal. That is the herding detection coefficient - λ_2 of -0.025 and -0.016 for Latin America and Asia respectively is very low.

A second set of estimation (equation 4) was carried out to verify the predictions of the herding detection model by measuring the magnitude of herding. The results are reported in Tables IV, V, and VI. In Latin America (Table VI) over 42 quarterly periods, the estimated average level of herding is measured at 0.0405. This suggests that about 4.05 percent of the countries in the region have a tendency to accumulate reserves based on the regional average. This low level of herding measure is not surprising. It is in line with the low coefficient reported by the herding detection model. In contrast to Latin America, the herding measure for Asia (Table V) is estimated at 0.5132. This level which is higher than that of Latin America suggest that in about 51.32 percent of the countries in Asia, the demand for international reserves may be influenced by the regional average. This higher measure of herding in Asia as apposed to Latin America is slightly surprising. Based on the herding detection model, the herding measure for Latin America should have been at a higher level than that of Asia. This tendency for the LSV model to overestimate the level of herding has been documented at the micro level by some studies (such as that by Laboa and Serra, 2002). As expected, the herding level for Africa (Table IV) is estimated at 0.0059 which is in line with the prediction of the herding detection model that no herding (negligible) exists in the region. Unfortunately, with this model we are unable to test for the statistical significance of the results. Additionally, as mentioned above, several other limitations of the model are listed in Laboa and Serra, (2000) and Sushil and Sunil (2001). The most notable is that the model takes only the volume of activity (in this case number of increases in reserves) and disregards the total value of the activity. This restriction can underestimate the magnitude of herding. Jones, Lee and Weis have also shown that the expected value of H_{it} may be negative when the volume of activity is low since the adjustment factor AF takes larger values. Future improvement in the model should take into consideration the value of activities (reserve accumulation), as higher values of activity would reflect a higher demand for reserves and thus impact the magnitude of herding.

A. Implications

The results of this study highlight several monetary policy implications. We observe that regions with greater monetary policy autonomy such as Asia show a greater tendency towards herding in foreign currency reserves than their counterparts in Latin America and Africa. In Africa for example; where no herding is detected (negligible), most of the countries in the study belong to a monetary or currency union such as the Central African Economic and Monetary Union (CAEMC), the West African Economic and Monetary Union (WAEMU) or the Common Monetary Area in Southern Africa (CMA). As part of the institutional arrangement of these monetary unions, the activities of the central banking system such as decisions on foreign currency reserve accumulation is exogenous to the member governments. This is especially true in the CAEMC and the WAEMU where the accumulation of reserves is not paramount given the guaranteed financial support from the French treasury to maintain the fixed exchange rate system and for trade purposes. This unlimited credit line is not available to the Asian countries that do

not belong to a monetary union and thus the need to accumulate foreign currency reserves to mitigate external shocks is greater. In fact, the uncertainty faced by many emerging market countries in global financial markets over the last couple of years (2008-2009) lends support to the contingency planning (increase in reserves) which most of Asia has implemented since the financial crisis of the 1990s. The surge in reserves has provided the necessary liquidity in these countries and prevented the banking crisis experienced in the advanced countries from 2008 to 2009. That is, the reserve accumulation strategy pursued by emerging market countries in their post financial crisis years has enabled them to concentrate on their economic development agenda albeit the global liquidity constraints which plagued the advanced countries recently. It is also projected that the recent global liquidity constraint would have hijacked the development plans and imposed severe hardship on emerging market countries had they not learned from their respective sudden stop experiences of the 1990s and accumulated reserves in the post crisis years.

Despite the fact that the reserves accumulated by emerging market countries have benefited the advanced countries as well during the global financial slowdown of 2008-2009, the advanced countries and the U.S. in particular continue to be concerned about the impact of surplus reserves on the current exchange rate system. This concern was evident during the G-20 meetings in South Korea in the fall of 2010 where the member nations cautioned each other to refrain from using surplus reserves to direct exchange rates in favor of their domestic policies. The accumulation of surplus reserves is also of particular concern to the U.S. because the reserves are denominated mostly in the dollar. This puts pressure on the U.S. economy and currency to remain strong, a condition which is difficult for any nation to guarantee. The U.S. economy is part of an integrated global economy which is currently weak and thus like many other nations has been using monetary policies to promote domestic demand.

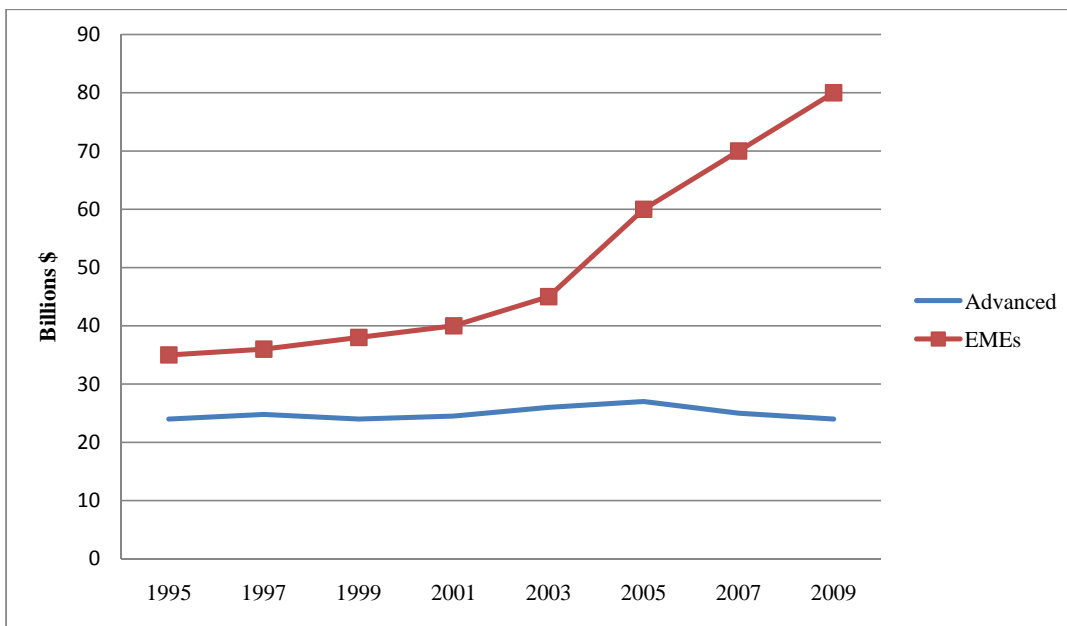
It is also feared that the excess dollars accumulated could result in capital flight if not managed effectively. Therefore, it is important that the government clearly define its reserve objectives to the central bank, which in turn would develop a corresponding reserve management strategy to mitigate potential mismanagement. Blackman (1982) suggests that rather than lumping all foreign currency reserves into one pool which may paint a picture of excess accumulation, these funds should be allocated into different accounts to reflect the respective objectives of holding reserves (such as liquidity, income, rainy day fund, defend the value of the local currency, etc).

V. Conclusion

The objective of this study was to examine if herding behavior is a determinant of the demand for foreign currency reserves in emerging market countries. Using quarterly data on foreign exchange reserves in 90 nations covering three geographic regions (Africa, Asia and Latin America and Caribbean), this study finds evidence of herding using a cross sectional standard deviation model. Three tests were applied to investigate the presence of herding: one to test for convergence, the second tested for causality and the third was to detect the presence of herding. The test of convergence reveals that there is a possibility of common trends in the accumulation of international reserves amongst Asian, Latin America and African countries. Although the test of causality does not totally support the test of convergence, it suggests that in two of the regions - Asia and Latin America, there exist some correlations between the volatility in foreign currency reserves at the country level and at the regional level. In an effort to resolve

the inconsistency presented by these two preliminary tests, the more powerful cross sectional standard deviation model was employed to detect the presence of herding. The results of the herding detection model are more in line with that of the causality test. The herding detection model suggests that herding behavior is a determinant of the demand for foreign currency reserves in Asia and Latin America but not in Africa. To verify the robustness of the herding detection model, a contemporary herding behavior model proposed by Lakonishok et al (1992) was used to determine the magnitude of herding. Interestingly, the herding measurement model confirms the results of the tests of causality and that of the herding detection model. The Lakonishok et al model shows that herding behavior is greater in Asia and minimal in Latin America. And as predicted by the herding detection model, the magnitude of herding in Africa is negligible.

Figure 1
Foreign currency reserves as a percent of import of goods and services
(Three year averages)



Source: IMF working paper: Reserve accumulation and International Monetary Stability
 Emerging market nations include: Brazil, Chile, China, Hong Kong, India, Indonesia, Malaysia, Mexico, Philippines, Poland, South Korea, Taiwan, Turkey, Singapore and Russia.

Table I
Panel Unit Root Test Results for Common Trend in Reserve Growth Rates
(Conditional Convergence Hypothesis)

Method	# of observation	T-Statistics	P-Value
AFRICA			
ADF test	1927	913.27	0.0000
ASIA			
ADF test	888	363.82	0.0000
LATIN AMERICA			
ADF test	1470	861.51	0.0000

ADF null: unit root (assumes individual unit root process). The optimal lag length was estimated by the AIC criteria.

Table II
Pairwise Granger Causality Test

Variables	# of observations	F-Statistics	Lags
Africa			
$R^2_{r,t}$ does not granger cause CSAD	322	0.01160	1
R_r does not granger cause CSAD	322	0.00038	1
Asia			
$R^2_{r,t}$ does not granger cause CSAD	336	2.13821	1
R_r does not granger cause CSAD	336	3.95068	1
Latin America			
$R^2_{r,t}$ does not granger cause CSAD	259	2.02613	7
R_r does not granger cause CSAD	259	1.70136	7

$R^2_{r,t}$ is the square of the reserve growth rate in each country. CSAD was derived from equation (3) above.

R_r is the weighted average regional growth rate.

Table III
Results of the Herding Behavior Detection Model (model 3)

Variables	Latin America	Asia	Africa
$R_{r,t} \lambda_1$	-0.469912* (-3.992900)	0.063662 (2.999413)	0.005245 (0.153031)
$R_{r,t}^2 \lambda_2$	-0.025183* (-2.061958)	-0.016347 (-3.473556)	0.000254 (0.886979)
$R_{r,t} * R_{r,t}^2 \lambda_3$	0.002795* (3.759082)	.....	.....
Constant	7.903950 (9.170185)	0.104435 (4.687654)	3.470766 (14.25198)
R-squared	.09	.11	.34
F-statistics	3.00	4.06	18.52
Durbin Watson	1.86	1.81	1.71

T- Statistics are in parenthesis. *Significant at the 1% level. A negative and significant $R_{r,t}^2$ exhibits herding

Table IV
Results of Herding Measurement Model – Africa

Period*	B_{it}	P_{it}	$P_{it}-E(P_{it})$	H
1997	29	0.5700	0.0500	-0.0600
1998	28	0.4300	0.1900	0.0400
1999	28	0.5500	0.1100	-0.0150
2000	31	0.5975	0.0975	-0.0025
2001	30	0.5800	0.0800	-0.0300
2002	29	0.5700	0.0700	-0.0300
2003	29	0.5650	0.0550	-0.0400
2004	35	0.6775	0.1075	0.0325
2005	33	0.6400	0.0800	0.0050
2006	27	0.7325	0.1225	0.0725
2007	39	0.7550	0.1450	0.0950
2008	34	0.6633	0.0533	0.0033
Average		0.6109	0.0967	0.0059

*Average of 4 quarters. B_{it} = # of nations whose reserves in period $t > t-1$; $P_{it} = B_{it}/N$; where N = # of nations in the sample. $P_{it}-E(P_{it}) = \sum(B_{it}/N) / \text{average}(B_{it}/N)$; and $H(it) = |p(i,t) - p(t)| - AF(i,t)$ signifies no herding in Africa. The higher the value, the greater the tendency to herd.

Table V
Results of Herding Measurement Model – Asia

Period*	B_{it}	P_{it}	P_{it}-E(P_{it})	H
1999	16	0.6775	0.0950	0.5125
2000	14	0.5850	0.1125	0.6050
2001	14	0.5625	0.1950	0.6275
2002	15	0.6375	0.0950	0.5525
2003	16	0.6550	0.1350	0.5350
2004	15	0.6150	0.0825	0.5750
2005	18	0.7375	0.1075	0.4525
2006	19	0.7700	0.0900	0.4200
2007	21	0.8750	0.1925	0.3150
2008	16	0.6533	0.0667	0.5367
Average		0.6768	0.1172	0.5132

B_{it} = # of nations whose reserves in period $t > t-1$; $P_{it} = B_{it}/N$; where N = # of nations in the sample

$P_{it}-E(P_{it}) = \sum(B_{it}/N) / \text{average}(B_{it}/N)$; and $H(i,t) = |p(i,t) - p(t)| - AF(i,t)$. A value of .51 signifies herding in Asia. The higher the value, the greater the tendency to herd.

Table VI
Results of Herding Measurement Model – Latin America

Period*	B_{it}	P_{it}	P_{it}-E(P_{it})	H
1998	23	0.5000	0.1200	0.1200
1999	19	0.5275	0.1375	0.0925
2000	22	0.5975	0.0175	0.0250
2001	21	0.5825	0.1275	0.0625
2002	18	0.5000	0.1450	0.1225
2003	18	0.4925	0.1075	0.1300
2004	24	0.6650	0.0750	-0.0350
2005	26	0.7075	0.1275	-0.0250
2006	23	0.6450	0.0450	-0.0250
2007	24	0.6675	0.1325	0.0000
2008	25	0.6900	0.1250	-0.0225
Average		0.5977	0.1055	0.0405

* Average of 4 quarters. B_{it} = # of nations whose reserves in period $t > t-1$; $P_{it} = B_{it}/N$; where N = # of nations in the sample. $P_{it}-E(P_{it}) = \sum(B_{it}/N) / \text{average}(B_{it}/N)$; and $H(i,t) = |p(i,t) - p(t)| - AF(i,t)$. The value of .03 signifies herding in Latin America. The higher the value, the greater the tendency to herd.

References

- Aizenman, J. and J. Lee. "Financial versus Monetary Mercantilism – Long Term View of Large International Reserve Hoarding." *World Economy* 31 (2008), 593-611.
- Aizenman, J., and N. Marion. "International Reserve Holding with Sovereign Risks and Costly Tax collections." *The Economic Journal* 14 (2004), 569-591.
- Aizenman, J., and D. Riera-Crichton. "Real Exchange Rate and International Reserves in the Era of Growing Financial and Trade Integration." *NBER Working Papers* 12363, (2006).
- Banerjee, A. V., "A Simple Model of Herd Behavior," *The Quarterly Journal of Economics* 107/3 (1992), 797-817.
- Berthelemy, J., and S. Ludvig. "The Role of Capital Accumulation, Adjustment and Structural Change for Economic Take-off: Empirical Evidence from African Growth Episodes," *World Development* 29 (2001), 323-343.
- Bird, G., R. Rajan. "Too Much of a Good Thing? The Adequacy of International Reserves in the Aftermath of Crises," *The World Economy* 26/6 (2003), 873-91.
- Blackman, C. "Reserves in Small Developing Countries," *Group of 30 Occasional Paper 11* (1982), 1-19.
- Chang, E. C. Cheng, J. W., and A. Kharana. "An Examination of Herd Behavior in Equity Markets: An International Perspective," *Journal of Banking and Finance* 24/10 (2000), 1651-1699.
- Chang, R., and A. Velasco. "Financial Fragility and Exchange Rate Regimes," *NBER Working Paper* 6469, (1998).
- Christie, W. G., and R. D. Huang. "Following the Pied Piper: Do Individual Returns Herd Around the Market?" *Financial Analyst Journal* 51/4 (1995), 31-37.
- Devenow, A., and I. Welch. "Rational Herding in Financial Economics," *European Economic Review* 40 (1996), 603-615.
- Dooley, M., D. Folkerts-Landau and P. Garber. "An Essay on the Revived Bretton Woods System," *National Bureau of Economic Research Working Paper* 9971 (2003). Flood, R., and Marion, N., Holding International Reserves in an Era of High Capital Mobility," *International Monetary Fund* working paper 02/62 (2002).
- Fischer, S. "Exchange rate regimes: Is the Bipolar View Correct?" *The Journal of Economic Perspective* 15 (2001), 3-24.
- Gelo, G., and S. Wei. "Transparency and International Investor Behavior," *International Monetary Fund* (2002).
- Graham, J.R. "Herding among Investment Newsletters: Theory and Evidence," *The Journal of Finance*, 54/1 (1999), 237-268.
- Hill, C., 2011. *International Business: Competing in the Global Marketplace*, 8th ed. McGraw-Hill Irwin.
- Jones, S., D. Lee, and E. Weis. "Herding and Feedback Trading by Different Types of Institutions and the Effects on Stock Prices," working paper, Indiana University—Indianapolis (1999).
- Lakonishok, J., J. Shleifer, and R. W. Vishny. "The Impact of Institutional Trading on Stock Prices," *Journal of Financial Economics*, 32/1 (1992), 23-44.
- Li, Q. and D. Papell. Convergence of International Output: Time Series Evidence for 16 OECD Countries," *International Review of Economics and Finance* 8 (1999), 267–80.
- Lobao, J., and A. Serra. "Herding behavior: Evidence from Portuguese Mutual Funds," *Center*

for Macroeconomics Studies (2002) Portugal.

Ming-Ming L. "Herd Behavior and Market Stress: the case of Malaysia," *Academy of Accounting and Financial Studies Journal* 9 (2004).

Obstfeld, M., J. Shambaugh and A. Taylor. "Reserve Accumulation and Financial Stability," *CEPR Discussion Paper* 6693 (2007).

Scharfstein, D., and J. Stein. "Herd Behavior and Investment," *American Economic Review* 80 (1990) 465-479.

Solow, M. R., "A Contribution to the Theory of Economic Growth," *Quarterly Journal of Economics* 70/1 (1956), 65-94.

Sushil, B., S. Sunil. "Herd Behavior in Financial Markets," *IMF Staff Working Paper* 47/3 (2001), 289.

Tan, L., T. Chiang, J. Mason. and E. Nelling. "Herding Behavior in Chinese Stock Markets: An Examination of A and B Shares," *Pacific-Basin Finance Journal* 16 (2008), 61-77.

Terada-Hagiwara, A. "Explaining the Real Exchange Rate during Sudden Stops and Tranquil Periods," *Institute for Monetary and Economic Studies*, (2005): Bank of Japan.

Welch, I., "Herding among Security Analysts," *Journal of Financial Economics*, 58/3 (2000), 369.

Maximizing IRA Returns Using FLP/LLC Discounting Techniques

William E. Maas, Kevin M. Bahr, and Sean T. Carey

Abstract

The purpose of this paper is to demonstrate the potential investment benefits of holding real estate inside an IRA and utilizing Family Limited Partnership (FLP) or family Limited Liability Company (LLC) discounting techniques. Statutory authority, administrative authority, and judicial authority was researched to support the conclusion that an IRA may own real estate and the Individual Retirement Account (IRA) value may be discounted for tax and minimum required distribution (MRD) purposes by using properly structured techniques.

I. Introduction

Total IRA assets within the United States continue to grow in value and the importance of IRA assets in retirement planning and living also continues to expand. U.S. Retirement Assets totaled \$14.0 trillion at the end of 2008, with IRAs being the largest component at \$3.6 trillion. Direct investments in IRAs and roll-over of assets in 401k and 403b IRA employer plans into self-directed IRAs may create substantial assets within an IRA. IRA assets normally consist of debt and equity investments such as publicly traded companies (or mutual funds) and bonds. IRA owners and financial planners continue to look for ways to maximize after-tax returns as they consider alternative investments that may be utilized within an IRA. Real estate is normally viewed as an investment to be made outside of an IRA. This paper reviews primary sources of authority supporting the ability to hold real estate inside an IRA and the potential pitfalls of holding real estate. Unrelated Business Taxable Income (UBTI) and “prohibited transaction” rules further complicate holding real estate within an IRA.

Planning techniques that historically were used in estate planning to reduce gift and estate taxes are researched in the context of IRAs. Discounting may not be applied to traditional IRA investments; however, when real estate is properly owned by an IRA, discounting techniques may be applied to maximize after-tax returns of IRAs using income tax deferral and if applicable, estate tax reduction.

II. Literature Review

Prior research has explored bits and pieces of the comprehensive approach taken to the research within this paper. (Guglielmo, Ware and Hamilton 2003) look at reducing taxation of large IRAs with a focus on using charitable remainder unitrusts, irrevocable life insurance trusts, and a strategy utilizing company-owned profit sharing plans to purchase life insurance. There are a few companies such as Equity Trust Company (<http://www.trustetc.com/>) and Pensco Trust Company (<http://www.penscotrust.com/investing/realEstate.aspx>) that promote utilizing IRA's to hold real estate and have various articles related thereto. The paper briefly considers use of an FLP without fully developing the concept or determining an appropriate asset to obtain

William E. Maas, J.D., C.P.A., is an Assistant Professor of Business Law at the Univ. of WI-LaCrosse, LaCrosse, WI 54601. He may be contacted at maas.will@uwlax.edu. Kevin M. Bahr, Ph.D., C.P.A., is a Professor of Finance at the Univ. of WI-Stevens Point, Stevens Point, WI 54481. He may be contacted at kbahr@uwsp.edu. Sean T. Carey, M.S.T., C.P.A. is an Assistant Professor of Tax at the Univ. of WI-Stevens Point, Stevens Point, WI 54481. He may be contacted at scarey@uswp.edu

discounts, stating such planning is in “its nascent stage.” (Oshins, Fox, Hirschey, Keebler and Kess 2008) reviews issues of FLP/LLC valuation (discounts) in the estate planning context, and the importance of having non-tax reasons for a FLP/LLC.

III. Maximizing IRA Returns Using Discounting Techniques

As IRA owners look to maximize their retirement assets and/or diversify their holdings, some owners are focusing on holding real estate inside an Individual Retirement Account (IRA). Assets qualifying to be held inside an IRA are defined as much by what is not allowed as by specific allowance. In general, investments in collectibles as a practical matter are not allowed since such an acquisition is deemed a distribution. IRC 408(m)(1-2). There is an exception for certain coins and bullion. IRC 408(m)(3). An IRA may not invest in insurance contracts. IRC 408(a)(3). An IRA may invest in real estate although there are traps for the unwary.

Traps include the rules for Unrelated Business Taxable Income (UBTI) and prohibited transactions. Investing in real estate may subject the IRA to UBTI. IRC 511 Triggering a tax liability through UBTI defeats the goal of tax deferral for traditional IRAs and tax exemption of Roth IRAs. Any IRA (Traditional or Roth) that is exempt from taxation may be subject to UBTI. IRC 408(e)(1) The term “unrelated trade or business” means any trade or business regularly carried on by such trust or by a partnership of which it is a member. IRC 511(a)(1), 512, 513(b).

UBTI may apply when real estate inside an IRA is financed (mortgaged) and generates rental income. IRC 514(a)(1). Publication 548 states that IRA’s are subject to tax on unrelated business income if the IRA incurs debt to acquire property within the IRA. Therefore, an IRA should have enough cash to acquire the real estate debt free, and then the rental income would be excluded from UBTI.

“Prohibited transaction” (prohibited by IRC 4975) rules are designed to prevent IRA owners from engaging in self-dealing transactions. If the rules are broken an IRA may lose tax exemption and cease to be an IRA. IRC 408(e)(2) An example of a prohibited transaction occurred when an IRA purchased a home for the IRA owner to reside in. Harris, Gerald M., et ux. v. Commissioner (T.C. 1994). The entire IRA value will be deemed to be distributed, triggering income tax consequences and may be subject to the 10% penalty on early distributions. IRC 72(t) This will also trigger state income tax and penalties. The same rules on prohibited transactions apply to Roth IRAs Reg 1.408A-1, Q-1, A-1,(b) A disqualified person includes not only the IRA owner, but also the owner’s family. IRC 4975(e)(2) Prohibited transactions may include the IRA buying, selling, leasing, or lending assets from or to the individual owner of the IRA. The IRA owner may not receive compensation for operating a business or managing rental property that is an asset of the owner’s IRA. IRC 4975 (c)(1)(C) and (F). If an owner is contemplating a transaction that may violate the prohibited transaction rules, the owner may request a ruling from the Department of Labor (which also has jurisdiction over IRAs). IRC 4975(c)(2)

Liquidity may create issues for IRAs holding real estate. The investor also faces annual expenses such as real estate taxes and maintenance needs, and risks associated with unforeseen expenses, such as emergency property repairs or tenant defaults, that could put the IRA investment in jeopardy if the IRA doesn't have the cash to cover them. Therefore it is important

to have some cash inside the IRA that is purchasing the real estate.

For purposes of the MRD (Minimum Required Distribution), a taxpayer may want to leave sufficient assets outside of real estate to have the liquidity required to make MRD in cash rather than using in-kind distributions of the real estate. An IRA owner that has multiple IRA's may take distributions in a disproportionate fashion, as long as the total MRD is met. This may allow a taxpayer with multiple IRAs to leave the IRA holding real estate intact for a longer period of time, while the initial MRD is taken from an IRA that holds mutual funds or other assets that may be easily converted to cash prior to distribution from the IRA. The IRS can levy a penalty equal to 50% of the difference between what you should have withdrawn from your account each year and what you actually withdrew, by filing IRS form 5329. Thus, a forced sale of the real estate could occur if liquidity needs are not addressed.

A trustee that is willing to hold real estate is needed to act as custodian. Many IRA trustees (ie. banks and brokerage companies) will not hold assets other than cash, fixed investments, and equities. The IRA fees will be higher when real estate is held, due to more frequent and involved transactions such as collecting rents and paying expenses such as real estate taxes.

No depreciation deduction is available on real estate held inside an IRA; however, the deduction may not be that important as there is no tax until subsequent distribution of the real estate or proceeds from the sale of the real estate. Holding a capital asset (real estate) inside an IRA will transform what otherwise would be capital gain (currently subject to lower income tax rates) into ordinary income inside a traditional IRA. All gain is taxed at ordinary rates rather than capital gain rates; however this is the same with stock gains and dividends from investment such as mutual funds held inside the IRA. A Roth IRA may offer additional planning opportunities with the purchase of real estate; however, since there is no tax on distribution or MRD the discounting techniques discussed here may not be useful.

Discounts are less likely to be attacked by the IRS if there are non-tax reasons for formation of the FLP/LLC. Assets may be exempt from creditor claims in bankruptcy or under applicable state law. Referring to its opinion in *Patterson v. Shumate*, the U.S. Supreme Court held that IRA assets are exempt from the debtor's bankruptcy estate under Bankruptcy Code §522(d)(10)(E) because an IRA confers a right to receive payment on account of age and is a similar plan or contract to those listed in Bankruptcy Code §522(d)(10)(E). Noting that, under Code §408(a)(4), the accountholders have a nonforfeitable right to the IRA assets, the Court reasoned that, under Code §72(t), that right is restricted by a 10% penalty tax on any withdrawal before age 59^{1/2}. Thus, the penalty tax prevents access to the entire IRA balance and limits the right to payment. Because the restriction is removed when the accountholder reaches age 59^{1/2}, the right to the IRA balance is a right to payment on account of age, the Court concluded.

Significantly, the Court noted that although the right to receive payment under an IRA is on account of age and is a similar plan or contract to those listed in Bankruptcy Code §522(d)(10)(E), the IRA assets are exempted under Bankruptcy Code §522(d)(10)(E) only to the extent that the assets are reasonably necessary for the support of the accountholder and any dependents. However, the IRA exemption under the Bankruptcy Code as amended by the 2005

Bankruptcy Act allows a debtor to claim an exemption for funds in an IRA up to the \$1 million cap without regard to the reasonably necessary standard.

A plaintiff injured on the real estate may file a lawsuit against the property owner or entity holding the asset, in this case the IRA if the real estate is titled in the name of the IRA, or the LLC if the IRA instead owns an interest in the LLC with the real estate titled in the name of the LLC. Since an IRA owner would not want to file bankruptcy to obtain protection of some or all of the IRA assets, a critical additional protection would be to place the real estate inside an LLC or multiple LLCs if multiple real estate properties are owned, and then IRA ownership interests in the LLCs. This creates a nontax reason (limited liability for other IRA assets) for creating the LLC, which may be important so the IRS respects the FLP/LLC. The FLP/LLC in turn becomes the mechanism supporting discounting the value of the IRA assets (real estate) for tax purposes.

Large discounts are often taken by GRATs (Grantor Retained Annuity Trusts), FLP (Family Limited Partnerships) or Family LLCs (Limited Liability Companies) for lack of marketability and lack of control. Fractional interest discounts are analogous to FLP discounts, for real estate directly held by the IRA rather than indirectly held using an FLP or LLC. The IRS has litigated the issue of discounts, and the taxpayer normally wins, as demonstrated in the following cases:

In *Mooneyham v. Commissioner*, 1991 T.C. Memo 178, the Tax Court allowed a 15 percent discount on a gift of a 50 percent interest in real estate to the taxpayer's brother based on a demonstrated lack of marketability, problems with control, and costs of partition relating to a fractional undivided interest. The court noted that the taxpayer's experts were unprepared and unqualified, but allowed the discount for the reason that the Internal Revenue Service "presented no evidence from which the Court could conclude that, under the facts of this case, no discount or a lesser discount was appropriate." The taxpayer had originally asked for a 25 percent discount.

In *Astleford v. Commissioner*, T.C. Memo 2008-128 (May 5, 2008), involving a gift of a limited partnership interest, the Tax Court applied cascading discounts on many different layers of assets. The taxpayer gifted an interest in a newly created limited partnership which owned a 50 percent interest in a general partnership which owned 1,187 acres of Minnesota farmland valued at \$3,500 an acre. The Tax Court first applied a 20 percent "absorption" discount to the farmland owned by the general partnership. The Tax Court said that an absorption discount is a discount in the value of real estate if the sale of such real estate within a short period of time would reduce the price for which real estate otherwise would sell. A short period of time was considered to be a year.

Essentially, the court said that flooding the local real estate market with 1,187 acres of farmland all in one year would require a price reduction of 20 percent to accomplish the sale. After applying a 20 percent absorption discount to the farmland owned by the general partnership, the Tax Court then applied a combined 30 percent minority and marketability discount to the one-half general partnership interest owned by the limited partnership. The Tax Court then applied a combined 39 percent minority and marketability discount to three gifts of 30 percent blocks of the limited partnership to the taxpayer's children. The end result of all the

cascading discounts is that the farmland originally valued at \$3,500 per acre was reduced to \$1,269 per acre with an effective discount rate of nearly 64 percent.

In *McCord v. Commissioner*, 120 T.C. 358 (2003) the Tax Court extensively analyzed the testimony and opinions of both the Government's and the taxpayer's appraisers to arrive at a discount of 15% for minority interest and 20% for lack of marketability interest for the transferred interests.

In *Knight v. Commissioner*, 115 T.C. 506 (2000), although the IRS raised the legitimacy of the family limited partnership for tax purposes, the Tax Court found that under Texas law the partnership had properly been created and was recognizable for federal gift tax purposes. The family limited partnership had been funded primarily with cash, municipal bonds, and real property. However, the Court allowed only a 15% overall discount for lack of marketability and minority interest from the underlying value of the property.

In *Lappo v. Commissioner*, T.C. Memo. 2003-258 the Tax Court, after considering the testimony of both taxpayer's and Government's expert witnesses, allowed an overall 15% minority interest discount and an overall 24% marketability discount in determining the fair market value of transfers of a family limited partnership with both active and passive assets. In *Lappo*, both parties agreed that the marketable securities portion of the family limited partnership should be valued using the net asset value of the partnership. The petitioner's expert used a minority interest discount of 7.5%, while the respondent's expert used a minority interest discount of 8.5%. Since the difference between the experts was not significant, the Tax Court adopted the 8.5% minority interest discount for the marketable securities.

In the recently decided case, *Estate of Webster E. Kelley v. Commissioner*, T. C. Memo. 2005-235, the Tax Court allowed a 12% minority discount and a 23% marketability discount for a family limited partnership that consisted solely of cash and certificates of deposit. In allowing this large discount, the Tax Court relied upon appraisals by both the petitioner and respondent that used general equity closed-end funds as comparables. The use of general equity funds as comparable to cash by both the petitioner and the respondent could be criticized, since cash is a more liquid investment than securities. This case was an anomaly for various reasons and should not be considered valuable guidance.

Fractional ownership interests in real estate may also receive discounts. An example would be three different IRA owners acquiring a fractional share interest (1/3, 1/3, 1/3) in a single apartment complex. The following court case, although unusual in the large size of the discount, demonstrates fraction share discount concepts.

The Tax Court again awarded a steep discount (60%) to the estate value of an undivided interest in timberland property in the *Estate of Della Walker van Loben Sels v. Commissioner*, 1986 T.C. Memo 501. The parcels of timberland ranged from 26 acres to 26,000 acres and the undivided interests ranged from 2.5 percent to 26 percent. The court cited lack of marketability, lack of management, lack of general control, lack of liquidity and potential partitionment expenses. An important consideration of this case was the disclosure by the Internal Revenue Service's experts that they were not directed by the I.R.S. to value the property to account for a

discount. At trial, all the I.R.S.'s experts agreed that had they been so instructed, they would have applied a discount. Thus, the Tax Court focused primarily on the taxpayer's experts whose discounts ranged from 50 to 78 percent. The court took special consideration of a minority sale of a tract of similar timber property at a 50 to 60 percent discount.

Although fraction interest discounts are available, for non-tax reasons there may be greater liability in lawsuits, and problems if one IRA owner wants to liquidate his or her fractional interest and the other IRA owners do not want to dispose of their interest, or a buyer is not found to acquire the fractional interest of one IRA owner. Discounts are fact specific. Consequently, each case needs to be individually assessed to determine the appropriate discounts.

The above cases did not involve IRAs. Discounting principals may also be applied in the context of valuing assets with IRAs. IRM 4.72.8.4(1) states that "although Rev. Rul. 59-60, 1959-1 C.B. 237 provides methods for valuing shares of stock of closely held corporations for estate and gift tax purposes, the factors may be used to determine values of assets in qualified plans." And where appropriate, stock values should be discounted due to a lack of marketability and, if appropriate, a control premium should be added to the stock value. IRM (09-01-2006) 4.72.8.4(3). In the FLP/LLC context, the IRA would need a fractional share ownership interest in the FLP/LLC with other IRA owners to effectuate the discounts. The FLP/LLC may have title to all or a fractional interest of the real estate.

One of the issues related to executing this valuation strategy is the administrative duties related to obtaining a valuation, including of course paying for the valuation. Business valuations can cost anywhere from \$5,000 to \$20,000, and more. And even though the asset involved is real estate, a valuation expert not a real estate appraiser is necessary since this individual is responsible for establishing the amount of your discount.

And of course paying for the valuation expert certainly does not guaranty (nor does the expert) the discount percentage (and hence the amount of your discount) that they have derived. If the valuation is challenged by the IRS, the fair market value determined by the IRS may be higher resulting in greater tax liability, and potentially interest and penalty. Depending upon the value of the asset, and hence the amount of tax, valuation has become a hotly contested issue - especially with the proliferation of family limited partnerships and limited liability companies. Therefore if the asset value involved has a high dollar-value, and therefore the tax savings/costs involved are significant, the IRS is more likely to challenge the discount.

There are indeed countless court cases involving success by the taxpayer as well as the IRS. The court cases reveal that the court usually makes a judgment call that relies upon the opinion of experts. Often the Judge will determine which expert presented a better position and side more in favor of that expert. Although in many instances, the courts "determine" their own opinion as to fair market value, siding with neither the taxpayer's nor the IRS's experts.

The "loss of value" using valuation discounts for lack of marketability and control would decrease the MRD. A 75 year-old retiree has a minimum required distribution pursuant to the IRS tables of an amount equal to 4.37%. Applying a discount to the value of the IRA assets of

35% reduces the effective MRD to 2.84%, resulting in a greater amount of assets left inside the IRA and greater tax deferral.

Assuming an annual investment rate of return on the assets held inside the IRA of 7% the MRD would not exceed the return until a taxpayer turned age 85. Applying a 35% discount to the IRA asset value effectively extends to age 94, the point at which the MRD percentage exceeds the return percentage. Therefore, the IRA owner utilizing discounting techniques gets an extra nine years in which the IRA balance continues to grow after MRD begins, resulting in greater tax deferral and after-tax returns. The discounts may continue to the heirs of a deceased IRA owner, resulting in further tax deferral in a “stretch IRA” scenario.

A taxpayer’s IRA is included in his or her gross estate on death. Depending on the size of a decedent’s estate and estate tax laws, the discounts applied to the IRA may also reduce the taxable estate for estate tax purposes providing additional financial planning opportunities. Table I gives an example assuming an IRA owner has real estate with a fair market value (absent discounts) of \$1,000,000 inside their estate and the estate is large enough to be subject to a 45% marginal estate tax rate. The discount techniques result in a tax savings of \$157,500 based on the assumptions used.

An IRA may invest in a closely held business entity without creating a prohibited transaction or self-dealing issue by staying within the constraints of the IRA rules. See: J.H. Swanson, 106 TC 76, Dec. 51,155 (1996), IRS FSA (Field Service Advice) 200128011, July 13, 2001, and Department of Labor Advisory Opinion 2000-10A. The IRS also recognizes the concept in its qualified plan audit manual, IRM 4.72.8, Employee Plans Technical Guidance, Valuation of Assets.

An issue that may arise during the MRD period, is determining the value of the real estate and FLP/LLC on an annual basis to determine what the MRD is each year. IRM 4.72.8.1.2. states that whether a formal valuation is required will depend on the transactions that occur with the plan and form of the plan. “The reasonableness of the method for valuing plan assets is based on the surrounding facts and circumstances...there is no absolute requirement the annual valuation be based on an independent appraisal.” Therefore, to reduce costs of administration the IRA custodian should consistently use a method that utilizes a ratio of an initial FMV appraisal by a certified appraiser, relative to the assessed fair market value on the real estate tax bill, multiplied by the FLP/LLC discount. Future real estate tax bills may then be used for annual valuations.

IV. Conclusion

Investing IRA assets in real estate and applying FLP/LLC discounting concepts to the IRA creates opportunities for IRA owners to increase after-tax returns that some individuals and financial planners may want to utilize. Under the right circumstances, a direct land investment through an IRA utilizing FLP/LLC discounting techniques provides an opportunity to maximize returns by minimizing taxes.

IRA owners interested in these opportunities should consult with their financial planner, tax, and legal advisors to review both tax and nontax issues. Upon determining such an

investment is appropriate, the transaction must be structured properly.

Table I

	Traditional IRA no discount	Traditional IRA with 35% discount
IRA value before discount	\$1,000,000	\$1,000,000
Discount	N/A	35%
Value after discount	\$1,000,000	\$650,000
Estate Tax Rate	45%	45%
Tax Liability	\$450,000	\$292,500

References

- Edelstein M., “Appeals Settlement Guidelines,” Discounts for Family Limited Partnerships and Family Limited Liability Companies, UIL No. 2031.01-00, Internal Revenue Service, pp. 1-24.
- Guglielmo D., Ware R., and Hamilton S., “Managing the Tax Consequences of Large IRAs: The Emergence of Integrated Solutions,” *Journal of Retirement Planning*, Mar. 1, 2003.
- Internal Revenue Manual (IRM), Section 4.72.8, Valuation of Assets, Internal Revenue Service, (Sep. 1, 2006).
- Kennedy, 367 T. M., IRAs, BNA U.S. Income Portfolios.
- Oshins R., Fox C., Hirshey D., Keebler R., and Kess S., “Valuation of FLP/LLC Interests – a Mismatch Between Inclusion and Marital Deduction Values,” *The Tax Magazine Current Financial and Estate Planning Trends*, Feb. 1, 2008, pp. 7-18.
- The U.S. Retirement Market, 2008, Research Fundamentals, Investment Company Institute, June 2009, Vol. 18, No. 5.

International Index Investing during the Financial Crisis

C. Edward Chang, H. Doug Witte, and Tsu-Hong Yen

Abstract

Conventional wisdom suggests that active portfolio management should be beneficial in international markets, given the relative inefficiency of these markets compared to the U.S. market. Also, recent empirical evidence for U.S. mutual funds suggests that active portfolio management beats indexing during bear markets. Whether this result holds for international mutual funds is an open question. The performance of international mutual funds over the last 15 years as well as during the financial crisis of 2007-2009 offers the most recent timeframes in which to examine these two issues. We compare the performance of international index funds relative to all U.S.-based international mutual funds. Our results show that international index funds, including both index mutual funds and exchange-traded funds, appear to provide *higher* returns and similar risk when compared with category averages and thus most actively managed international mutual funds. These results hold over the 2007-2009 timeframe as well as over the past 15 years.

I. Introduction

As the number of U.S.-based international index funds grows, investors in the U.S. will need to evaluate the merits of indexing relative to actively managed international funds and the higher costs that go along with them. Conventional wisdom suggests that active management may provide an edge in less-efficient overseas markets. However, recent data on some of the top actively managed international funds and their index rivals call the conventional wisdom into question. A survey from Standard & Poor's in July 2006 found that most actively managed international mutual funds did not perform as well as their benchmark indexes. Over five years, the Citigroup/S&P PMI (Primary Market Index) World ex-U.S. benchmark outpaced 62.5% of international funds and the S&P/Citigroup EMI (Extended Market Index) World ex-U.S. outperformed 63.3% of international small-company funds (Kollmeyer 2006).

Recent empirical evidence from the U.S. mutual fund industry suggests that active management is most beneficial when the markets are performing poorly. Consumption-based asset-pricing theory posits that investors will pay more for assets that have relatively good payoffs during bear markets; marginal utility of consumption is high during these times. Thus, investors may be willing to accept the unconditionally inferior returns to actively managed portfolios if, conditional on bear markets, these same portfolios deliver superior returns. This finding may explain why there continues to be demand for actively managed funds despite evidence that, after expenses, these funds deliver returns that are generally inferior to index funds.

If we couple together the evidence suggesting active management may be better in bear markets with the conventional wisdom that active management is most likely to be beneficial in

C. Edward Chang is Professor in the Finance and General Business Department at Missouri State University, Springfield, Missouri. H. Doug Witte is Assistant Professor in the Finance and General Business Department at Missouri State University, Springfield, Missouri. Tsu-Hong Yen is Associate Professor at San Jose State University, San Jose, California.

less-efficient international markets, two interesting predictions emerge. First, international index funds in bear market times should perform poorly relative to their actively-managed counterparts. Both the international setting and a bear market bode ill for indexing. Second, in bullish markets, the generally superior returns to indexing during these times will be offset to some extent by the (conventionally assumed) inferiority of indexing in an international setting. Our paper addresses these predictions.

Investors considering international index fund investing also need to be aware that some self-identified international index funds do not behave as such. In our sample of 241 international index funds and indexing ETFs, one-sixth of these funds have expense ratios greater than their category average of all funds. We call these funds “non-ideal”. Since not all self-identified international index funds behave as such, this paper differentiates “ideal” international index funds with low expense ratios and turnover rates from their “non-ideal” counterparts that have expenses and turnover more in line with actively managed funds. We find that the existence of “non-ideal” international index funds understates the returns and overstates the risks of international index funds as a group.

In addressing the issues raised above, we examine the operating characteristics, risk and performance measures of all available vehicles for index investing in U.S.-based international stock funds during the fifteen-year period from April, 1994 to March, 2009. In this study, international index funds include not only index mutual funds (hereafter “IMFs”), but also their recently emerging close substitutes - exchange-traded funds (hereafter “ETFs”). Operating characteristics include expense ratios, annual turnover rates, and tax cost ratios. Performance measures include average annual returns and return percentile ranks in category, and risks (measured by standard deviations). Our results help shed light on two issues: First, how did international index funds perform relative to the average of all U.S.-based international mutual funds (hereafter “AMFs”) over the last 15 years as well as, more narrowly, during the financial crisis of 2007-2009? Second, do “ideal” international index funds perform differently from all international index funds?

Our paper adds to the literature by addressing the issue of whether actively managed U.S.-based international mutual funds deliver performance superior to the alternative offered by investible international index funds in times of economic crisis. The choice of data ending on March 31, 2009 provides an ideal point in which to observe the performance of these international investment funds, as the trough of market prices occurred in March 2009. Our paper also addresses the issue of whether “ideal” international index funds with low expense ratios and turnover rates deliver superior performance relative to their “non-ideal” counterparts with high expenses and portfolio turnover.

II. Literature Review

Investors in the U.S. are becoming increasingly aware of the benefits of international equities in their portfolios. For example, foreign markets can give U.S. investors more exposure to growth opportunities. Since the U.S. encompasses only about half (and declining) of the world’s market capitalization, U.S. investors who confine themselves to only domestic issues are missing out on important overseas companies and economies in which more and more of the world’s economic growth is occurring. Moreover, not all overseas markets have experienced the same degree of volatility that has recently beset the U.S. markets. Adding low correlation

international investments to the asset mix can be an effective diversification strategy (Olienyk, Schwebach, and Zumwalt 1999). Investors in the U.S. who add international funds to their portfolios may well see reduced return volatility.

Conventional wisdom suggests that active portfolio management may be beneficial to U.S. investors considering investment in international equity markets given that these markets are presumably less efficient than the U.S. market. Information on international firms may be sparse and more difficult to interpret. Additionally, foreign firms can be less transparent than their U.S. counterparts, giving rise to greater informational asymmetries. Active portfolio managers may be better able to evaluate the quality of management, corporate governance structures, future growth prospects, etc., and take advantage of mispricings.

Empirical evidence on international active portfolio management generally contradicts the conventional wisdom. The three most widely cited studies are Droms and Walker (1996), Cumby and Glen (1990), and Eun, Kolodny, and Resnick (1991). Droms and Walker (1996) find that the Jensen's alpha for international mutual funds are not significantly different from 0. Cumby and Glen (1990) find that actively managed international funds yield superior performance relative to a U.S. index but not superior to an international equity index. This suggests that the main benefit of the international funds they studied is diversification and not security selection or market-timing ability. Additionally, Cumby and Glen find that the funds performed particularly poorly during the crash of October 1987. Eun, Kolodny, and Resnick (1991) find that international funds performed well relative to the S&P 500 index, but only matched the performance of the MSCI World index.

Proffitt and Seitz (1983) report that international funds outperform the S&P 500 index on a risk-adjusted basis over 1974 to 1982. Aiello and Chieffe (1999) find that international indexing does not offer superior returns relative to the S&P 500 index, but diversification benefits do exist. Lang and Niendorf (1993) did not find any significant return difference in the risk-adjusted performance of global and international (ex-U.S.) funds when compared to either a passive U.S. index or two MSCI international indexes. Taken as a whole, these papers suggest that active portfolio management in international markets is generally superior to the performance of passive U.S. indexes, but not superior to passive international indexes.

Malkiel (2010, p. 125) compares the investment returns earned by 414 global equity managers to the MSCI World Index, and finds that well over half of the active managers failed to outperform the passive benchmark. Even in emerging markets, many of which are far less efficient than markets in developed countries, passive management appears to be a winning strategy. Malkiel (2010, p. 126) also finds about two-thirds of the active managers of emerging-market funds were beaten by the index. He concludes that the very inefficiency of the trading in many emerging markets, with relatively large bid-ask spreads and a variety of transaction costs, makes it difficult for active managers to outperform a passive benchmark.

Our paper adds to the literature by addressing the issue of whether actively managed U.S.-based international mutual funds deliver performance superior to the alternative offered by *investible* international index *funds*. Thus, our study differs from those cited which compare international funds to an index in which investors cannot directly invest. In addition to the fact

that indexes are not directly investible, indexes often do not accurately reflect the return investors can earn in trying to match them. Elton, Gruber, and Busse (2004) find that S&P 500 index funds average returns about .5% below the S&P 500 index itself. Our study provides a more accurate analysis of the merits of actively managed international fund investing given that we benchmark these funds to an alternative passive investment rather than an index.

Some empirical evidence does support active portfolio investment in international markets. Eling and Faust (2010) find that emerging market hedge fund returns and alphas are much higher than traditional mutual funds that focus on emerging markets. It should be noted, however, that the hedge funds are compared to traditional actively managed funds. Fortin and Michelson (2002) report that indexing compares favorably to active funds in most equity categories, except in the small company and international equity categories. These two equity categories are likely to be relatively less efficient and this evidence supports the notion that active management is most beneficial in less efficient markets. Gallo and Swanson (1996) use a two-factor international arbitrage pricing model and find that their sample of U.S.-based international mutual funds generates superior investment performance over the 1985-1993 period. Tkac (2001) reports that well-diversified international funds do outperform passive MSCI benchmarks, but regional and country funds do not show the same ability to outperform.

Dentzler and Wiggins (1997) find that actively managed international funds beat a world index, but find that the world index is not mean-variance efficient. They contend that if the world index is inefficient, fund managers can demonstrate spurious superior performance. Relative to a 12-country benchmark, the Jensen measures of the funds in the Dentzler and Wiggins study are overwhelmingly negative, suggesting that active portfolio managers may have country selectivity, but no security selectivity.

A benefit of active management more generally may be that performance is relatively better in down markets. Kosowski (2006) studies domestic U.S. mutual funds and finds that active portfolio management is most beneficial when markets are down. He suggests that investors accept lower average fund performance because the funds perform particularly well in recession times when investors care most about returns. However, Kosowski's results for domestic U.S. funds contrast Cumby and Glen's (1990) finding that international funds performed poorly in October of 1987. We study whether the results Kosowski documents for domestic U.S. mutual funds carries over to U.S.-based international mutual funds by examining the performance of these funds relative to international index funds during the financial crisis of 2007-2009.

The last issue we address is whether "ideal" international index funds with low expense ratios and turnover rates deliver superior performance relative to their "non-ideal" counterparts with high expenses and portfolio turnover. This issue is motivated by Elton, Gruber, and Busse's (2004) finding that not all S&P 500 index funds behave as true index funds. They find that expense ratios vary from .06% to 1.35% (average is 44 basis points) for their sample 52 open-end index funds. The difference between the best performing and worst performing funds averages over 2% per year. Importantly, Elton, Gruber, and Busse find that past expenses predict future differential returns well. Buying the funds with low expenses results in nearly 1% extra return per year relative to the funds with high expenses. This implies that a sorting of

funds into an ideal and non-ideal category based on expense ratios is likely to provide investors with better returns going forward if they invest in only ideal funds.

Elton, Gruber, and Busse (2004) also find that past tax efficiency is a good predictor of future tax efficiency. Index funds with historically good tax efficiency have about one-sixth the amount of capital gains as index funds with historically poor tax efficiency, presumably because of lesser turnover. This implies that turnover may be a beneficial sorting criterion to use along with expenses when forming ideal and non-ideal index fund categories.

III. Data and Methodology

Data for IMFs, ETFs, and AMFs were obtained from Morningstar Principia for the fifteen-year periods ending on March 31, 2009. Results were computed for up to five investment periods (1-, 3-, 5-, 10-, and 15-year). Table I shows the breakdown of all 241 available international index funds, including 106 IMFs and 135 ETFs, in up to 12 Morningstar international stock categories.

Not all self-identified index funds behave like an index fund with low expense ratio and turnover rate. Appendix A lists all non-ideal index funds that charge expense ratios higher than their category average in March 2009. These non-ideal index funds behave more like actively managed funds and were included in “all” international index funds,” but not “ideal” international index funds for our analysis. Table I also shows the breakdown of all 201 “ideal” international index funds, including 72 IMFs and 129 ETFs, in up to 12 Morningstar international stock categories.

This paper empirically compares operating characteristics and performance measures of international index funds relative to category averages in the U.S. mutual fund industry. Operating characteristics collected, averaged, and reported include expense ratios, annual turnover rates, and tax cost ratios.

Expense ratio is the annual fee all mutual funds or ETFs charge investors. Expense ratio is expressed as the percentage of assets deducted each fiscal year for fund expenses, including 12b-1 fees, management fees, administrative fees, operating costs, and all other asset-based costs incurred by the fund.

Turnover rate or ratio is a measure of the fund’s trading activity. Turnover ratio is computed by taking the lesser of purchases or sales (excluding all securities with maturities of less than one year) and dividing by average monthly net assets. A turnover ratio of 100% does not necessarily suggest all securities in the portfolio have been traded. For example, the fund could have held 50% of all positions for the past five years and turned over the other 50% of all positions twice throughout the year. A low turnover rate tends to be more indicate a buy-and-hold strategy. High turnover suggests a more active investment strategy involving more frequent buying and selling of securities. The turnover figure is culled directly from the financial highlights of the fund’s annual report and is not calculated by Morningstar.

Morningstar’s tax cost ratio measures how much a fund’s annualized return is reduced by the taxes investors pay on distributions. Funds regularly distribute dividends and capital gains to

their investors. Investors then must pay taxes on those distributions during the year they are received. Like an expense ratio, the tax cost ratio is usually concentrated in the range between 0% and 5%. A tax cost ratio of 0% indicates the fund had no taxable distributions. A higher tax cost ratio indicates the fund was less tax efficient.

Performance measures include conventional return and risk measures as suggested by Bodie, Kane and Marcus (2007). Annual average returns are measured by mutual funds' net asset value (NAV) returns and ETFs' market returns. Return percentile rank in category represents the percentile rank the fund's return had in its Morningstar category over the designated time frame. Returns are ranked from highest to lowest, with the best return having a 1% ranking and the worst a 100% ranking. These relative figures are a good way to identify funds that out- or underperformed their peers during a certain time period.

Standard deviation (a statistical measurement of dispersion about an average) depicts how widely a fund's returns varied over a certain period of time. Investors use the standard deviation of historical performance to predict a range of returns most likely for a given fund. When a fund has a high standard deviation, the predicted range of future return is wide, implying greater volatility. Morningstar computes the standard deviation by using the trailing monthly total returns for the appropriate time period. All monthly standard deviations are then annualized.

IV. Results

Expense ratios, annual turnover rates, and tax cost ratios are summarized in Table II. International index funds as a whole appear to have lower expense ratios (0.94% vs. 1.74%), lower turnover rates (73.59% vs. 92.75%), and lower tax cost ratios (0.84% vs. 1.58%) than the averages of all international mutual funds in the same Morningstar category. However, IMFs display inconclusive results for expense ratios and higher turnover rates (235.44% vs. 101.25%).

When non-ideal index funds were excluded, "ideal" international index funds in the analysis also have lower expense ratios (0.57% vs. 1.74%), lower turnover rates (29.95% vs. 92.75%), and lower tax cost ratios (0.83% vs. 1.58%) than the averages of all international mutual funds in the same Morningstar category. The statistical significance for turnover rates has been enhanced from 0.10 level to 0.01 level. "Ideal" IMFs display lower expense ratios (0.52% vs. 1.73%) and lower turnover rates (28.54% vs. 102.40%). The statistical significance for all three operating characteristics also has been enhanced.

Table III shows results of average annual returns over the one-, three-, five-, ten-, and fifteen-year period ending on March 31, 2009. The results show all IMFs provided lower returns than category averages (-21.08% vs. -18.28%) whereas "ideal" IMFs provided higher returns than category averages (-13.54% vs. -14.60%). All ETFs exhibit higher returns than category averages (-17.64% vs. -18.54%) and "ideal" ETFs also provided higher returns than category averages (-17.57% vs. -18.54%). Together, while all international index funds display inconclusive results for return performance, "ideal" international index funds appear to perform better than category averages (-15.08% vs. -15.99%). These results contradict the conventional wisdom that active portfolio management is beneficial in international markets.

Specifically, “ideal” IMFs exhibit consistently higher returns in the categories of diversified emerging markets and Japan stock funds. All and “ideal” ETFs exhibit consistently higher returns in the categories of diversified emerging markets and foreign large growth funds. Together, all and “ideal” international index funds exhibit consistently higher returns in the categories of diversified emerging markets, foreign large growth, and Japan stock funds.

Three-year return data is available for ten of the twelve fund categories in Table III. This data coincides with the financial crisis of 2007-2009. In seven of the ten categories, “ideal” international index funds have had better returns than category averages. This direct evidence is inconsistent with actively managed funds doing better in bear markets. Our results suggest Kosowski’s (2006) results for the U.S. market do not carry over to international markets.

Table IV shows results of return percentile rank in category over the one-, three-, five-, ten-, and fifteen-year period ending on March 31, 2009. The results show that while all IMFs display inconclusive results for returns, “ideal” IMFs exhibit higher returns than category averages (39.80% vs. 50.00%). There are no data available for ETFs.

Specifically, all and “ideal” IMFs exhibit consistently higher returns in the categories of diversified emerging markets and Japan stock funds. All four of the categories which have data for the three-year period ending March 31, 2009 show that IMFs have had better returns than category averages. This bear market data again demonstrates that actively managed funds do not have better returns in down markets. These results are similar to what we have found from Table III for IMFs. We find little evidence that active management is superior to indexing in international markets.

Table V shows results of standard deviations (stand-alone or total risk) over the three-, five-, and ten-year period ending on March 31, 2009. The results show all IMFs exhibit higher standard deviations than category averages (22.83% vs. 21.62%) whereas “ideal” IMFs exhibit lower standard deviations than category averages (21.31% vs. 22.08%). All and “ideal” ETFs in general exhibit inconclusive results of standard deviations. Together, all international index funds appear to exhibit higher standard deviations than category averages (24.12% vs. 23.18%) whereas “ideal” international index funds display inconclusive results for risks.

Specifically, unlike all IMFs, “ideal” IMFs exhibit consistently lower standard deviations in the categories of Europe stock, foreign large blend, and Japan stock funds. All and “ideal” ETFs exhibit consistently lower standard deviations in the categories of foreign large growth, Japan stock, and world stock funds. Together, while all international index funds exhibit consistently lower standard deviations only in the category of foreign large funds, “ideal” international index funds exhibit consistently lower standard deviations in the categories foreign large blend, foreign large growth, Japan stock, and world stock funds.

V. Conclusion

Investors in the U.S. can benefit from international diversification by adding international equity funds in their portfolios. Mixing a broad domestic portfolio with some broad international funds can enhance return while reducing risk for a global investor. However, we report empirical evidence suggesting investors are not likely to benefit if they direct their international

investment to actively managed funds as opposed to indexing. The conventional wisdom that indexing may not be competitive in international markets does not hold. Further, we find that indexing is more than competitive with active management during bear markets. During the financial crisis of 2007-2009, indexes provided higher returns. Finally, we caution that investors need to be aware that some self-identified international index funds do not behave like an index fund. About 17% of the international index funds we study in this paper charge higher expense ratios and incur higher turnover rates than category averages. Investors should regard these funds as actively managed funds. The existence of “non-ideal” international index funds understates the returns and overstates the risks of international index funds as a group.

More generally, our results show that both index mutual funds and exchange-traded funds exhibit lower expense ratios, lower turnover rates, and lower tax cost ratios than category averages. Index mutual funds exhibit higher returns and lower risks than category averages. Exchange-traded funds exhibit higher returns than category averages, and display inconclusive results for risk measures. Taken as a whole, international index funds, including both index mutual funds and exchange-traded funds, appear to provide higher returns and similar risks compared with category average and thus most actively managed international mutual funds.

Table I. Numbers of Available International Stock Funds as of March 31, 2009

Morningstar Category	All International Index Funds			“Ideal” International Index Funds			All MFs
	IMFs	ETFs	IIFs	IMFs	ETFs	IIFs	
Diversified Emerging Mkts	10	25	35	5	25	30	318
Diversified Pacific/Asia		3	3		3	3	41
Europe Stock	9	25	34	4	24	28	117
Foreign Large Blend	65	19	84	53	18	71	789
Foreign Large Growth		1	1		1	1	261
Foreign Large Value		5	5		4	4	311
Foreign Small/Mid Growth	4	4	8	1	4	5	135
Foreign Small/Mid Value		4	4		4	4	77
Japan Stock	6	10	16	4	10	14	50
Latin America Stock	2	5	7		5	5	26
Pacific/Asia ex-Japan Stk	2	22	24		21	21	145
World Stock	8	12	20	5	10	15	682
Total	106	135	241	72	129	201	2,952

IMFs: International Index Mutual Funds
IIFs: International Index Funds

ETFs: International Exchange-Traded Funds
All MFs: All International Mutual Funds

Table II. Expense Ratio (%), Annual Turnover (%), and Three-Year Tax Cost Ratio (%)

Panel A. Expense Ratio (%)												
Morningstar Category	All International Index Funds vs. Category Average						"Ideal" International Index Funds vs. Category Average					
	IMFs	AMFs	ETFs	AMFs	IIFs	AMFs	IMFs	AMFs	ETFs	AMFs	IIFs	AMFs
Diversified Emerging Mkts	1.72	1.84	0.74	1.84	1.02	1.84	0.37	1.84	0.74	1.84	0.68	1.84
Diversified Pacific/Asia			0.51	1.85	0.51	1.85			0.51	1.85	0.51	1.85
Europe Stock	1.21	1.67	0.76	1.67	0.88	1.67	0.20	1.67	0.52	1.67	0.48	1.67
Foreign Large Blend	0.96	1.58	0.63	1.58	0.88	1.58	0.74	1.58	0.50	1.58	0.68	1.58
Foreign Large Growth			0.40	1.59	0.40	1.59			0.40	1.59	0.40	1.59
Foreign Large Value			0.94	1.47	0.94	1.47			0.46	1.47	0.46	1.47
Foreign Small/Mid Growth	3.66	1.71	0.66	1.71	2.16	1.71	0.60	1.71	0.66	1.71	0.65	1.71
Foreign Small/Mid Value			0.50	1.53	0.50	1.53			0.50	1.53	0.50	1.53
Japan Stock	0.85	1.81	0.52	1.81	0.64	1.81	0.20	1.81	0.52	1.81	0.43	1.81
Latin America Stock	2.16	1.79	0.57	1.79	1.03	1.79			0.57	1.79	0.57	1.79
Pacific/Asia ex-Japan Stk	2.03	2.29	0.78	2.29	0.88	2.29			0.66	2.29	0.66	2.29
World Stock	1.84	1.74	1.24	1.74	1.48	1.74	1.01	1.74	0.64	1.74	0.76	1.74
Average	1.80	1.80	0.69	1.74	0.94	1.74	0.52	1.73	0.56	1.74	0.57	1.74
T-test (probability)	0.500		0.000***		0.000***		0.000***		0.000***		0.000***	

Panel B. Annual Turnover (%)												
Morningstar Category	All International Index Funds vs. Category Average						"Ideal" International Index Funds vs. Category Average					
	IMFs	AMFs	ETFs	AMFs	IIFs	AMFs	IMFs	AMFs	ETFs	AMFs	IIFs	AMFs
Diversified Emerging Mkts	133.00	89.00	27.30	89.00	62.53	89.00	18.20	89.00	27.30	89.00	25.48	89.00
Diversified Pacific/Asia			52.67	89.00	52.67	89.00			52.67	89.00	52.67	89.00
Europe Stock	511.33	113.00	29.28	113.00	156.88	113.00	15.00	113.00	27.17	113.00	25.43	113.00
Foreign Large Blend	24.17	90.00	42.24	90.00	28.01	90.00	22.72	90.00	41.69	90.00	27.12	90.00
Foreign Large Growth			37.00	99.00	37.00	99.00			37.00	99.00	37.00	99.00
Foreign Large Value			60.20	49.00	60.20	49.00			46.75	49.00	46.75	49.00
Foreign Small/Mid Growth	37.00	84.00	42.00	84.00	39.86	84.00			42.00	84.00	42.00	84.00
Foreign Small/Mid Value			17.25	66.00	17.25	66.00			17.25	66.00	17.25	66.00
Japan Stock	439.00	135.00	8.80	135.00	170.13	135.00	9.00	135.00	8.80	135.00	8.86	135.00
Latin America Stock	685.00	133.00	14.00	133.00	205.71	133.00			14.00	133.00	14.00	133.00
Pacific/Asia ex-Japan Stk	5.00	81.00	22.90	81.00	21.27	81.00			24.05	81.00	24.05	81.00
World Stock	49.00	85.00	16.00	85.00	31.53	85.00	77.80	85.00	10.86	85.00	38.75	85.00
Average	235.44	101.25	30.80	92.75	73.59	92.75	28.54	102.40	29.13	92.75	29.95	92.75
T-test (probability)	0.084*		0.000***		0.094*		0.010**		0.000***		0.000***	

Panel C. Three-Year Tax Cost Ratio (%)												
Morningstar Category	All International Index Funds vs. Category Average						"Ideal" International Index Funds vs. Category Average					
	IMFs	AMFs	ETFs	AMFs	IIFs	AMFs	IMFs	AMFs	ETFs	AMFs	IIFs	AMFs
Diversified Emerging Mkts	0.52	2.36	0.75	2.36	0.67	2.36	0.52	2.36	0.75	2.36	0.67	2.36
Diversified Pacific/Asia			0.95	1.52	0.95	1.52			0.95	1.52	0.95	1.52
Europe Stock	0.71	1.84	1.11	1.84	0.97	1.84	0.82	1.84	1.11	1.84	1.06	1.84
Foreign Large Blend	1.24	1.52	1.04	1.52	1.23	1.52	1.23	1.52	1.04	1.52	1.22	1.52
Foreign Large Growth			0.48	1.29	0.48	1.29			0.48	1.29	0.48	1.29
Foreign Large Value			0.89	2.07	0.89	2.07			0.89	2.07	0.89	2.07
Foreign Small/Mid Growth												
Foreign Small/Mid Value												
Japan Stock	1.55	0.98	0.44	0.98	1.14	0.98	0.41	0.98	0.44	0.98	0.43	0.98
Latin America Stock			0.76	1.22	0.76	1.22			0.76	1.22	0.76	1.22
Pacific/Asia ex-Japan Stk			1.01	1.68	1.01	1.68			1.01	1.68	1.01	1.68
World Stock	0.00	1.27	0.83	1.27	0.33	1.27			0.83	1.27	0.83	1.27
Average	0.80	1.59	0.83	1.58	0.84	1.58	0.75	1.68	0.83	1.58	0.83	1.58
T-test (probability)	0.067*		0.000***		0.001***		0.035**		0.000***		0.000***	

IMFs: International Index Mutual Funds
 IIFs: International Index Funds
 ***, **, *: Significant at the 0.01, 0.05, 0.10 level

ETFs: International Exchange-Traded Funds
 AMFs: (Category) Average of International Mutual Funds

Table III. Average Annual Return (%)

Morningstar Category	All International Index Funds vs. Category Average						"Ideal" International Index Funds vs. Category Average					
	IMFs	AMFs	ETFs	AMFs	IIFs	AMFs	IMFs	AMFs	ETFs	AMFs	IIFs	AMFs
Diversified Emerging Mkts												
1-Year	-52.53	-49.59	-43.36	-49.59	-46.89	-49.59	-47.30	-49.59	-43.36	-49.59	-44.30	-49.59
3-Year	-8.54	-10.41	-7.60	-10.41	-8.07	-10.41	-8.54	-10.41	-7.60	-10.41	-8.07	-10.41
5-Year	5.63	4.05	7.76	4.05	6.54	4.05	5.63	4.05	7.76	4.05	6.54	4.05
10-Year	7.83	7.78			7.83	7.78	7.83	7.78			7.83	7.78
Diversified Pacific/Asia												
1-Year			-41.98	-42.64	-41.98	-42.64			-41.98	-42.64	-41.98	-42.64
3-Year			-13.31	-12.75	-13.31	-12.75			-13.31	-12.75	-13.31	-12.75
5-Year			-2.73	-0.61	-2.73	-0.61			-2.73	-0.61	-2.73	-0.61
Europe Stock												
1-Year	-53.26	-51.19	-53.32	-51.19	-53.30	-51.19	-49.67	-51.19	-52.88	-51.19	-52.42	-51.19
3-Year	-18.19	-15.75	-15.16	-15.75	-16.25	-15.75	-14.14	-15.75	-15.16	-15.75	-14.95	-15.75
5-Year	-5.38	-1.77	-1.94	-1.77	-3.23	-1.77	-1.70	-1.77	-1.94	-1.77	-1.89	-1.77
10-Year	-3.45	3.19	-0.48	3.19	-1.59	3.19	-0.83	3.19	-0.48	3.19	-0.58	3.19
15-Year	5.48	5.32			5.48	5.32	5.48	5.32			5.48	5.32
Foreign Large Blend												
1-Year	-48.47	-46.46	-48.71	-46.46	-48.52	-46.46	-47.07	-46.46	-48.53	-46.46	-47.41	-46.46
3-Year	-15.41	-14.74	-14.53	-14.74	-15.38	-14.74	-14.96	-14.74	-14.53	-14.74	-14.94	-14.74
5-Year	-3.04	-2.48	-2.77	-2.48	-3.02	-2.48	-2.68	-2.48	-2.77	-2.48	-2.69	-2.48
10-Year	-1.12	-0.77			-1.12	-0.77	-1.02	-0.77			-1.02	-0.77
15-Year	2.30	2.22			2.30	2.22	2.57	2.22			2.57	2.22
Foreign Large Growth												
1-Year			-45.23	-46.86	-45.23	-46.86			-45.23	-46.86	-45.23	-46.86
3-Year			-13.16	-14.15	-13.16	-14.15			-13.16	-14.15	-13.16	-14.15
Foreign Large Value												
1-Year			-47.66	-45.71	-47.66	-45.71			-47.42	-45.71	-47.42	-45.71
3-Year			-13.96	-14.74	-13.96	-14.74			-13.96	-14.74	-13.96	-14.74
5-Year			3.77	-2.41	3.77	-2.41			3.77	-2.41	3.77	-2.41
10-Year			7.19	1.39	7.19	1.39			7.19	1.39	7.19	1.39
Foreign Small/Mid Growth												
1-Year	-44.43	-49.31	-52.08	-49.31	-48.80	-49.31			-52.08	-49.31	-52.08	-49.31
Foreign Small/Mid Value												
1-Year			-48.43	-48.51	-48.43	-48.51			-48.43	-48.51	-48.43	-48.51
Japan Stock												
1-Year	-48.63	-42.74	-32.07	-42.74	-38.28	-42.74	-38.32	-42.74	-32.07	-42.74	-33.86	-42.74
3-Year	-24.91	-23.44	-16.37	-23.44	-22.07	-23.44	-14.53	-23.44	-16.37	-23.44	-15.32	-23.44
5-Year	-8.86	-8.77	-5.51	-8.77	-8.02	-8.77	-2.95	-8.77	-5.51	-8.77	-3.80	-8.77
10-Year	-0.57	-2.02	-2.90	-2.02	-1.03	-2.02	-0.57	-2.02	-2.90	-2.02	-1.03	-2.02
15-Year	-1.53	-2.69			-1.53	-2.69	-1.53	-2.69			-1.53	-2.69
Latin America Stock												
1-Year	-85.88	-57.11	-46.41	-57.11	-57.69	-57.11			-46.41	-57.11	-46.41	-57.11
3-Year			-3.02	-6.91	-3.02	-6.91			-3.02	-6.91	-3.02	-6.91
5-Year			15.11	13.36	15.11	13.36			15.11	13.36	15.11	13.36
10-Year			9.46	11.89	9.46	11.89			9.46	11.89	9.46	11.89
Pacific/Asia ex-Japan Stk												
1-Year	-77.55	-42.18	-43.77	-42.18	-46.84	-42.18			-44.14	-42.18	-44.14	-42.18
3-Year			-5.46	-3.66	-5.46	-3.66			-5.46	-3.66	-5.46	-3.66
5-Year			1.42	4.62	1.42	4.62			1.42	4.62	1.42	4.62
10-Year			6.15	8.99	6.15	8.99			6.15	8.99	6.15	8.99
World Stock												
1-Year	-41.18	-41.70	-47.25	-41.70	-44.22	-41.70	-46.42	-41.70	-45.04	-41.70	-45.65	-41.70
3-Year	-5.80	-13.38	-12.22	-13.38	-8.37	-13.38			-12.22	-13.38	-12.22	-13.38
5-Year	0.60	-3.06	-4.64	-3.06	-1.50	-3.06			-4.64	-3.06	-4.64	-3.06
Average	-21.08	-18.28	-17.64	-18.54	-15.74	-15.99	-13.54	-14.60	-17.57	-18.54	-15.08	-15.99
T-test (probability)		0.074*		0.085*		0.267		0.064*		0.064*		0.047**

IMFs: International Index Mutual Funds

IIFs: International Index Funds

ETFs: International Exchange-Traded Funds

AMFs: (Category) Average of International Mutual Funds

***, **, *: Significant at the 0.01, 0.05, 0.10 level

Table IV. Return Percentile Rank in Category

Morningstar Category	All International Index Funds vs. Category Average						"Ideal" International Index Funds vs. Category Average					
	IMFs	AMFs	ETFs	AMFs	IIFs	AMFs	IMFs	AMFs	ETFs	AMFs	IIFs	AMFs
Diversified Emerging Mkts												
1-Year	40.00	50.00			40.00	50.00	32.20	50.00			32.20	50.00
3-Year	29.50	50.00			29.50	50.00	29.50	50.00			29.50	50.00
5-Year	23.50	50.00			23.50	50.00	23.50	50.00			23.50	50.00
10-Year	44.50	50.00			44.50	50.00	44.50	50.00			44.50	50.00
Europe Stock												
1-Year	57.44	50.00			57.44	50.00	54.00	50.00			54.00	50.00
3-Year	61.67	50.00			61.67	50.00	33.25	50.00			33.25	50.00
5-Year	72.56	50.00			72.56	50.00	44.25	50.00			44.25	50.00
10-Year	85.17	50.00			85.17	50.00	78.50	50.00			78.50	50.00
15-Year	40.00	50.00			40.00	50.00	40.00	50.00			40.00	50.00
Foreign Large Blend												
1-Year	55.83	50.00			55.83	50.00	50.92	50.00			50.92	50.00
3-Year	53.15	50.00			53.15	50.00	47.80	50.00			47.80	50.00
5-Year	54.61	50.00			54.61	50.00	49.21	50.00			49.21	50.00
10-Year	51.44	50.00			51.44	50.00	49.65	50.00			49.65	50.00
15-Year	49.27	50.00			49.27	50.00	39.43	50.00			39.43	50.00
Japan Stock												
1-Year	46.83	50.00			46.83	50.00	21.00	50.00			21.00	50.00
3-Year	35.83	50.00			35.83	50.00	4.75	50.00			4.75	50.00
5-Year	36.50	50.00			36.50	50.00	6.00	50.00			6.00	50.00
10-Year	29.50	50.00			29.50	50.00	29.50	50.00			29.50	50.00
15-Year	40.00	50.00			40.00	50.00	40.00	50.00			40.00	50.00
World Stock												
1-Year	49.00	50.00			49.00	50.00	78.00	50.00			78.00	50.00
Average	47.82	50.00			47.82	50.00	39.80	50.00			39.80	50.00
T-test (probability)	0.259				0.259		0.013**				0.013**	

IMFs: International Index Mutual Funds

ETFs: International Exchange-Traded Funds

IIFs: International Index Funds

AMFs: (Category) Average of International Mutual Funds

***, **, *: Significant at the 0.01, 0.05, 0.10 level

Table V. Standard Deviation (%)

Morningstar Category	All International Index Funds vs. Category Average						"Ideal" International Index Funds vs. Category Average					
	IMFs	AMFs	ETFs	AMFs	IIFs	AMFs	IMFs	AMFs	ETFs	AMFs	IIFs	AMFs
Diversified Emerging Mkts												
3-Year	30.09	29.53	30.49	29.53	30.29	29.53	30.09	29.53	30.49	29.53	30.29	29.53
5-Year	26.38	25.68	28.22	25.68	27.17	25.68	26.38	25.68	28.22	25.68	27.17	25.68
10-Year	24.84	24.96			24.84	24.96	24.84	24.96			24.84	24.96
Diversified Pacific/Asia												
3-Year			24.06	23.37	24.06	23.37			24.06	23.37	24.06	23.37
5-Year			20.73	20.69	20.73	20.69			20.73	20.69	20.73	20.69
Europe Stock												
3-Year	24.17	23.35	25.42	23.35	24.97	23.35	22.81	23.35	25.42	23.35	24.90	23.35
5-Year	20.44	20.39	21.68	20.39	21.22	20.39	19.21	20.39	21.68	20.39	21.16	20.39
10-Year	20.41	20.89	22.37	20.89	21.63	20.89	18.67	20.89	22.37	20.89	21.31	20.89
Foreign Large Blend												
3-Year	21.72	21.71	21.73	21.71	21.72	21.71	21.67	21.71	21.73	21.71	21.67	21.71
5-Year	18.51	18.65	18.50	18.65	18.51	18.65	18.44	18.65	18.50	18.65	18.44	18.65
10-Year	17.57	18.15			17.57	18.15	17.53	18.15			17.53	18.15
Foreign Large Growth												
3-Year			21.52	22.69	21.52	22.69			21.52	22.69	21.52	22.69
Foreign Large Value												
3-Year			24.00	21.23	24.00	21.23			24.00	21.23	24.00	21.23
5-Year			23.51	18.16	23.51	18.16			23.51	18.16	23.51	18.16
10-Year			22.22	17.37	22.22	17.37			22.22	17.37	22.22	17.37
Japan Stock												
3-Year	28.29	20.11	19.54	20.11	25.37	20.11	19.79	20.11	19.54	20.11	19.68	20.11
5-Year	25.99	20.03	18.15	20.03	24.03	20.03	18.00	20.03	18.15	20.03	18.05	20.03
10-Year	18.25	21.49	19.40	21.49	18.48	21.49	18.25	21.49	19.40	21.49	18.48	21.49
Latin America Stock												
3-Year			33.84	33.88	33.84	33.88			33.84	33.88	33.84	33.88
5-Year			30.90	30.86	30.90	30.86			30.90	30.86	30.90	30.86
10-Year			27.83	29.39	27.83	29.39			27.83	29.39	27.83	29.39
Pacific/Asia ex-Japan Stk												
3-Year			30.64	30.94	30.64	30.94			30.64	30.94	30.64	30.94
5-Year			24.25	25.63	24.25	25.63			24.25	25.63	24.25	25.63
10-Year			29.09	25.62	29.09	25.62			29.09	25.62	29.09	25.62
World Stock												
3-Year	22.67	20.29	17.98	20.29	20.79	20.29			17.98	20.29	17.98	20.29
5-Year	20.24	17.50	14.78	17.50	18.05	17.50			14.78	17.50	14.78	17.50
Average	22.83	21.62	23.79	23.31	24.12	23.18	21.31	22.08	23.79	23.31	23.42	23.18
T-test (probability)	0.071*		0.148		0.017**		0.023**		0.148		0.279	

IMFs: International Index Mutual Fund;

ETFs: International Exchange-Traded Funds

IIFs: International Index Funds

AMFs: (Category) Average of International Mutual Funds

***, **, *: Significant at the 0.01, 0.05, 0.10 level

Appendix A. Non-Ideal International Index Funds

Morningstar Category	Fund Type	Fund Name	Ticker	Expense Ratio	Turnover Rate
Diversified Emerging Mkts	IMF	Schb Fdm EmgMkt Idx Ins	SFENX	4.08	159.00
Diversified Emerging Mkts	IMF	Schb Fdm EmgMkt Idx Inv	SFEMX	3.99	159.00
Diversified Emerging Mkts	IMF	Schb Fdm EmgMkt Idx Sel	SFESX	3.35	159.00
Diversified Emerging Mkts	IMF	ProFunds UltraEm Mkt Svc	UUPSX	2.44	381.00
Diversified Emerging Mkts	IMF	ProFunds UltraEm Mkt Inv	UUPIX	1.44	381.00
Europe Stock	ETF	First Trust DJ STOXX 30	FDD	6.43	80.00
Europe Stock	IMF	ProFunds Europe 30 Svc	UEPSX	2.67	1,791.00
Europe Stock	IMF	Rydex Europe Str C	RYCEX	2.40	320.00
Europe Stock	IMF	Rydex Europe Str A	RYAEX	1.69	320.00
Europe Stock	IMF	ProFunds Europe 30 Inv	UEPIX	1.67	1,791.00
Europe Stock	IMF	Rydex Europe Str H	RYEUX	1.67	320.00
Foreign Large Blend	ETF	Claymore/Zacks Country Ro	CRO	2.98	51.00
Foreign Large Blend	IMF	ProFunds Ultra Intl Svc	UNPSX	2.58	
Foreign Large Blend	IMF	AllianceBer Intl C	AIZCX	2.12	53.00
Foreign Large Blend	IMF	AllianceBer Intl B	AIZBX	2.11	53.00
Foreign Large Blend	IMF	AllianceBer TMgd Intl B	ABXBX	2.09	70.00
Foreign Large Blend	IMF	AllianceBer TMgd Intl C	ABXCX	2.09	70.00
Foreign Large Blend	IMF	State Farm Intl Idx B	NFSBX	1.98	8.00
Foreign Large Blend	IMF	JPMorgan Intl Eq Idx B	OGEBX	1.77	18.00
Foreign Large Blend	IMF	JPMorgan Intl Eq Idx C	OIICX	1.77	18.00
Foreign Large Blend	IMF	State Farm Intl Idx B Leg	SIIBX	1.67	8.00
Foreign Large Blend	IMF	RidgeWorth Intl Eq Idx C	SIIFX	1.60	13.00
Foreign Large Blend	IMF	State Farm Intl Index R1	RIIOX	1.60	8.00
Foreign Large Blend	IMF	ProFunds Ultra Intl Inv	UNPIX	1.58	
Foreign Large Value	ETF	Claymore/Zacks InMltA Inc	HGI	2.85	114.00
Foreign Small/Mid Growth	IMF	Schb Fdm IntS/MCIdx Ins	SFILX	5.45	37.00
Foreign Small/Mid Growth	IMF	Schb Fdm IntS/MCIdx Inv	SFIVX	4.52	37.00
Foreign Small/Mid Growth	IMF	Schb Fdm IntS/MCIdx Sel	SFSMX	4.08	37.00
Japan Stock	IMF	ProFunds UltraJapan Svc	UJPSX	2.66	1,299.00
Japan Stock	IMF	ProFunds UltraJapan Inv	UJPIX	1.66	1,299.00
Latin America Stock	IMF	ProFunds Ultra Lt Am Svc	UBPSX	2.66	685.00
Latin America Stock	IMF	ProFunds Ultra Lt Am Inv	UBPIX	1.66	685.00
Pacific/Asia ex-Japan Stk	ETF	Claymore/Alpha China SmCp	HAO	3.16	1.00
Pacific/Asia ex-Japan Stk	IMF	Profds UltraChina Svc	UGPSX	2.53	5.00
Pacific/Asia ex-Japan Stk	IMF	Profds UltraChina Inv	UGPIX	1.53	5.00
World Stock	ETF	First Trust DJ Gbl SelDiv	FGD	4.69	42.00
World Stock	ETF	Claymore/Robb Report Gbl	ROB	3.81	26.00
World Stock	IMF	AMIDEX35 Israel C	AMDCX	3.71	1.00
World Stock	IMF	AMIDEX35 Israel	AMDEX	2.96	1.00
World Stock	IMF	AMIDEX35 Israel A	AMDAX	2.95	1.00

IMF: International Index Mutual Fund

ETF: International Exchange-Traded Fund

References

- Aiello, S. and N. Chieffe. 1999. "International Index Funds and the Investment Portfolio." *Financial Services Review* 8: 27-35.
- Bodie, Z., Kane, A. & Marcus, A. 2007. *Essentials of Investments*. New York: McGraw-Hill.
- Cumby, R. and J. Glen. 1990. "Evaluating the Performance of International Mutual Funds." *The Journal of Finance* 45 (2, June): 497-521.
- Detzler, M. and J. Wiggins. 1997. "The Performance of Actively Managed International Mutual Funds." *Review of Quantitative Finance and Accounting* 8: 291-313.
- Droms, W. and D. Walker. 1994. "Investment Performance of International Mutual Funds." *The Journal of Financial Research* 17: 1-14.
- Eling, M. and R. Faust. 2010. "The Performance of hedge Funds and Mutual Funds in Emerging Markets." *Journal of Banking & Finance* 34: in press.
- Elton, E., M. Gruber, and J. Busse. 2004. "Are Investors Rational? Choices among Index Funds." *The Journal of Finance* 59 (1, February):261-288.
- Eun, C., R. Kolodny, and B. Resnick. 1991. "U.S.-based International Mutual Funds: A Performance Evaluation." *The Journal of Portfolio Management* 17: 88-94.
- Fortin, R. and S. Michelson. 2002. "Indexing versus Active Mutual Fund Management." *Journal of Financial Planning* 15 (9): 82-94.
- Gallo, J. and P. Swanson. 1996. "Comparative Measures of Performance for U.S.-based International Equity Mutual Funds." *Journal of Banking & Finance* 20: 1635-1650.
- Kollmeyer, B. 2006. "Benchmarks vs. Stock Pickers: Stacking Up International Actively Managed Funds against Index Funds." MarketWatch.com (September 16).
<<http://www.marketwatch.com/story/international-actively-managed-funds-vs-index-funds-who-wins>>
- Kosowski, R. 2006. "Do Mutual Funds Perform When it Matters Most to Investors? US Mutual Fund Performance and Risk in Recessions and Expansions." Available at SSRN: <http://ssrn.com/abstract=926971>.
- Lang, L. and R. Niendorf. 1993. "Performance and Risk Exposure of International Mutual Funds." *Financial Services Review* 2: 97-110.
- Malkiel, B. 2010. "Efficient Markets and Mutual Fund Investing." In J. Haslem (Ed.) *Mutual Funds: Portfolio Structures, analysis, Management, and Stewardship*, Chapter 7, pp. 119-137. New Jersey: Wiley.
- Olienyk, A., R. Schwebach, and J. Zumwalt. 1999. "WEBS, SPDRs, and Country Funds: An Analysis of International Cointegration." *Journal of Multinational Financial Management* 9: 217-232.
- Proffitt, D. and N. Seitz. 1983. "The performance of Internationally-diversified portfolios." *Journal of the Midwest Finance Association* 12: 39-53.
- Tkac, P. 2001. "The performance of Open-End International Mutual Funds." *Federal Reserve Bank of Atlanta Economic Review* (3rd Quarter): 1-17.

A Comparative Performance Analysis of Three Model Portfolios of Value Line

Jamshid Mehran, Robert Balik and Raj K. Kohli

Abstract

Value Line timeliness weekly rankings puts out 4 model portfolios each containing 20 stocks. Portfolio stocks are added based on a "Timeliness" ranking and a "Financial Strength Rating" of at least B+. The Value Line Investment Survey has been the subject for many studies regarding market efficiency and Value Line's ability to debunk this theory by delivering higher abnormal returns based on public information. The results of this study indicate that mean weekly abnormal rates of return statistically exists for three of the four portfolios. In addition, although statistically insignificant, variable HML's betas for all three portfolios are negative indicating that the return movement between HML and each of the three model portfolios are in opposite direction.

I. Introduction

The Value Line Investment Survey has been the subject for many studies regarding market efficiency and Value Line's ability to debunk this theory by delivering higher abnormal returns based on public information. Many experts believe that enigma does exist, however factors such as post-announcement earnings drift, size effect and transaction costs exist to dispel the notion that investors can use this information for profit.

The Value Line timeliness rankings are issued each week. Additionally, Value Line puts out 4 model portfolios every week, where stocks are added and dropped according to their rankings. Four portfolios are created and are managed with different investment objectives. Model Portfolio 1 is designed for price appreciation, Portfolio 2 for income and for, potential price appreciation, and Portfolio 3 for long term growth. Each portfolio contains 20 stocks. An investor might infer that tracking any of these portfolios will take advantage of the Value Line enigma. Portfolio stocks are added based on a "Timeliness" ranking and a "Financial Strength Rating" of at least B+. When the timeliness ranking falls below the designated level it will be removed automatically.

Many theories exist as to why Value Line is capable of producing abnormal returns. Most notably, many experts believe the sole reason for Value Line's success in predicting short term returns is due to luck (Conover, Lancaster, & Szakmary, 2008). The reasoning behind this is simple – when so many investment advisory firms exist, and only one of them is able to produce abnormal returns, statistical analysis would indicate this to be possible without proving anything (Gregory, 1983). Another theory that exists to explain Value Line's success revolves around

Value Line's independence from client pressures. Value Line is an independent service, and is not subject to pushing client firms for incentive money. Therefore, analysts are not pressured to create misleading recommendations based on faulty information (Conover, Lancaster, & Szakmary, 2008).

Jamshid Mehran and Raj K. Kohli are in the Department of Finance at Indiana University South Bend. Robert Balik is in the Department of Finance and Commercial Law at Western Michigan University. The authors can be reached via email @jmehran@iusb.edu

We examine and compare risk-adjusted weekly performances of three model portfolios of Value Line. The characteristics of these three model Portfolios are:

II. Portfolios Characteristics

Portfolio Model - I

1. A stock must have a Timeliness rank of 1, and
2. A Financial Strength rating of at least B+ at the time of purchase.

A stock can be sold at any time, either to buy a stock that seems to have a greater potential or to realign the portfolio diversification, any stock whose Timeliness rank falls to 3 or lower is automatically dropped. Some other characteristics of Portfolio Model I:

1. The companies have generally had above average earnings records.
2. The companies often have relatively smaller market capitalizations.
3. Few of these stocks pay a dividend and most pay no dividends at all.
4. A number of the stocks in the portfolio have Betas considerably higher than 1, which indicates that they are more volatile than the market as a whole.

Portfolio Model – II

1. Stock must have Timeliness rank of at least 3,
2. Stocks in this Portfolio must have lower beta and lower P/E than stocks on Portfolio I
3. Stocks must pay large enough dividend that yield ranks in the top half of all stocks tracked by Value Line
4. Stocks should have at least a safety rank of 3 or higher. If Timeliness or Safety drops below 3 the stock is automatically dropped from Portfolio.

Portfolio Model – III

1. Stocks with valuable long-term price appreciation potential,
2. Timeliness and Safety rank can be from 1 to 5,
3. Stocks with paying dividend or not paying dividends are included,
4. Normally high beta stocks, compared with other model Portfolios, are in this Portfolio

III. Literature Review

Recent research suggests that Value Line's information is still functional. Stickel (1985) studied the effect of rank changes on the returns of individual holdings. He contends that rank changes by Value Line affect returns, an indicator that Value Line information moves the market (Porrás & Griswold, 2000). Fama (1991) analyzes the Value Line enigma. He acknowledges Value Line's ability to provide abnormal returns, but states that only small statistical evidence exists. More so, he acknowledges Value Line's ability to move the market; recognizing that information exists within the *Value Line Investment Survey* that is not priced into stocks. This conflicts with efficient market theory. Stickel (1985), confirms this theory. He finds the announcement effect to be stronger for smaller stocks. When studying announcement effects on stock prices, he found smaller stocks to have a 3-day return of 5.18% compared to larger stocks having only .7%. The reasoning behind this is the difficulty in obtaining information surrounding smaller companies. One may wonder how this has changed with the influx of public information

on the internet for small and large stocks alike. Peterson (1987) also argues Value Line information is not contained within stock prices, but the market is efficient in accounting them into the share price.

Hulbert (1990) researched Value Line information by studying the Centurion Fund, a portfolio focusing on the highest ranked stocks. From years 1984 to 1990, group 1 stocks earned 16.9% annually, the Wilshire 5000 index earned 15.2% annually, and the Centurion Fund 12.7% annually. He concluded the failure of the Centurion Fund to outperform the market may suggest that while Value Line's information is useful, it may be difficult to apply into a profitable investment.

Porras and Griswold (2001) performed an extended study of the Copeland and Mayers study, which focuses on the ability of higher ranked stocks by Value Line to produce statistically significant abnormal returns. Porras and Griswold confirm the Value Line effect to hold through 1995, with a decrease in returns from better ranks to worse ranks. However, they attribute abnormal returns to a abnormal negative performance of the worse ranked stocks. They find an average monthly excess return 1.24 percent greater for rank 1 portfolios than rank 5 portfolios. They also conclude the CAPM model unable to explain the Value Line anomaly due to Value Line's ability to weed out losers rather than pick winners. This suggests that Value Line cannot produce abnormal returns by picking stocks that will outperform in the short term, but rather they can identify poor performing firms and adjust portfolios accordingly. Porras and Griswold also test using the Fama-French three factor model and the Carhart four-factor model, both of which are unable to explain the Value Line effect.

Peterson (1995) asserts stocks highlighted by Value Line earn abnormal returns of 2.42 percent after accounting for post-announcement earnings drift. He finds no correlation between the length of time between prior earnings announcement and the Value Line publication; and attributes Value Line's abnormal returns to useful information. Choi (2000) finds Value Line to be capable of producing abnormal short term stock returns as well. He believes everyday investors can do nothing more but input Value Line stocks into a portfolio and do as well and investment professionals. However, he will debunk any profitability myths after accounting for transaction costs. He also debunks the Value Line myth by concluding "superior gross performance can be attributed to market frictions that prevent perfect correction of pricing deviations (496)." Otherwise stated, Value Line is able to use information not already priced into stocks to capitalize on short term price movements, but only significantly for smaller firms, in which market "friction" is most high due to the unavailability of information.

Peterson and Peterson (1995) conducted a study to find if professional investors use Value Line information, and results were positive. Graham (1999) conducted a similar study, and found Value Line to be regarded as the premier investment information provider as decided by other investment newsletters. Value Line information is regarded with utmost respect by professional investors, amateur investors, and other investment information providers alike.

In 1997, Benesh and Perfect determined Value Line to unable to predict long term stock returns. Most recently, Szakmary et al. (2008) did a similar study regarding Value Line's ability to forecast long-run returns and other data. If Value Line analysts are able to predict without a

bias the many ratios, returns, and growth statistics they publish, investors would be able to profit immensely. Investors could rely on Value Line for cost of capital projections, growth estimates, earnings estimates, and P/E ratio estimates all of which can be used to determine the intrinsic value of a share of stock. These inputs are difficult to predict, and inaccuracies result in wide fluctuations. Szakmary et al. (2008) determined Value Line unable to predict long term stock projections with accuracy. They attribute this to Value Line's apparent bias in predicting higher stock returns for stocks with higher profit margin projections. They contest that investors should not rely solely on Value Line's projections for stock analysis, and attribute much of Value Line's success to factors other than ability in projecting short term price movements.

Studies attempting to dispel the Value Line enigma focus on factors such as post-announcement earnings drift, size effect, and transaction costs. Affleck-Graves and Mendenhall (1992) find no significant abnormal returns after accounting for post-announcement earnings drift. Choi (2000) contends that evidence does exhibit the potential for abnormal returns from Value Line recommendations, but the ability to invest profitably is diminished by transaction costs. He states that Value Line information can provide up to 45 basis points of abnormal return per month. Size effect was dispelled by Huberman and Kandel (1987), who state "the successful record of Value Line in predicting average relative stock returns does not diminish when size is controlled for."

Studies regarding the Value Line enigma provide mixed evidence that Value Line is capable of providing abnormal market returns over short-time periods. Kaplan and Weil (1973) studied Value Line's ranking system over a six month period and determined better ranked stocks to have performed better than worse ranked stocks. Fischer Black (1973) performed a larger study. Black believes passive portfolio management to be superior to active portfolio management, and is a strong proponent of the random walk hypothesis, which relates stock price movements to be as predictable as a drunken person walking around. Black analyzed the Value Line rankings over five years and determined significant statistical evidence that Value Line rankings outperformed the market, and performance decreased from better ranks to worse. Even after accounting for transaction costs and less diversification due to unequal weighting of each stock, Black determined the results to be significant.

An extended study by Copeland and Mayers (1982) affirmed Value Line's ability to deliver abnormal excess returns. Copeland and Mayers take particular care in their performance evaluation methods. They suggest that when using past pricing information, the past benchmark period may not be accurate with future benchmark periods. More specifically, they warn about non-stationarity, or inconsistencies in statistical data over a large domain. When using past benchmark data, they find it difficult to interpret the results in order to predict future movements. They document the performance of Value Line's ranking system from 1965 thru 1978. They find evidence of abnormal performance in three separate sub-histories. Moreover, they find greater abnormal performance in earlier years compared to later years. When accounting for transaction costs, they find it difficult for an investor to profit from Value Line's information. Depending on the cost and frequency of trading strategies, Value Line information is capable of providing excess returns, but difficult to put in action.

Empirical evidence exists to both support and dispel the Value Line enigma for the public

investor. In today's technology-driven age, public investors have access to incredible amounts of investment literature and information. With so much information available, it is apparent the everyday public investor is very unlikely to deliver abnormal returns. Value Line's rankings continue to perplex market experts. Determining the success of Value Line's information will provide an indication of whether or not an investor can profit from Value Line information, and how function the information is today.

IV. Methodology and Data

The three-factor regression model (Fama and French, 1993) is used to measure the performances of the three value line Model Portfolios. The mathematical form is

$$R_i - R_f = \alpha_i + \beta_1(R_m - R_f) + \beta_2(\text{SMB}) + \beta_3(\text{HML})$$

where R_i is the weekly rate of return on the target date fund, R_f is the weekly risk free rate, R_m is the weekly market rate of return, SMB is small cap stock portfolios minus big cap stock portfolios and HML is two average returns on big and small cap value stocks minus two average returns on big and small cap growth stocks. The Fama-French three factor model is superior to the CAPM, as it accounts for the flaws in the CAPM.

Stated somewhat differently, the dependent variable is weekly rate of return for the selected stock portfolio minus the weekly risk free rate. The three independent variables are:

1. Excess return on the value weighted market portfolio (Rate of Return on the value weighted CRSP index with dividends minus the risk free proxy);
2. Difference between the returns of value weighted portfolios of small and big firm stocks; and
3. Difference in returns of value weighted portfolios of high and low book-to-market stocks;

The estimated y-intercept or alpha is the mean weekly abnormal rate of return.

Weekly rates of return for the stocks in the Value Line three Model portfolios are from CRSP (Center for Research in Stock Prices). A buy and hold strategy is used to calculate the weekly rates of return for three model portfolios. The weekly rates of return for the independent variables in the three factor model are from the French web site, http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/Data_Library/f-f_bench_factor.html

The weekly rates of return for a stock included in the value line three model portfolios are computed using the following equation.

$$(R_{it} - R_{it-1}) / R_{it-1}$$

Where R_{it} is the stock price at the end of week t and R_{it-1} is the stock price at the beginning of week $t-1$. Equally - weighted rates of return for each of the three model portfolios are computed for the following weeks as per the data availability - September 2008, January 16 through August 28, 2009 and May 28 through June 25, 2010. French website did not contained date after June 25, 2010. The Appendix has ticker symbols and names of common stocks in these three model portfolios. French website did not include data after June 25th 2010.

V. Results

The following Table 1 contains the results for descriptive statistics for variables. The mean weekly rates of return minus weekly risk free rate for portfolios 1, 2 and 3 are 0.0003; -0.0044, and 0.0047 respectively. The mean of -0.0044 for portfolio 2 indicates that Stocks with Income and Potential Price Appreciation yielded weekly return less than risk free rate over the analyzed time period.

Table I: Descriptive Statistics for All Variables

Descriptive Statistics			
	Mean	Std. Deviation	N
R1_Rf	.0003	.04593	40
R2_Rf	-.0044	.03015	40
R3_Rf	.0047	.06018	40
$R_m - R_f$	.470500	3.9634322	40
SMB	.136250	1.2494341	40
HML	.124750	2.7903781	40

The following table II contains the performance results of the Value Line three Model portfolios of 1, 2, and 3 for a period of 40 weeks for the Fama French three factor regression model. The mean weekly abnormal rates of return for three portfolios of 1, 2 and 3 are (0.001 with a p-value of 0.923), (-0.005 with a p-value of 0.311), (0.005 with a p-value of 0.504) respectively. Although statistically insignificant, variable HML's betas for all three portfolios are negative indicating that the return movement between HML and each of the three model portfolios are in opposite direction. Betas for market and portfolios are positive which is consistent with the criteria.

Table II: The performance results for the Fama French three - factor model.

		Un-standardized Coefficients		Standardized Coefficients	t	p - value
		B	Std. Error	Beta		
Portfolio I: Stock with above average year ahead price potential	α 0.001				.097	.923
	$R_m - R_f$	.000	.003	.008	.028	.977
	SMB	-.002	.006	-.060	-.345	.732
	HML	-.002	.004	-.103	-.396	.694
Portfolio II: Stocks with Income and Potential Price Appreciation	α -0.005				-1.027	.311
	$R_m - R_f$	.000	.002	-.010	-.038	.970
	SMB	.006	.004	.232	1.366	.181
	HML	-.001	.003	-.104	-.408	.685
Portfolio III: Stocks with Long Term Price Potential	α 0.005				.504	.617
	$R_m - R_f$	-.001	.004	-.035	-.143	.887
	SMB	.009	.008	.196	1.223	.229
	HML	-.007	.005	-.336	-1.408	.168

References

- Affleck-Graves, J., & Mendenhall, R. (1992). The relation between the Value Line enigma and post-earnings-announcement drift. *Journal of Financial Economics*, 75-96.
- Black, F. (1971). Yes Virginia, there is hope: Test of the value line ranking system. *Financial Analysts Journal*, 29 (Sept.-Oct. 1973), 10-14.
- Carhart, Mark M., "On persistence in mutual fund performance," *Journal of Finance*, Vol. 52, 1997, pp57-82.
- Choi, J. J. (2000). The Value Line Enigma: The Sum of Known Parts? *The Journal of Financial and Quantitative Analysis*, 485-498.
- Conover, C. M., Lancaster, c., & Szakmary, A. C. (2008). An examination of Value Line's long-term projections. *Journal of Banking and Finance*, 820-833.
- Fama, Eugene F. and Kenneth R. French, "Common risk factors in the returns on stocks and bonds," *Journal of Financial Economics*, Vol. 33, 1993, pp 3-56.
- French, K. R. (1993). Description of Fama/French Benchmark Factors. Retrieved January 2010, from Kenneth R. French: http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/Data_Library/f-f_bench_factor.html
- Gregory, N. (1983). Testing an aggressive investment strategy using value line ranks. *Journal of Finance*, 257-258.
- Lewellen, J., & Nagel, S. (2006). The conditional CAPM does not explain asset-pricing anomalies. *Journal of Financial Economics*, 289-314.
- Porras, D., & Griswold, M. (2000). The Value Line Enigma Revisited. *Quantitative Journal of Business and Economics*, 39-49.
- Stickel, S. E. (1985). The effect of Value Line investment survey rank changes on common stock prices. *Journal of Financial Economics*, 14(1), 121-143.
- Treynor, J.L. (1965). How to rate management of investment funds. *Harvard Business Review*, 43.
- Value Line Investment Survey. (2008). <http://www.valueline.com>

Appendix

PORTFOLIO I: STOCKS WITH ABOVE-AVERAGE YEAR-AHEAD PRICE POTENTIAL		
<i>(primarily suitable for more aggressive investors)</i>		
Ticker	Company	
AGN	Allergan, Inc.	Drug
AMX	America Movil	Telecom. Services
AAPL	Apple Inc.	Computers/Peripherals
BLL	Ball Corp.	Packaging & Container
CHKP	Check Point Software	E-Commerce
CTSH	Cognizant Technology	Computer Software/Svcs
CL	Colgate-Palmolive	Household Products
ESRX	Express Scripts 'A'	Pharmacy Services
GOOG	Google, Inc.	Internet
HPQ	Hewlett-Packard	Computers/Peripherals
SHOO	Madden (Steven) Ltd.	Shoe
MA	MasterCard Inc.	Financial Svcs. (Div.)
MHS	Medco Health Solutions	Pharmacy Services
NIHD	NII Holdings	Telecom. Services
RL	Polo Ralph Lauren 'A'	Apparel
RMD	ResMed Inc.	Medical Supplies
SLAB	Silicon Labs.	Semiconductor
SY	Sybase Inc.	Computer Software/Svcs
TJX	TJX Companies	Retail (Special Lines)
THS	TreeHouse Foods	Food Processing
PORTFOLIO II: STOCKS FOR INCOME AND POTENTIAL PRICE APPRECIATION		
<i>(primarily suitable for more conservative investors)</i>		
Ticker	Company	Industry
ABT	Abbott Labs.	Drug
AFL	Aflac Inc.	Insurance (Life)
ADP	Automatic Data Proc.	Computer Software/Svcs
CB	Chubb Corp.	Insurance (Prop/Cas.)
CLX	Clorox Co.	Household Products
KO	Coca-Cola	Beverage
CL	Colgate-Palmolive	Household Products
ITT	ITT Corp.	Diversified Co.
INTC	Intel Corp.	Semiconductor
JNJ	Johnson & Johnson	Medical Supplies
LMT	Lockheed Martin	Aerospace/Defense

MCD	McDonald's Corp.	Restaurant
MDT	Medtronic, Inc.	Medical Supplies
MCHP	Microchip Technology	Semiconductor
PAYX	Paychex, Inc.	Computer Software/Svcs
PEP	PepsiCo, Inc.	Beverage
SNY	Sanofi-Aventis	Drug
SYY	Sysco Corp.	Retail/Wholesale Food
TEF	Telefonica SA ADR	Telecom. Services
WMT	Wal-Mart Stores	Retail Store
PORTFOLIO III: STOCKS WITH LONG-TERM PRICE GROWTH POTENTIAL		
<i>(primarily suitable for investors with a 3- to 5-year horizon)</i>		
Ticker	Company	Industry
AFL	Aflac Inc.	Insurance (Life)
CVS	CVS Caremark Corp.	Pharmacy Services
CELG	Celgene Corp.	Drug
CSCO	Cisco Systems	Telecom. Equipment
DIS	Disney (Walt)	Entertainment
ESV	Enesco Int'l plc	Oilfield Svcs/Equip.
GOOG	Google, Inc.	Internet
HAL	Halliburton Co.	Oilfield Svcs/Equip.
HOG	Harley-Davidson	Recreation
HRL	Hormel Foods	Food Processing
JNJ	Johnson & Johnson	Medical Supplies
K	Kellogg	Food Processing
NOV	National Oilwell Varco	Oilfield Svcs/Equip.
NOC	Northrop Grumman	Aerospace/Defense
PEP	PepsiCo, Inc.	Beverage
DGX	Quest Diagnostics	Medical Services
HOT	Starwood Hotels	Hotel/Gaming
X	U.S. Steel Corp.	Steel (Integrated)
UNH	UnitedHealth Group	Medical Services
XLNX	Xilinx Inc.	Semiconductor

Women on the Board: Diversity and Firm Performance

Sharon K. Lee

Abstract

While there have been significant increases in recent years in the independence level on boards due to stricter regulations, there have been modest increases in women and minority board memberships. Women directors have accounted for 15% of all directors sitting on S & P 500 firms and just 9% for small-cap firms the last few years. Several recent studies have examined the possible relationship between the size and composition of the board of directors and firm performance. Specifically, a study of S & P 500 firms (Lee, Carlson 2008) shows that firms with relatively higher levels of independence on their boards perform significantly better. Adams and Ferreira (2009) conclude that gender diversity is helpful only for firms with weak governance. Is the board more effective when there is an inclusion of different views and perspectives? This study reports the inclusion of women on the board in different economic sectors and examines the possible effects of board gender diversity on firm performance.

I. Introduction and Background

Many studies have addressed board size and composition and possible effects on firm performance. The average board independence levels have been steadily rising, to 78% in 2008, up from 74% in 2007 and 72% in 2003. The percentage of companies, whose boards are at least two-thirds independent, rose to 85% in 2008, a 7% increase from 2007. In an examination of the board structure of nearly 7,000 firms, Linck et. al (2008) find that since the passage of SOX, there has been an accelerated trend toward more independent boards and larger boards. With this trend, there is also some increasing pressure to select female directors to increase the diversity composition of the board.

Several corporate governance experts believe that the different views and perspectives brought about by a more diverse board may lead to greater corporate success, for all its stakeholders. TIAA-CREF's *Policy on Statement on Corporate Governance* states that the board should be composed of qualified individuals and should reflect diversity of experience, gender, race, and age. [TIAA-CREF] Also, the California Public Employees' Retirement System (CalPERS), the nation's largest public pension fund, recommends that the board consider the mix of director characteristics, experiences, diverse perspectives and skill when nominating individuals to the board. [CalPERS] In a report commissioned by the British Department of Trade (Higgs, 2003), it is recommended that firms actively draw new board members from professional organizations that have major female representation. In Sweden, the government has strongly encouraged at least 25% gender diversity on boards of firms in their country. On the other hand, adding diversity encourages larger board sizes. Cheng (2008) suggests that the larger the board size, the less variability of corporate performance. Their results are consistent with the view that it takes more compromises for a larger board to reach a decision, which may not be in the best interests of shareholders.

A recent study of S & P 500 firms [Lee, Carlson; 2007] shows that firms with the most

Sharon K. Lee is an Associate Professor of Finance at Western New England College, Springfield, MA 01119. She can be contacted at slee@wnec.edu

independent boards perform significantly better than firms with less independent boards. Independent directors may be more likely to monitor management more effectively by challenging management if it appears that the value of the firm is not being maximized. As a result, the presence of outside or independent directors may decrease agency costs experienced by most firms, and should increase the overall performance and value of the firm. In another study using a sample of small-cap firms of the Super S & P 1,500 Lee (2008) finds no significant relationship between the level of independence on the board and firm performance. In relatively smaller firms, the goals of management and shareholders may be more aligned than that in larger firms such as the S & P 500. In many cases with small-cap firms, management may have significant shareholdings in the firm and therefore have a vested, perhaps also emotional, interest in the performance and value of the firm.

Adams and Ferreira (2009) find that the relationship between gender diversity and firm performance is not a simple one. Diversity appears to have a positive impact on performance in firms that have “weak” governance, as measured by the firm’s ability to resist takeovers. Conversely with firms that have strong corporate governance the higher gender diversity appears to decrease firm value.

While there have been significant increases in recent years in the independence level on boards due to stricter regulations, there have been modest increases in women and minority board memberships. Women directors have accounted for 15% of all directors sitting on S & P 500 firms, unchanged for the last several years. For small-cap firms in the S & P “Super” 1,500 firms, only 9% of board members in 2008 and 2007 are women, a small increase from 8% in 2006. Twelve percent (12%) of the boards of S & P 500 companies are held by minorities in 2008, up from 11% in 2007. However the percentage of S & P 500 companies that have at least one minority on its board increased from 59% 2007 to 69% in 2008. Diversity on boards is likely hindered by the scarcity of women in the executive suites from which companies recruit. Less than 1% is held by female CEOs, and the same holds true for minority CEOs. Because relatively few women hold top executive positions, companies are competing for the same individuals to fill board vacancies (RiskMetrics, 2008).

Historically, different types of businesses tend to attract and employ more women than others. The consumer discretionary sector has a very long history of employing women and therefore has a higher percentage of women in top management positions. On the other hand, the information technology sector, a younger economic sector, has been dominated by male employees and males in top management. With the motivation for an increase in gender diversity on corporate boards, how have businesses reacted? With regulation for higher independence on corporate boards, are women (many times, independent by definition) being chosen as new members? Can any positive effect on firm performances be seen because of recent board structure changes? It is possible that the perspectives offered by a diverse board might influence the decision making process in a direction that it would not otherwise follow. *Does diversity increase firm value?*

II. Data and Methodology

The board composition characteristics and firm performances are examined for firms in two economic sectors: consumer discretionary sector and information technology sector. The

companies identified in these two sectors are classified according to the S & P categories of ten (10) economic sectors. As noted, these two economic sectors represent the lowest and highest composition respectively, of women in their workforce and in the boardroom. Specifically, as noted in Table I, the mean women board member percentages are over 13% and about 8% for the consumer discretionary and information technology sectors, respectively. This study examines 358 firms: 183 from the consumer discretionary sector and 175 from the information technology sector. Board characteristics including board size, board independence levels, and female board member percentages are collected. In addition, return on assets (ROA), industry average ROA's, market-to-book (i.e., price/book), and total assets are collected for each firm. Board composition data for 2008 are identified from the Investor Responsibility Research Center (IRRC) *Board Practices 2009 Edition*, and later confirmed in the firm's 10K report on the SEC Edgar Database. Firm ROA, industry ROA, market-to-book and total assets for 2008 are collected from the *Compustat* tapes.

As used in several studies [Lee (2008), Lee, Carlson (2007), Eisenberg et. al (1998) and Yermack (1996)], an industry-adjusted return on assets (ROA) is used as one of the firm performance measures for the fiscal period ending in 2008. This industry-adjusted ROA [Firm ROA – Industry ROA] is used as a relative firm performance measure. To consider future growth prospects of the sample firms, the market-to-book measure is also used as a proxy for firm performance.

In Table I the entire sample of 358 firms includes firms from two economic sectors that have historically different levels of women in their workforce, upper management, and also in the boardroom. The consumer discretionary sector includes firms such as Darden's Restaurants, Fossil, Mattel, Nordstrom, Polaris Industries, and Wyndham Worldwide Corp. The information technology sector includes firms such as Adobe Systems, Apple, Citrix Systems, Google, Microchip Technology, and Sandisk Corp.

In addition, within each sector, the largest and smallest firms are examined in this study: S & P 500 firms (i.e., relatively large) and small-cap firms in each of the two sectors. Analysis of variance (ANOVA) tests are performed to determine if there are significant differences in the variable means between the two sectors. Two sets of least-squares regressions are estimated using the industry-adjusted ROA as the dependent variable in one set and market-to-book ratio in the other set. These two different measures of firm performance are used to capture the most recent year's performance and the benefits of future growth prospects of a firm through the market to book ratio. The explanatory variables include log of board size, log of total assets, percentage of independence on the board, and the percentage of women board members. If gender diversity enhances firm performance, then a positive relationship would be expected between the industry-adjusted ROA or market-to-book measure and the percentage of women on the board.

III. Results

In the consumer discretionary sector, firms have significantly higher board sizes than firms in the information technology sector. Most new women and minority board members added in the last few years have been considered independent by the definitions outlined by SOX and the exchanges. New women and minority directors tend to be more independent than other

new additions to the boards. Specifically ninety-two (92%) percent of women directors and eighty-eight (88%) percent of minority directors are independents, compared with seventy-eight (78%) percent of all directors. Because of this many times larger board sizes are due to the result of adding more independent members. However, this does not appear to be the case since the level of board independence is actually significantly ($p=10\%$ level) higher for information technology firms but the level of female board representation is significantly ($p=5\%$ level) lower. Specifically there is board independence of 75% for the consumer discretionary sector and 77% for the information technology sector, but female representation is 13.4% vs. 7.9%, respectively. It appears that the boards of information technology firms have increased independence levels but not due to adding female board members.

In comparing the mean variables between the two sectors, the most significant difference is between the levels of female representation on boards: over 13% women on consumer discretionary boards but less than 8% representation on boards of information technology boards. There is not a significant difference in firm size, as represented by total assets, between firms of the two economic sectors.

There are significant differences in means between sectors using both firm performance measures. The consumer discretionary firms performed significantly better than information technology firms (when adjusted by industry averages); industry-adjusted ROA's significantly higher at the 5% level and market to book ratios higher at 10% level of significance.

As shown in Table II, the firms are subdivided into large and small-cap firms within each sector in an attempt to examine the differences and possible effects of gender diversity in different size firms in very different working environments (i.e., historically different levels of women in the respective workforce and management). Lee (2008) concludes that the firm performance of small-cap firms is not significantly affected by the level of board independence, unlike the case of S & P 500 firms (Lee, Carlson 2007). The need for more independence and objective outside monitoring may be needed with larger firms but not for smaller firms. In smaller firms, the insider holdings of firm ownership is significantly higher, motivating lower agency costs. Therefore potential positive effects (i.e., agency cost reducing effects) of a more independent board may be small for small-cap firms.

Table II shows that board sizes are significantly higher for both S & P 500 firms and the small-cap firms in the consumer discretionary sector than the respective-size firms in the information technology sector. Is this due to the higher representation of women on the boards of these firms? Perhaps, since for both S & P 500 firms and small-cap firms, the percentage of women board members is significantly higher for consumer discretionary firms over that of the firm technology firms of respective size. In 2008, eighty-seven (87%) percent of S & P 500 boards but only 54% of small-cap firms include at least one woman. [Riskmetrics, 2009]. The firm technology sector firms, both large and small, have board independence levels similar to the average for all economic sectors of their respective firm size. Within each firm size category there are no statistically significant differences in total assets, or board independence levels.

The most significant differences between the variable means are in the women board member percentages in both firm size categories: S & P 500 vs. small-cap firms. For larger S &

P 500 firms, the consumer discretionary sector firms have an average of almost 18% gender diversity on their boards whereas the information technology sector firms have an average of about 12%. For small-cap firms, the consumer discretionary sector firms have an average of about 10% women board representation whereas the information technology sector firms have an average of only half that, 5%. It would seem that, especially given the history of low gender diversity in the information technology sector, it is likely that a new woman board member would qualify as “independent”. So it appears that *the independence on the boards of information technology firms was not brought about by selecting more female members.*

The industry-adjusted return on assets, a firm performance measure, was significantly different between sectors in the small-cap firm sample. Specifically the mean industry-adjusted ROA for the consumer discretionary sector firms was -1.91%, significantly higher than the mean -7.81% for the information technology sector firms. There were significant differences between sectors in the percentage of women board members in the small-cap sample also; 10% for consumer discretionary sector firms vs. 5% for information technology firms. Even though the percentage of women board members was significantly higher in the S & P 500 firm sample also, there was no significant difference in the industry-adjusted ROA (i.e., firm performance). This may suggest that the inclusion of more women on boards, such as in the consumer discretionary firms, has been beneficial to firm performance of relatively smaller firms. It may be due to the nature and history of the sector firms that adding female representation adds more benefit in the consumer discretionary sector than perhaps in a historically male-dominated sector, such as information technology. As more women enter technology fields, this will, most likely, change. In addition it is probably more difficult to find female executives to add to firms' boards in technology fields. The ANOVA results are supported by the results of a non-parametric test, the Mann-Whitney U Test. The null hypothesis of equality among the variables between the firms of the two economic sectors was rejected at the significance level of 5% for three variables: board size, level of female percentage, and the industry-adjusted ROA.

If the level of gender diversity on corporate boards enhances firm value by providing broader, objective views to the decision-making process, then a significant positive relationship would be found between a firm performance variable (such as the industry-adjusted ROA or market-to-book ratio) and the percentage of women on the board.

Several regressions, partitioning the sample by sector and size, were run using a firm performance measure as the dependent variable. Using an industry-adjusted ROA, the only variable that appears to have a significant effect on firm performance is the level of board independence. Specifically, for large firms (S & P 500) in the information technology sector the relationship between firm performance and the level of board independence is negatively significant ($t = -2.614, p=0.011$). This holds true for both large and small cap information technology firms when a market-to-book ratio is used as the firm performance measure ($t = -2.825, p=0.006$, and $t=-2.387, p=0.019$, respectively). On the other hand, for small cap consumer discretionary firms, the relationship between the level of board independence and the firm performance measure, market-to-book ratio, appears to be a positive relationship ($t = 3.054, p = 0.003$).

These findings suggest that having independent, more objective input from directors may enhance firm performance of small cap firms in the consumer discretionary sector. However, firm performance of information technology firms, irrespective of size, may actually be harmed by more outsiders on the board. Perhaps, given the nature of the technology field, it may be important to have experts familiar with the firm's particular set of products unique to that firm. The benefit of familiarity and knowledge appears to outweigh the benefits of diversity and any reduction in agency costs. These regression results suggest that perhaps there is little, if any, benefit to having a diverse board composition except in the case of small cap firms in the consumer discretionary sector.

IV. Conclusion

This study extends the discussion and evidence on gender diversity of corporate boards. Specifically, board characteristics and firm performance are examined using firms from two different economic sectors, consumer discretionary and information technology sectors. The consumer discretionary sector includes firms that historically employ larger percentages of women whereas the information technology sector has been male-dominated in their workforce and top management. There are significant differences between the two sectors in board sizes and percentage levels of women on their respective corporate boards. In the small-cap firm sample it appears that there may be benefits to gender diversity on boards. With the presence of significantly higher percentages of women on the board in the consumer discretionary sector, there was a significantly higher mean firm performance, as measured by two different firm performance measures, higher than those firms in the information technology sector. This possible benefit did not appear in the sample of relatively larger firms, the S & P 500 firms. This study provides some interesting points in the examination of the potential positive effects of diverse viewpoints on firm performance. By adding more economic sectors and mid-cap firms to a future study, perhaps more conclusions can be drawn on the board diversity/firm performance question.

TABLE I
Descriptive Statistics of Entire Sample
Includes ANOVA Results
Divided by Sector: Consumer Discretionary
vs. Information Technology

Variable Mean (Standard Deviation)	Consumer Discretionary N = 183	Information Technology N = 175
Board Size *	9.08 (2.322)	8.19 (2.084)
Total Assets (\$ millions)	7450.10 (21619.23)	5899.84 (15426.91)
Board Independence % **	75.27 (11.629)	77.42 (10.076)
Women Board Member %*	13.35 (10.075)	7.90 (9.989)
Industry-Adjusted Return On Assets (ROA)*	-0.0877 (13.999)	-4.8442 (16.952)
Market to Book Ratio **	4.4088 (7.70787)	3.4020 (3.45755)

* Significant difference in Means between the two Sectors at the 5% level of Significance. Similar results are found using the non-parametric test, Mann-Whitney U Test, showing significance between sectors for the same three (3) variables: board size, female board percentage, and industry-adjusted ROA.

** Significant difference in Means between the two Sectors at the 10% level of Significance.

Five (5) variables, board size, board independence percentage, female board member percentage, industry-adjusted ROA, and market-to-book were significantly different between the consumer discretionary sector firms vs. the information technology sector firms.

TABLE II
Descriptive Statistics and ANOVA Results
Consumer Discretionary and Information Technology Sector
Firms Divided by S & P 500 Firms (N = 144)
vs. Small-Cap Firms (N = 214)

Variable Means (Standard Deviations)	Consumer Discretionary S & P 500 n=77 Small-Cap n=106	Information Technology S & P 500 n=67 Small-Cap n =108	Total N=358
Board Size			
S & P 500 *	10.67 (1.998)	9.56 (2.156)	10.16 (2.137)
Small-Cap **	7.90 (1.781)	7.37 (1.538)	7.63 (1.678)
Total Assets (\$ millions)			
S & P 500	16438.07 (31044.64)	14538.53 (22677.55)	15561.36 (27424.97)
Small-Cap	795.55 (751.42)	669.08 (832.27)	730.83 (794.49)
Board Independence %			
S & P 500	78.02 (10.312)	79.37 (9.557)	78.64 (9.962)
Small-Cap **	73.23 (12.168)	76.23 (10.239)	74.76 (11.302)
Women Board Member %			
S & P 500 *	17.61 (7.970)	12.41 (9.557)	15.23 (9.083)
Small-Cap **	10.17 (10.335)	5.17 (9.264)	7.63 (10.097)
Industry-Adj ROA			
S & P 500	2.3482 (11.059)	0.614 (13.841)	1.2927 (12.428)
Small-Cap **	-1.9086 (15.651)	-7.8145 (18.002)	-4.9451 (17.118)
Market/Book Ratio			
S & P 500	4.8477 (9.2927)	4.7655 (4.63683)	4.8134 (7.4182)
Small-Cap **	4.8019 (6.8065)	2.4976 (1.9255)	3.2788 (4.2728)

* For these S & P 500 firms, there were significant differences between means of the two sectors for two (2) variables: board size and female board %.

** For these Small-Cap firms, there were significant differences between means of the two sectors for five (5) variables: board size, board independence %, female board %, industry-adjusted return on assets (ROA), and market-to-book ratio.

References

- Adams, R., and Ferreira, D. (2009). "Women in the Boardroom and their Impact on Governance and Performance," *Journal of Financial Economics*, 94, Issue 2, 291-309.
- Bebchuk, L., and Cohen, A. (2005) "The Costs of Entrenched Boards," *Journal of Financial Economics*, 78, Issue 2, 409-433.
- Bhagat, S., and Black, B. (1999). "The Uncertain Relationship Between Board Composition and Firm Performance" *Business Lawyer*, 54, 921-963.
- Cheng, S. (2008) "Board Size and the Variability of Corporate Performance," *Journal of Financial Economics*, 87, Issue 1, 157-176.
- Eisenberg, T., Sundgren, S., and Wells, M. (1998). "Larger Board Size and Decreasing Firm Value in Small Firms," *Journal of Financial Economics* 48, 35-54.
- Gompers, P., Ishii, J., Metrick, A. (2003) "Corporate Governance and Equity Prices," *Quarterly Journal of Economics* 118, 107-155.
- Hermalin, B., and Weisback, M. (1991). "The Effect of Board Composition and Direct Incentives on Firm Performance," *Financial Management* 20, 101 –112.
- Hermalin, B., and Weisback, M. (2002). "Boards of Directors as an Endogenously Determined Institution: A Survey of the Economic Literature," *Economic Policy Review*, 9, 7 – 26.
- Higgs, D., 2003. *Review of the Role and Effectiveness of Nonexecutive Directors* (www.dti.gov.uk/cld/non_execs_review).
- Jensen, M. (1993). "The Modern Industrial Revolution, Exit, and the Failure of Internal Control Systems," *Journal of Finance* 48, 831-880.
- Kini, O., Kracaw, W., and Mian, S. (1995). "Corporate Takeovers, Firm Performance, And Board Composition," *Journal of Corporate Finance* 1, 383-412.
- S. K. Lee (2009), "Board Independence and Firm Performance: Case of Small-Cap Firms," *Journal of Academy of Finance*, 6, Number 2, 187-195.
- Lee, S., and L. Carlson, (2007). "The Changing Board of Directors: Board Independence in S & P 500 Firms," *Journal of Organizational Culture, Communications and Conflict* 11, No. 1, 31-41.
- Linck, J., Netter, J., and Yang, T., (2008) "The Determinants of Board Structure," *Journal of Financial Economics* 87, Issue 2, 308-328.
- Lipton, M., and Lorsch, J. (1992). "A Modest Proposal for Improved Corporate Governance," *Business Lawyer* 48, 59-77.
- Monks, R., and Minow, N. (1995) Corporate Governance, Basil Blackwell, Cambridge.
- RiskMetrics Group, (2009) *Board Practices: The Structure of Boards of Directors at S & P 1,500 Companies*.
- Yermack, D. (1996). "Higher Market Valuation of Companies with a Small Board of Directors," *Journal of Financial Economics* 40, 185-211.

International Diversification

Robert Balik and Jamshid Mehran

Abstract

A fundamental ideal of finance is that investors should hold a diversified portfolio. This usually means a diversified portfolio that is Markowitz mean-variance (or standard deviation) efficient. In practical terms, this means the diversified portfolio should contain international investments.

The first phase of this research, which is reported here, uses historic monthly rates of return for ten years from 1997 through 2006 to study four alternative investment categories. The four investment alternatives (portfolios) are

- (1) 30 U.S. firms with minimal international revenue,
- (2) 30 U.S. firms with maximum international revenue,
- (3) 30 closed end country funds and the 30 U.S. firms with minimum international revenue, and
- (4) 30 ADRs and 30 U.S. firms with minimum international revenue.

The 30 firms with minimum international revenue are the benchmark and are the least efficient. The results indicate that portfolio (4), 30 ADRs and 30 U.S. firms with minimum international revenue, has the lowest risk, standard deviation, for a give level of return.

The second phase, which is ongoing, follows the same general procedure as the first phase, but

- (1) Considers additional portfolio groups such as 30 ADRs and 30 U.S. firms with maximum international revenue.
- (2) Creates two categories of ADRs, those with minimum sales outside the home country and those with maximum sales outside the home country.

This research reflects the idea that international diversification should be analyzed using, for instance, sales outside the home country, rather than location of a firm's headquarters.

I. Introduction

For several decades researchers have concluded that the optimum equity portfolio for an investor in the United States should contain international equity securities. These studies indicate that portfolios that combine such international securities can reduce portfolio risk as measured by the standard deviation and increase the portfolio average rates of return (Redman, Gullett and Manakyan, 2000).

These studies investigated various ways to optimize the risk return relationship by incorporating non-U.S. equity securities into a domestic equity portfolio. Some suggest that a domestic portfolio should include stocks of Multinational Corporations (MNCs). In this way, there is sufficient exposure to non-U.S equities to gain the benefits of the "International Diversification Effect. The postulate is that U.S multinationals have a significant portion of revenues and earnings derived from overseas operations; hence, the inclusion of MNCs in a US

domestic portfolio would provide adequate international exposure. Other researchers suggest that the risk-adjusted returns of U.S. multinational stocks are too highly correlated with U.S. domestic portfolios to provide maximum benefits. Others suggest that international funds are the best route in that they are, by definition, comprised solely of international (non-U.S.) securities. Returns of international funds are also more correlated to the returns of international indexes (such as MSCI-EAFE) than the domestic indexes, hence there is more potential for the international diversification effect.

A third alternative for international diversification is the inclusion of American Depositary Receipts (ADR's). ADRs represent foreign securities trading on U.S. markets. ADR returns are more correlated with international stock indexes than with domestic indexes.

II. Objective

This research investigates the mean-variance/standard deviation efficiency of various asset classes for an investor who lives in the United States. The U. S. investor diversifies by investing in the common stock of U.S. corporations that have international operations, purchasing American Depositary Receipts (ADRs), or purchasing closed end international funds. For each asset class five points on the mean-standard deviation efficient frontier are estimated. A "benchmark" asset class contains the common stock of U.S. firms that have minimal international operations.

III. Research Significance

International investing has now become a major financial activity in the U.S., as evidenced by the over \$300 billion investment in foreign equity made each year in the 1990s and early 2000s. Additionally, foreign assets accounted, on average, for only around 25% of the total value of the assets owned by U.S. residents over the period 1990-2004 (Heathcote and Perri, 2007). Most of this investment is channeled either through international funds or through investment in shares of MNCs. Although there are a number of commercial agencies that provide information on the annual returns of funds, information on risk-adjusted returns is inadequate. This study provides an efficient frontier evaluation of the performance of international diversification. U.S. investors can use this information when selecting the best vehicle for diversifying into global markets.

IV. Literature Review

Since the 1980's there have been a number of studies extolling the benefits of diversifying U.S. investment portfolios on an international scale. Even on a risk adjusted basis, it has been demonstrated that investments spread over different countries have shown both higher returns and lower risk when compared with the Standard and Poor's 500 Index of stock prices in the U.S. For the average U.S. based investor, there are several ways to diversify an investment portfolio globally: invest in an international mutual fund, purchase American Depositary Receipts (ADRs) and purchase shares of U. S. based Multinational corporations (hereafter, MNCs). Starting with Bruno Solnik (1974) and Gary Bergstrom (1975), economists have confirmed the benefits of international investing. Their main thrusts related to the fact that the stock indexes of many foreign countries exhibited very low correlations with the returns of the S&P 500. Hence they could be combined with U. S. portfolios to lower overall portfolio risk without proportionately reducing returns. Some of the studies in support of the positive portfolio

benefits of global diversification included the following: Cumby and Glen (1990) who studied the risk-adjusted performance of 15 international mutual funds compared with that of the S&P 500 and the Morgan Stanley World Index using a period of 1982-1988, they found that U.S. mutual funds did not outperform the World Index. Eun, Kolodny & Resnick (1991) who used 19 funds for the period of 1977-1986, found that the majority of international funds outperformed the S&P 500. However, Droms and Walker (1994) studied four international funds over a period of 20 years and 30 funds over a six-year period. Their performance was compared with the S&P 500 and the MSCI EAFE who used a sample of 30 funds. They found that the international funds did not outperform either index.

The overall support for the use of international diversification continued to the late 1990's with various recommendations as to how to best accomplish maximum portfolio benefits. Some indicated the use of a diversified domestic portfolio along with international mutual funds as the route to accomplish optimum results. The benefits of diversification via ADRs has been investigated by Wahab and Khandwala (1993). This study focused on the relative merits of diversification via international mutual funds, multinationals and/or ADRs with domestic portfolios and also tested whether the slowdown in the 1990's is a temporary or a longer-term phenomenon. Rowland and Tesar (1998) in another study, found that combining a portfolio of large MNC's with the domestic portfolio provided the biggest diversification benefit versus international funds and ADR's.

Cai and Warnock (2006) imply that international diversification should look at where a firm has its operations rather than where its headquarters is located. For instance, in 2005, Nokia, with headquarters in Finland, generated more than 25 percent of its revenue in China and the United States.

V. Methodology

The efficient frontier optimization model (Markowitz, 1952 and Bodie, Kane, and Marcus, 1993) used in this research considers only a set of risky assets (that is, there are no risk free assets) and does not allow for short sales. Exhibit 1 (all Exhibits are at the end of the paper) contains the mathematical formulation of the model. The objective of the optimization model is to find the weights (percentages) for each risky asset that gives the minimum portfolio standard deviation (risk measure) subject to the constraints that the weights add to one (all funds are invested), each weight is greater than or equal to zero (no short sales) and the expected rate of return on the portfolio is a stated percentage (1, 2, 3, 4, or 5 percent).

The approach used is to calculate the efficient frontier values for four investment strategies. They are

1. Data Set 1: 30 U.S. equity stocks in the S&P 500 Index that have minimal international operations. This can be considered the benchmark asset class. That is, this asset class should have minimal international diversification. Exhibit 2 contains an alphabetical list of these firms.
2. Data Set 2: 30 U.S. equity stocks in the S&P 500 Index that have extensive international operations. Exhibit 3 contains an alphabetical list of these firms.

3. Data Set 3: Data Set 1 plus 30 Closed End International Funds. Exhibit 4 contains an alphabetical list of the 30 closed end international funds.
4. Data Set 4: Data Set 1 plus 30 ADRs. Exhibit 5 contains an alphabetical list of the 30 ADRs.

VI. Data

The 2006 version of Compustat (Research Insight) was used to obtain the list of firms in the S&P 500 index, the most recent annual revenue and the most recent annual foreign revenue. These revenue values are used to determine the list of 30 firms for Data Sets 1 and 2. More than 200 S&P 500 firms did not have a figure for most recent annual foreign revenue. The 30 largest firms (by market capitalization) that did not have a value for foreign revenue and did have five years of return data form Data Set 1 (list of firms with minimal international operations). Likewise, the 30 largest firms (by market capitalization) with the largest percentage for foreign revenue and with five years of return data form Data Set 2 (list of firms with maximum international operations).

The international closed end equity funds was obtained from an early December 2006 issue of *Barron's*. Only those funds that had 10 years of return data are used. Exhibit 4 lists the 30 closed end funds used.

The ADRs used are a subset of all ADRs (adr.com) Those ADRs with the largest institutional holding and five years of return data are used. Exhibit 5 lists the 30 ADRs used.

For each U.S. firm, closed end fund, or ADR used there are 120 historic monthly rates of return (including dividends). These monthly rates of return begin in January 1997 and end in December 2006. CRSP (Center for Research in Stock Prices) was the source of these rates of return.

VII. Efficient Frontier Calculation

All Efficient Frontier calculations are done using Excel 2007. Excel's COV and OFFSET functions are used to obtain the variance/covariance matrix. The MMULT function is used for the optimization model's objective functions and the rate of return constraint. The solver feature in Excel 2007 is used to solve the quadratic optimization problem (Benninga). Most calculations were checked using various initial positions (that is values for the weights-amount to invest in each risky asset).

VIII. Results

Exhibit 6 contains the results of the Efficient Frontier calculations. For each of the four data sets the portfolio minimum standard deviation is calculated for five monthly rate of return values, 1%, 2%, 3%, 4%, and 5%. For each data set and for each of the five monthly rates of return there is the minimum standard deviation value and the number of securities in the optimum portfolio. Additionally, for Data Sets 3 and 4 the percentage of each optimum portfolio invested in closed end international funds or ADRs is provided.

The results contain one outlier. The number of securities in the optimum portfolio is 35 when the rate of return is 4 percent and the data set includes ADRs (Data Set 4). This efficient frontier calculation was checked twice (using different initial conditions). All three calculations gave the same optimum solution (to two places to the right of the decimal point).

If we consider the 1, 2, and 3 percent rate of return calculations the most efficient is portfolio/Data Set 4, which consists of the 30 U.S. firms with minimal international sales and 30 ADRs. The optimum standard deviation values are 2.6, 2.6, and 4.0.

When the monthly rate of return is set at 4 or 5 percent the optimum portfolio standard deviation seems to be sensitive to what happened to a few stocks. For instance, when the rate of return is 5 percent the number of risky assets in the optimum portfolio ranges from 4 assets for Data Set 3 to 6 assets for Data Set 4.

When comparing the results of Data Set 3 (30 U.S. firms with minimal international sales and 30 closed end international funds) and Data Set 4, Data Set 3 has a higher standard deviation at all rate of return levels (except rate of return of 4%). Additionally, the percentage of the optimum portfolio for Data Set 3 has some investment in closed end funds only when the rate of return value is 1 and 2 percent.

The primary implication of this research is that the benefits of international diversification seem to be greatest when investing in ADRs (the stocks of non-U.S. firms) rather than international funds.

Exhibit 1: Markowitz Minimization Model for Efficient Frontier Calculation

$$\text{min portfolio risk/standard deviation} = \min \sigma_p = \min \sqrt{\sum_{i=1}^N \sum_{j=1}^N x_i x_j \sigma_{ij}}$$

subject to

$$E(r_p) = \sum_{i=1}^n x_i E(r_i) = b$$

$b =$ values 1, 2, 3, 4, 5,

$$\sum_{i=1}^N x_i = 1 \text{ and } x_i \geq 0,$$

$i = 1, \dots, N$

$x_i =$ weight of each risky asset in the portfolio,

$i = 1, \dots, N$ is the asset identifier,

$E(r_p) =$ expected rate of return for portfolio p,

$E(r_i) =$ expected rate of return for risky asset i,

$\sigma_p =$ risk/sigma/standard deviation for portfolio p,

$\sigma_{ij} =$ covariance between risky asset i and j.

Exhibit 2: 30 S&P 500 Firms with Minimum International Revenue

Number	Name of Firm	Ticker Symbol	Number	Name of Firm	Ticker Symbol
1	Allstate	ALL	16	Lowe	LOW
2	AOL Time Warner	AOL	17	MBNA	KRB
3	Bank of America	BAC	18	Morgan Stanley	MWD
4	Bank of New York	BK	19	National City	NCC
5	Bank One	ONE	20	Schlumberger	SLB
6	Citigroup	C	21	Southern	SO
7	Colgate-Palmolive	CL	22	Sun Trust Banks	STI
8	Comcast	CMCSK	23	Sysco	SYU
9	Dow Chemical	DOW	24	Target	TGT
10	Federal Home Loan Mortgage	FRE	25	Tenet Healthcare	THC
11	Fifth Third Bancorp	FITB	26	US Bancorp	USB
12	Fleet Boston	FBF	27	United Health Group	UNH
13	HCA	HCA	28	Walgreen	WAG
14	J P Morgan	JPM	29	Washington Mutual	WM
15	Kohl	KSS	30	Wells Fargo	WFC

Exhibit 3: 30 S&P 500 Firms with Maximum International Revenue

Number	Name of Firm	Ticker Symbol	Number	Name of Firm	Ticker Symbol
1	3M	MMM	16	International Flavors & Fragrances	IFF
2	AES	AES	17	McDermott International	MDR
3	Altera	ALTR	18	McDonald	MCD
4	Applied Materials	AMAT	19	Motorola	MOT
5	Avon Products	AVP	20	National Semiconductor	NSM
6	Bausch & Lomb	BOL	21	Pall	PLL
7	Baxter International	BAX	22	Parametric Technology	PMTI
8	Cisco Systems	CSCO	23	PerkinElmer	PKI
9	Coca Cola	KO	24	Qlogic	ALGC
10	Eastman Kodak	EK	25	Rohm & Haas	ROH
11	Gillette	G	26	Solectron	SLR
12	Halliburton	HAL	27	Sun Microsystems	SUNW
13	Hewlett-Packard	HWP	28	Teradyne	TER
14	Intel	INTC	29	Unisys	UIS
15	IBM	IBM	30	Wrigley	WWY

Exhibit 4: 30 Closed End International Funds

Number	Name of Firm	Ticker Symbol	Number	Name of Firm	Ticker Symbol
1	Brazil Equity	BZF	16	Korea Equity	kef
2	Asia Pacific Fund	APB	17	Korea	KF
3	Asia Tiger	GRR	18	Latin America Equity	LAQ
4	Chile	CH	19	Malaysia	MF
5	China	CHN	20	Mexico Equity and Income	MXE
6	Central European Equity	CEE	21	Morgan Stanley Asia-Pacific	APF
7	Europe Fund	EF	22	Morgan Stanley India	IIF
8	First Isreal	ISL	23	New Ireland	IRL
9	First Philippine	FPF	24	Scudder New Asia	SAF
10	France Growth	FRF	25	Spain	SNF
11	Germany Fund	GCHGER	26	Templeton China	TCH
12	Greater China	IFNGCH	27	Templeton Dragon	TDH
13	India Fund	ITAI FN	28	Templeton Emerging Market	EMF
14	Italy	ITA	29	Templeton Russia and Eastern Europe	TRF
15	Japan Equity	JEQ	30	Turkish Investment	TKF

Exhibit 5: 30 American Depository Receipts (ADRs)

Number	Name of Firm	Ticker Symbol	Number	Name of Firm	Ticker Symbol
1	Aegon	AEG	16	Matsushita	MC
2	Akzo	AKZOY	17	News Corp	NWS
3	ASML	ASML	18	Nokia	NOK
4	AstraZeneca	AZN	19	NTT	NTT
5	Aventis	AVE	20	POSCO	PKX
6	BPPLC	BP	21	Repsol	REP
7	Diageo	DEO	22	Rio Tinto	RTP
8	Elan	ELN	23	Royal Dutch Shell	RD
9	ENI	ENI	24	SK Telecom	SKM
10	GlaxoSmithKline	GSK	25	Sony	SNE
11	Grupo Televisa	TV	26	Telefonica	TEF
12	Gucci	GUC	27	TelMex	TMX
13	Hitachi	HIT	28	Total Fina	TOT
14	KEPCO	KEP	29	Unilever	UN
15	Luxottica	LUX	30	Vodafone	VOD

Exhibit 6: Efficient Frontier Results

Efficient Frontier Portfolio Standard Deviation				
	Data Set 1	Data Set 2	Data Set 3	Data Set 4
			30 U.S. Firms with Minimal International Sales and 30 Closed End International Funds	30 US Firms with Minimal International Sales and 30 American Depository Receipts, ADRs
Portfolio Monthly Rate of Return (%)	30 U.S. Firms with Minimal International Sales	30 U.S. Firms with Maximum International Sales		
1	4.3	3.7	3.3	2.6
2	4.3	4.2	3.0	2.6
3	4.5	5.4	4.2	4.0
4	7.8	7.9	7.8	8.2
5	12.3	10.8	12.1	11.4
Number of risky securities in minimum standard deviation portfolio.				
1	9	11	12	15
2	12	11	15	16
3	8	7	9	11
4	6	5	6	35
5	5	5	4	6
			Percentage in Closed End Funds	Percentage in ADRs
1			32.5	45.7
2			11.3	39.6
3			0	23.6
4			0	22.5
5			0	20.4

References

- Benninga, S. *Financial Modeling*, Chapter 9: Efficient Portfolios without Short Sales, The MIT Press, Cambridge, Massachusetts, 1998, pp 127-139.
- Bodie Z., A. Kane and A. Marcus, *Investment Management*, Richard Irvin, 1993.
- Cai, F. and F. Warnock, "International Diversification at Home and Abroad, Working Paper 12220, National Bureau of Economic Research, May, 2006.
- Cumby R., and J. D. Glen, "Evaluating the performance of International Mutual Fund," *Journal of Finance*, Vol 45, 1990, pp 497-522.
- Droms, W.G. and D. A. Walker, "Investment performance of International Mutual Funds", *Journal of Financial Research*, Vol 17, Spring, 1994, pp. 1-14.
- Heathcote, J. and F. Perri, "The International Diversification Puzzle Is Not as Bad as You Think," Working Paper 13483, National Bureau of Economic Research. October, 2007.
- Lehmann, B.N., and D.M. Modest, "Mutual Fund Performance Evaluation: A Comparison of Benchmarks and Benchmark Comparisons," *Journal of Finance*, Vol 42, 1987, pp 233-265.
- Markowitz, H., "Portfolio Selection," *Journal of Finance*, Vol 7, Num 1, March, 1952, pp 77-91. Morningstar: Mutual Fund 500, 2002.
- Redman, A., N. Gullett, and H. Manakyan, "The Performance of Global International Mutual Funds," *Journal of Financial and Strategic Decisions*, Vol 13, Spring, 2000, pp 75-85.
- Rowland, P. and L. Tesar, "Multinationals and the Gains from International Diversification," Working Paper 6733, National Bureau of Economic Research, Cambridge, MA, September, 1988.
- Solnik, B. and B Jacquillat, "Multinationals are poor tools for Diversification", *Journal of Portfolio Management*, 1978.
- Wahab, M. and A. Khandwala, "Why not diversify internationally with ADRs?" *Journal of Portfolio Management*, Winter 1993.

Do Jim Cramer's *Mad Money* Recommendations Have the Same Impact in a Bear Market as in a Bull Market?

Peppi M. Kenny and Don T. Johnson

Abstract

Many empirical studies of investment advisory services find statistically significant abnormal returns at the time of their public availability. Jim Cramer's *Mad Money* recommendations are one example of investment advice that has been studied in the recent past. This study is an extension of Neumann and Kenny's (2007) work published earlier concerning Jim Cramer's *Mad Money* stock picks. Earlier Neumann and Kenny (2007) found market reactions to Jim Cramer's stock recommendations using 2005 data. In this study, Jim Cramer's recommendations are examined again but utilizing more recent data occurring during a bear market rather than the previous examinations during bull markets. Specifically, this research questions whether viewers continue to follow Jim Cramer's *Mad Money* stock suggestions in a bear market and whether the mentioned stocks still experience significant abnormal returns during part of the bear market of 2008. The analysis of stock returns and trading volume reveals statistical evidence of response to his buy recommendations.

I. Introduction

Today there is a proliferation of investment advice available to novice investors. Televised programs and internet sites are readily available to investors as sources of information on which to make investment selections. The question becomes which sources, if any, can provide useful information to investors. It is of interest to study these sources of information to determine whether investors are using the information and how reliable and useful the information. This allows an examination of the impact on asset prices, the existence of market volatility, and the efficiency of the market.

In this study, the stock buy recommendations made by Jim Cramer on his nightly CNBC *Mad Money* program are analyzed. Mr. Cramer's show is unlike other programs and comes into question as to whether it is for entertainment or news. Serwer (1998) has described him as "a man who blurs the line between creating business news and covering it." When Mr. Cramer first began his *Mad Money* show after a market bubble burst, he stated his show would "help people avoid the kind of misguided bets that left them with worthless stock" (Gasparino, 2005). He indicated *Mad Money* would "be looking out for people by beating the system" (Gasparino, 2005). Apt (2009) notes that Mr. Cramer's *Mad Money* program has become the most widely watched broadcast for CNBC with 380,000 viewers and that websites are devoted entirely to discussions of his selections.

Several studies have analyzed investment advice from various media. Beginning with print media, there are many publications available today from which investors seek investment advice. Ho and Harris (1998) find significant abnormal returns in their event windows around brokerage stock rating reports, with downgrades prompting stronger reactions than upgrades. In studies of newspaper or magazine columns, Mathur and Waheed (1995) find significant abnormal returns and trading volume in event periods around recommendations contained in the "Inside Wall Street" column from *BusinessWeek*. Several authors who look at "Heard on the Street" in the *Wall Street Journal* find significant market reactions around the day of publication,

including Liu, Smith, and Syed (1990), Beneish (1991), Liu, Smith, and Syed (1992), Bauman, Datta, and Iskandar-Datta (1995), and Sarkar and Jordan (2000). The *Wall Street Journal's* previously conducted dartboard contests also produced abnormal returns on announcement days exceeding 3% as documented by Pruitt, Van Ness and Van Ness (2000), Albert and Smaby (1996), Metcalf and Malkiel (1994), and Barber and Loeffler (1993). Most of this abnormal return was seen at the market's opening prices after the dartboard column had been printed in the morning editions.

There have also been several studies analyzing advice from television and internet media, the same outlets for Mr. Cramer's recommendations. Hirschey, Richardson, and Scholz (2000) use 21 "foolish" buy recommendations to detect significant positive abnormal returns and volume on the day after the buy announcements were made. The conclusions in Dewally (2003) contradict this internet finding in observing no information passage through the newsgroup sites and no perceptible stock market reaction to the recommendations posted to them. Research into recommendations made during weekly broadcasts of Louis Rukeyser's *Wall Street Week* generally document stronger reactions to buy recommendations than sells with buy recommendations eliciting positive price and volume reactions (Beltz and Jennings, 1997; Pari, 1987; Griffin, Jones and Zmijewski, 1995).

More recent research has included examinations of Mr. Cramer and his *Mad Money* recommendations. Karniouchina, Moore and Cooney (2009) examined *Mad Money* from a marketing perspective. The 2009 study used buy recommendations during the time period November 2005 through July 2007. Although their article focused on the communication being employed by Jim Cramer in *Mad Money* being similar to advertising, they utilized event study methodology in other *Mad Money* studies and found buy recommendations resulted in significant abnormal returns of .50% on the day following the recommendation. They also find evidence of investors learning over time with tracking the success of Jim Cramer's performance on recommending the same stocks.

Bolster and Trahan (2009) examined Cramer's recommendations on *Mad Money*. Their event study incorporated data from July 2005 through December 2007. Abnormal positive returns for buy recommendations were found on average of 1.94% for day 1 after the recommendation was made. They examined the time period prior to the recommendations and suggest Cramer recommends stocks to buy that already have "momentum." Results for sell recommendations were found to be significant as well with an abnormal return on average of -0.71%. Further analysis beyond the event study which incorporated risk found Cramer's recommendations, however, have a zero alpha.

Lim and Rosario (2008) found abnormal returns for the recommendations suggested by Jim Cramer on the day after his picks. In their examination of recommendations from June 2005 to December 2006, the authors found Cramer recommends stocks which already have a positive momentum. His recommendations for small-capitalization stocks were found to be more accurate generating longer-term (six month) positive returns.

Engelberg, Sasseville, and Williams (2007) also looked at Cramer's buy recommendations. Their research using buy recommendations between November 16, 2005 and

June 23, 2006 found the recommended buy stocks experienced a price increase of 2.86% on average on the day after their recommendation.

The research that this paper extends is from Neumann and Kenny (2007). Neumann and Kenny found buy recommendations by Jim Cramer during July through September 2005 resulted in statistically significant abnormal and raw returns, as well as trading volume increases, on both the day 0 air dates of buy recommendations and the day +1 trading day, with the day +1 effects being stronger as expected. Almost all of the average raw return on day +1 is captured in the difference between the day 0 close price and the day +1 opening price. They also documented evidence that their smaller sample of the show's sell recommendations coincided with negative abnormal returns and trading volume increases in the (0,+1) event window. Finally, their study analyzed the short-term impacts around *Mad Money* recommendations. While their results showed that short-sale portfolios based on *Mad Money* buy recommendations produced risk and mean-adjusted abnormal returns over a nearly one-month horizon after the positions were established, these returns were only available to professional investors with enough capital to establish and maintain the simultaneous day-specific portfolios. Their results send a message to individual investors with limited capital to be cautious about short-term trading on *Mad Money* recommendations. Not only has the price of recommended buy stocks already moved by the next day's open, but they show that strategies aimed at exploiting next day price moves are not profitable in the aggregate.

The previous research concerning Mr. Cramer's *Mad Money* recommendations has all utilized data during bull market trends. This paper looks at Mr. Cramer's selections during a bear market trend to see whether similar impacts are seen for his buy recommendations.

II. Data and Methodology

Mad Money stock recommendations covering shows aired nightly between September 2008 through December 2008 were obtained from TheStreet.com. During the pre-production phase of *Mad Money*, Mr. Cramer selects which stock he will discuss during the evening's show. Only those firms that Mr. Cramer selected were originally considered for inclusion in the study. The firms suggested by viewer call-in are not included.

During the three months under consideration, Mr. Cramer made 187 recommendations on self-selected stocks. Companies which were mentioned more than once were taken out of the sample. This left 126 companies which were recommended once for which a total of 106 were buy recommendations and 20 were sell. Mr. Cramer suggests selling stocks on which he previously has made a buy recommendation. The sell recommendations were not considered in this study, consistent with Karniouchina, Moore and Cooney (2009). Additionally, in Neumann and Kenny (2007) results were not as significant for sell recommendations. From this group of 126 buy recommendations, 20 were randomly selected to be included in this study.

The companies included in the study shared some similar characteristics. Sixteen of the twenty companies are listed on the New York Stock Exchange. The other four stocks are NASDAQ stocks. Two firms did not have market capitalization data but of the other eighteen, only five had market capitalizations less than one billion dollars. The average market capitalization for the eighteen firms for which there was data was \$31.03 billion. The full list of

the sample of 20 firms is given in Table I.

The standard event study methodology outlined by Brown and Warner (1980, 1985) and used by many of the studies cited previously is used. Opening prices, closing prices and volume data for the sample are taken from www.financeyahoo.com. The daily returns were calculated using closing prices (P):

$$R_{i,t} = \frac{P_t - P_{t-1}}{P_{t-1}}$$

Event day 0 is the date of airing of a show. Since *Mad Money* is initially televised in the evenings at 6pm (Eastern time), it is expected to see any reaction to a particular show on event day +1. In Neumann and Kenny (2007) abnormal returns were determined in three ways, relative to a market model prediction, to the CRSP value-weighted index, and to a stock's recent historical mean. The results were not significantly different using the three approaches, so this study uses only the stock's recent historical mean to calculate the abnormal returns. The abnormal return is then:

$$AR_{i,\text{eventday}(t)} = R_{i,t} - \bar{R}_i.$$

Stock return means are estimated using daily returns from six months preceding the event.

The difference between the closing price on the day of a recommendation and the following day's open price is calculated: $\text{Open } P_1 - \text{Close } P_0$. In Neumann and Kenny (2007), it was found that most of the abnormal return for event day one was captured in the close to open price difference. The average of this price differential is calculated for the six months prior to the event day. The abnormal price difference is then determined by: $(\text{Open } P_1 - \text{Close } P_0) - \text{Average of } (\text{Open } P_1 - \text{Close } P_0)$.

The abnormal volume was examined last. In Neumann and Kenny (2007), it was found that abnormal trading volume occurred at the event. The average volume was calculated for the month preceding the event. The abnormal volume is then determined by: $\text{Volume}_t - \text{one month average volume preceding event}$.

III. Results

Tables II and III report results of the event analysis of the *Mad Money* buy recommendations becoming public. As shown in table II, there is evidence at the 3% confidence level that these returns are significantly different from zero during the first trading day after a buy recommendation has aired. The raw return on day +1 is 2.62%. The results also document a positive mean-adjusted abnormal return of 2.84% which is statistically significant at the 2% level. Comparing this to the results obtained by Neumann and Kenny (2007) during a bull market, the results are similar. In the current study during a bear market, the difference is that day zero does not have statistically significant raw or mean-adjusted abnormal returns.

The average open price₁ – close price₀ is \$0.51 for the buy recommended stocks. When the mean-adjusted abnormal price change was calculated, the average value was found to be

\$0.46 indicating the opening price on event day +1 compared to day 0’s closing price was \$0.46 higher than would be expected based on the prior month’s average. This value is statistically significant at the .56% level.

Table IV present results of abnormal trading volume using the same estimation period parameters and benchmarks we employed in analyzing event day returns. As seen in the table, the average abnormal trading volume is significantly greater on day +1. This value is statistically significant at the 4% level. This result is consistent with the findings in the bull market study.

IV. Conclusion

The evidence presented here suggests that the stock recommended by Mr. Cramer as “buys” during *Mad Money* do experience price and volume changes after his recommendation. The results of this study during a bear market are consistent with those found during a bull market. There are statistically significant abnormal and raw returns, as well as trading volume increases on day +1 trading day. However, since almost all of the average raw return on day +1 is captured in the difference between the day 0 close price and the day +1 opening price, a change likely induced by the weight of pending buy orders placed before the market opens, the average investor is likely unable to benefit from this effect and, further, the aggregate impact is to increase the cost of acting on these recommendations for all investors. The price of recommended buy stocks has already moved by the next day’s open. As time passes, subsequent research can examine the long-term performance of stocks recommended through this venue.

Table I: Sample of “Mad Money” Stock Buy Recommendations

Company	Market	Market Cap
Clean Energy Fuels	NASDAQ	\$ 1,230,000,000
BB&T Corporation	NYSE	\$ 22,000,000,000
Darden Restaurants Inc	NYSE	\$ 6,100,000,000
Boeing Company	NYSE	\$ 51,410,000,000
Ethan Allen Interiors	NYSE	\$ 579,190,000
McCormick & Co.	NYSE	\$ 5,170,000,000
Lender Processing Services	NYSE	\$ 3,910,000,000
KBR Inc. Common Stock	NYSE	\$ 3,450,000,000
Family Dollar Stores	NYSE	\$ 4,960,000,000
Pepsico Inc.	NYSE	\$ 104,490,000,000
Archer Daniels Midland	NYSE	\$ 18,690,000,000
Advanced Micro Devices	NYSE	\$ 6,120,000,000
Hewlett-Packard	NYSE	\$ 123,090,000,000
Atlas Pipeline Partners	NYSE	\$ 691,610,000
Salesforce.com Inc	NYSE	\$ 9,670,000,000
Owens Corning Inc	NYSE	N/A
Fortune Brands Inc	NYSE	\$ 7,430,000,000
Great Plains Energy	NYSE	\$ 2,570,000,000
Wisconsin Energy Corp.	NYSE	\$ 591,000,000,000
Costco Wholesale Corp/	NASDAQ	\$ 26,700,000,000
Schering Plough corp.	NYSE	N/A
Hovnanian Enterprises	NYSE	\$ 346,490,000
Legg Mason	NYSE	\$ 4,780,000,000
Rockwell Collins	NYSE	\$ 9,900,000,000
Goodrich Corp.	NYSE	\$ 8,940,000,000
Hexcel Corp.	NYSE	\$ 1,350,000,000
Precision Castparts	NYSE	\$ 17,250,000,000
Sprit Aero Systems Holding	NYSE	\$ 3,150,000,000
Alamo Group	NYSE	\$ 218,480,000
Petsmart	NASDAQ	\$ 3,720,000,000
Hartford Financial Services	NYSE	\$ 10,470,000,000
Lincoln National Corp.	NYSE	\$ 8,690,000,000
Principal Financial group	NYSE	\$ 8,750,000,000
Prudential Financial	NYSE	\$ 26,950,000,000
DCP Midstream Partners	NYSE	\$ 1,110,000,000
Williams Pipeline Partners	NYSE	\$ 696,750,000
Broad.com Corp.	NASDAQ	\$ 16,690,000,000
National Semiconductor	NYSE	\$ 3,460,000,000
Texas instruments	NYSE	\$ 30,250,000,000
E.I du Pont de Nemours	NYSE	\$ 33,320,000,000

Table II: Raw Returns for “Mad Money” BUY Recommendations. Event day 0 is the show air date and event day +1 is the next trading day. Figures in parentheses are t scores. * is significant at 2.6% level.

Event Day(s)	Raw Returns
-1	1.94% (1.553)
0	-1.18% (-.9837)
1	2.62% (2.0765*)
2	1.02% (1.2259)
3	-.11% (-0.0881)

Table III: Mean-Adjusted Abnormal Returns for “Mad Money” BUY Recommendations. Event day 0 is the show air date and event day +1 is the next trading day. Figures in parentheses are t scores. ** is significant at 1.97% level.

Event Day(s)	Mean-Adjusted Abnormal Returns
0	-.96% (-.8169)
1	2.84% (2.2117**)
2	1.25% (1.4783)
3	0.11% (.0947)

Table IV: Abnormal Volume Means for “Mad Money” BUY recommendations. Event day 0 is the show air date and event day +1 is the next trading day. Figures in parentheses are t scores. *** indicates significance at the 3.92% level.

	Abnormal Volume Mean
Day 0	343,149 shares (.5549)
Day +1	1,874,214 shares (1.8601***)
Day +2	1,037,579 shares (1.4018)
Day +3	842,014 shares (1.0541)
Day +4	492,529 shares (.5884)

References

- Albert, Jr., Robert L. and Timothy R. Smaby. 1996. "Market response to analyst recommendations in the 'Dartboard' column: The information and price-pressure effects." *Review of Financial Economics*, vol. 5, no. 1 (Winter): 59-74.
- Apt, Adam. (2009). "Jim Cramer Exposed: Does He Generate Alpha." *Advisor Perspectives*, (August 25): http://www.advisorperspectives.com/newsletters09/Jim_Cramer_Exposed-Does_He_Generate_Alpha.php
- Barber, Brad M. and Douglas Loeffler. 1993. "The 'Dartboard' column: Second-hand information and price pressure." *Journal of Financial and Quantitative Analysis*, Vol. 28, no. 2 (June): 273-284.
- Bauman, W Scott, Sudip S. Datta, and Mai E. Iskandar-Datta. 1995. "Investment analyst recommendations: a test of 'the announcement effect' and 'the valuable information effect'." *Journal of Business Finance & Accounting*, vol. 22, no. 5 (July): 659-670.
- Beltz, Jess and Robert Jennings. 1997. "Wall Street Week with Louis Rukheyser recommendations: Trading activity and performance." *Review of Financial Economics*, vol. 6, no. 1: 15-27.
- Beneish, Messod D. 1991. "Stock prices and the dissemination of analysts' recommendations." *The Journal of Business*, vol. 64, no. 3 (July): 393-416.
- Bolster, Paul J. and Emery A. Trahan. 2009. "Investing in Mad Money: Price and Style Effects." *Financial Services Review*, vol.18: 69-86.
- Brown, Stephen J. and Jerold B. Warner. 1980. "Measuring security price performance." *Journal of Financial Economics*, vol. 8, no. 3 (September): 205.
- Brown, Stephen J. and Jerold B. Warner. 1985. "Using daily stock returns: The case of event studies." *Journal of Financial Economics*, vol. 14, no. 1 (March): 3-31.
- Dewally, Michael. 2003. "Internet investment advice: Investing with a rock of salt." *Financial Analysts Journal*, vol. 59, no. 4 (July/August): 65-77.
- Gasparino, Charles. 2005. "TV the 'Mad' Money Man." *Newsweek*, vol. 145, issue 12 (March): 12.
- Griffin, P.A., J.J. Jones, and M. Zmijewski. 1995. "How useful are *Wall Street Week* stock recommendations?" *Journal of Financial Statement Analysis*, vol. 1, no. 1 (Fall): 33-52.
- Hirschey, Mark, Vernon J. Richardson, and Susan Scholz. 2000. "How 'foolish' are internet investors?" *Financial Analysts Journal*, vol. 56, no. 1 (January/February): 62-69.
- Ho, Michael J. and Robert S. Harris. 1998. "Market reactions to messages from brokerage rating systems." *Financial Analysts Journal*, vol. 54, no. 1 (January/February): 49-57.
- Lim, Bryan and Rosario Joao. 2008. "The Performance and Impact of Stock Picks Mentioned on 'Mad Money'." (February 18). Working Paper accessed March 1, 2010, Available at SSRN: <http://ssrn.com/abstract=1017353>.
- Liu, P., S.D. Smith, and A.A. Syed. 1990. "Stock price reactions to *The Wall Street Journal's* securities recommendations." *Journal of Financial and Quantitative Analysis*, vol. 25, no. 3 (September): 399-410.
- Liu, P., S.D. Smith, and A.A. Syed. 1992. "The impact of the insider trading scandal on the information content of *The Wall Street Journal's* 'Heard on the Street' column." *Journal of Financial Research*, vol. 15, no. 2 (Summer): 181-188.
- Mathur, Ike and Amjeed Waheed. 1995. "Stock price reactions to securities recommended in *Business Week's* 'Inside Wall Street'." *Financial Review*, vol. 30, no. 3 (August): 583-604.

- Metcalf, Gilbert E. and Burton G. Malkiel. 1994. "The Wall Street Journal contests: The experts, the darts, and the efficient market hypothesis." *Applied Financial Economics*, vol. 4, no. 5 (October): 371-374.
- Neumann, John and Peppi Kenny. 2007. "Does Mad Money make the market go mad?" *The Quarterly Review of Economics and Finance*, vol. 47, 602-615.
- Pari, Robert A. 1987. "Wall Street Week recommendations: Yes or no?" *Journal of Portfolio Management*, vol. 14, no. 1 (Fall): 74-76.
- Pruitt, Stephen W., Bonnie F. Van Ness, and Robert A. Van Ness. 2000. "Clientele trading in response to published information: Evidence from the dartboard column." *The Journal of Financial Research*, vol. 23, no. 1 (Spring): 1-13.
- Sarkar, Salil K. and Douglas J Jordan. 2000. "Stock price reactions to regional Wall Street Journal securities recommendations." *Quarterly Journal of Business and Economics*, vol. 39, no. 2 (Spring): 50-61.
- Serwer, Andrew. 1998. "The trader: Jim Cramer." *Money*, vol. 27, no. 10 (October):116-117.

Exchange Traded Funds as a Vehicle for Implementing End-of-Month Trading Strategies

Charles Rayhorn, Kenneth Janson and James Drosen

Abstract

An Exchange Traded Fund (ETF) is a retail investment product which is designed to mirror the returns of a basket of assets, typically the stocks which comprise a particular market index. ETFs provide an efficient mechanism for individuals to enter investment positions in a broad market or industry sector index. End-of-Month (EOM) trading involves the timed switching from cash to market exposure and then back to cash, in an attempt to capture higher returns than is available to a buy-and-hold alternative. The effectiveness of EOM has been demonstrated in a number of studies, but transaction costs and, very importantly, regulatory restrictions have been implementation impediments faced by individual investors. In this study, ETFs are examined for implementation efficiency for individual retirement account investors who wish to employ an EOM trading strategy.

I. Introduction

An Exchange Traded Fund (ETF) is an investment product that is based on the securities which comprise a particular market index such as the Standard and Poors 500 (S&P). Primary investors, generally institutional investors some of whom are also broker/dealers, deliver baskets of securities which comprise the index to the fund manager who exchanges the baskets for large blocks of registered ETF shares. The broker/dealers then offer the ETF shares to retail investors and commence to make a market in the new security. Arbitrageurs assure that the ETF shares very closely mirror the behavior of the index itself and the market making activities of the sponsoring broker/dealers assure that small lot investors can enjoy not only efficient investment access to the broad index but excellent liquidity as well. ETFs are designed to provide per-share pricing levels that do not discourage small round lot investors and are of sufficient total dollar size to assure that float is sufficient to support very active trading. Indeed, ETF issues have often been among the daily volume leaders on the exchanges where they are traded, and leading index ETFs often display intraday bid-ask spreads of a penny or less.

A market timing strategy is an investor's attempt to outperform a buy-and-hold alternative by systematically moving an investment account balance between two different market exposures, typically comprised of an aggressive "in-the-market" position and a very conservative "cash-equivalent" position. End-of-Month (EOM) strategies generally seek to expose the investment account to market opportunities and risks over the few days surrounding month-end, and safely park the account's balances in cash for the remainder of each month. A number of studies have demonstrated that EOM strategies have the potential to outperform buy-and-hold alternatives. In practice, a number of impediments confound profitable implementation.

First is the tax consequence associated with short-term investment forays designed to capture fleeting excess returns. While buy-and-hold strategies will typically result in long-term capital gain/loss treatment, the taxation of gains from an EOM switching strategy will be all

Charles R. Rayhorn, Ph.D., is Professor of Finance, Kenneth R. Janson, Ph.D., is Professor of Accountancy and James W. Drosen, Ph.D., is Associate Professor of Management, all at the Walker L. Cisler College of Business, Northern Michigan University, Marquette, MI 49855. Professor Rayhorn can be contacted at crayhorn@nmu.edu.

short term. For an individual's taxable investment account, an EOM strategy must bear a higher imputed taxation rate than would apply to buy-and-hold. The practical consequence is that EOM switching strategies are generally viewed as appropriate for only retirement accounts. Indeed, early investigations of EOM switching focused on the family of mutual funds that comprise the TIAA-CREF retirement plans available to professionals in higher education and research.

Historically, the alluded EOM strategy using CREF mutual fund accounts was available without transaction costs, but regulatory evolution in the form of restrictions on the number of mutual fund account changes permitted during any calendar quarter effectively quashed that opportunity. In the open market, an EOM program must earn enough excess returns to overcome its transactions costs and historically, that would have been burdensome. Brokerage efficiencies and competition, however, have sufficiently commoditized trading costs that the transaction cost issue for stocks is relatively inconsequential. Indeed, individuals account holders can affect a 200 share round trip trade (into the security and then back out a few days later) for as little as \$2.00. ETFs trade like stocks, so the cost advantages of discount brokerage are completely available to EOM strategists.

For generations, investors have sought trading strategies that might outperform a buy-and-hold approach. Systematic switching of account balances between or among two or more investment vehicles is one such strategy. Researchers have identified a number of strategies with the promise of premium returns, but those higher gross returns have generally been accompanied by measurably higher implementation costs. A switching strategy must overcome three obstacles before it can compete successfully with buy-and-hold. First, the switching algorithm must outperform buy-and-hold by at least the incremental direct costs of trading. Second, in accounts where realized gains and losses are currently taxed, a switching strategy must overcome this tax disadvantage. Third, a switching strategy must avoid institutional and regulatory constraints such as anti-churning rules that characterize, for instance, some mutual fund programs.

Switching strategies which exploit a perceived turn-of-month (TOM) effect in the returns of U.S. equity securities have received some research attention. Equity indices have been the focus of much of that interest. For a number of hypothesized reasons, indices such as the S&P are thought to display higher returns in the few days surrounding each month-end, and revert to more modest average daily returns during the remainder of the month. A TOM switcher establishes a long position in the index just prior to the month-end, maintains the position over the calendar change, and liquidates it shortly thereafter. The proceeds are held at money market rates for the ensuing weeks until a second TOM investment is launched at the next calendar event. The investment returns to such a switching strategy, after transaction costs have been deducted, are compared to the indicated returns from a simple buy-and hold strategy.

For taxation purposes, investment gains are generally deferred until realized through the sale of an investment position. Thus, gains accruing in a buy-and-hold portfolio escape current taxation while gains that are realized through a switching algorithm face current tax levies. The potential acceleration of tax obligations is a second hurdle that a TOM switcher must overcome.

The availability of exchange traded funds permit a switcher to easily clear the third hurdle, namely the regulatory and administrative restrictions that seek to limit churning in mutual

fund accounts. ETFs based on broad market indices allow a TOM trader to implement his strategy as simply as by buying and selling an individual stock.

II. The Literature

Calendar based effects have been observed in the return streams of U.S. equities and switching strategies have been suggested to exploit these effects. Wachtel (1942) described a January effect where above average returns were attributed to the first month of the year. Tax motivated December sales, followed by aggressive re-investment in January is generally thought to explain the phenomenon. Kunkel and Compton (1998) summarize the January effect literature, noting the findings by Riepe (1998) that opportunities to exploit the effect appear to have diminished over time.

Cross (1973) documented an observed negative Monday effect in the returns of equities. Kamara (1997) showed that the intensity of the Monday effect in stock prices, and by extension its potential as a profitable basis for a switching strategy, has also diminished over time.

Ariel (1987) described a month-end pattern in the returns of stock portfolios. His dichotomous study showed that returns for the first half of the month exceed, on average, returns for the latter half. Subsequently, Lakonishok and Smidt (1988) and Ogden (1990) narrowed the range for superior returns to the few days surrounding month-end and advanced hypotheses that liquidity issues motivated those excess returns. First, institutional investors seek to reposition portfolios before month end, resulting in a concentrated month-end sell-off of some positions. Second, near month-end in-flows of investable funds to the household sector stimulates a short-lived surge in demand for investments at the beginning of the next month. Henzel and Ziembra (1996) found that this TOM effect could be profitably exploited by switching between an S&P 500 portfolio and a money market account. Their study of the S&P 500 from 1928 to 1993 revealed that average daily returns were positive during a TOM interval (defined in this study to be the last trading day of the month plus the first four trading days of the next month) and the first half of the month. The second half of the month saw negative returns. They concluded that “the cumulative wealth effects of investment during various time periods magnify the effects. The results indicate that the total return from the S&P 500 over this sixty-five-year period was received mostly during the turn of the month. The strategy of being long the S&P 500 during the TOM or the FH and long T-bills otherwise has very high total returns ... When risk is considered this strategy dominates all the strategies considered ...”

The CREF Stock Fund is an investment option available to academicians and others who invest retirement savings through TIAA-CREF. Kunkel and Compton (1998) examined the CREF Stock fund to see if participants could exploit TOM to earn higher returns while reducing overall risk. They simulated a TOM strategy that was long the CREF Stock Account from day -4 to day +2 (four trading days before the end of the month through the second trading day of the next month) and switched out to CREF’s Money Market Account the rest of the time. Their CREF Stock and Money Market portfolio earned an average annual return of 17.7% compared with a 15.6% annual return for a CREF Stock Fund buy-and-hold strategy.

Rayhorn, Janson, and Drosen (2009) examined the TOM effect in broad-based U. S. market indices and found that the effect persists through 2008. They also found that the CREF

account strategy proposed by Kunkel and Compton would still be profitable, if anti-churning rules for mutual fund investments had not been strengthened.

III. The Studies

This paper reports the results of our investigations into the efficacy of TOM switching strategies implemented through two prominent ETFs. One fund is the SPDR S&P 500 ETF which tracks the performance of the common equity of 500 of the largest United States firms and trades on the AMEX under the symbol SPY. The ETF is managed by State Street Global Advisors (SSgA), trades on the American Stock Exchange (AMEX) under the symbol SPY, and offers shares that are affectionately known as Spiders. The second is the Diamonds Trust Series 1, which is a unit investment trust that itself owns shares of each of the 30 firms which comprise the Dow Jones Industrial Average. The Diamonds Trust is designed to closely track the average. SSgA also manages the Diamonds ETF, which shares trade on the New York Stock Exchange under the symbol DIA.

In each case, we compare the returns from a buy-and-hold strategy that invests in a broad market ETF, with the returns generated by a TOM switching strategy employing a Money Market Fund as its baseline investment and the same ETF for short-duration market exposure over the month-end.

For each study, we created a daily returns series from the reported closing prices of the ETF. For the Spiders, the return series spans 29 January 1993 through 11 September 2009, while returns for the Diamonds were computed from 20 January 1998 through 11 September 2009. These series support the calculation of buy-and-hold performance metrics for each ETF. For the TOM switching strategies, baseline money market returns are also needed. We created a surrogate money market return series from daily closing prices of the current 3-month U.S. Treasury bill.

First, we coded each ETF daily returns series observation with an indexing variable that reflects its displacement from the first day of the month. Thus, the observed return for the first trading day of June would be coded as day +1, while the return for the third trading day of April would be coded as day +3. Similarly, a return observed on the last trading day of August would be coded as day -1, while the return seen on the fourth to the last trading day of October would be coded as day -4. Our first tests of significance addressed the question of possible concentrations in the returns earned on particular index days. Following the formulation of Kunkel, Compton and Beyer (2003) we tested the significance of average returns obtained on days organized according to this indexing scheme. For each ETF, Ordinary Least Squares regression was used to estimate the model:

$$R_t = \beta_{-11}D_{-11,t} + \beta_{-10}D_{-10,t} + \dots + \beta_{+10}D_{+10,t} + \beta_{+11}D_{+11,t} + \beta_{\text{other}}D_{\text{other},t} + e_t$$

where R_t is the return on trading day t , and D is a dummy variable for the trading days -11 to +11 and other. 'other' is the occasional day(s) in a month where you have more than 22 trading days. $D_{-2,t}$, for instance, will be set to one if the day t happens to be the second to the last trading day of a month, and set to zero for all other days. The effect of the dummy variables will be to group and average the returns to holding the ETF that are enjoyed on a particular day,

relative to the turn-of-the month. Testing the parameters, β , of this regression is analogous to conducting individual T-tests of the null hypotheses that the average daily return for a particular index day is not significantly different from zero. As observed by other researchers, we also found significant returns concentrated around the TOM event. Notably, our analysis suggests that the intensity of the TOM effect on day +1 may have diminished in Spiders since 2000 but remains relatively pronounced in Diamonds through 2009. Tables I and II summarize the OLS estimates for the Spiders and Diamonds models, respectively.

A second approach for assessing index day significance involved moving averages. Binary variables were employed to structure the observed data. For each series, a 19 trading-day moving average return was calculated, and the return for a particular day was then compared to the moving average centered on that day. Essentially, this filter attempts to extract above-trend or below-trend performance from the series. If a particular day's return exceeded its centered 19-day moving average, its binary variable will be coded as 1, and if its return fails to exceed the moving average, its binary variable will be coded as 0. Under a null hypothesis of no TOM effects, these variables (for any specific trading day) should be independent Bernoulli variables with $p=0.5$. Deviations from that expected level for a particular index day suggest the presence of systematic abnormal returns (TOM effects) and warrant significance testing. Sample proportions and their z-scores were calculated for Diamonds, Spiders and the Money Market surrogate and the later period results are reported in Panel A of each table, III through V, respectively. Notably, the Spider and Diamond returns showed a fairly significant z-score for day +1.

Moving averages were replaced with the 19-day median return, and the observations were recoded. Again, under the null hypothesis of no systematic excess returns, the binary variables should be independently distributed Bernoulli variables with $p=0.5$. Panels B of tables III, IV and V report the median return performance. For Spiders, excess day +1 performance is confirmed, but for Diamonds the TOM jump appears to be most significant on day -1.

Each of the descriptive tests confirms the existence of significant excess returns on trading days near the turn-of-the-month in the price series of prominent index-based ETFs. This confirmation motivates the design of an investment strategy which might exploit these effects.

To investigate the relative strength of a timed trading strategy involving switching into and then out of broad-market ETF, we constructed four portfolios and replicated the portfolio structures over the Spider and Diamond ETFs. Wealth relatives (WR), representing the cumulative returns of each portfolio, were calculated for two holding periods for each of the ETFs. For each fund, the period from contract inception through 1999 was designated as the early era and is generally considered to be reflective of bullish sentiment. For both Diamonds and Spiders, the period from 2000 through 2009 was designated as the late era and is generally thought to be reflective of more bearish sentiment. Comparisons of the WRs generated by the four portfolios in each of the eras provide insight into the capacity of a TOM timed trading strategy to generate excess returns and the potential defensive efficacy of such a strategy.

The first portfolio in each study is a simple money market account which serves as a baseline for riskless investment. For this portfolio, WRs are surrogated by the price series of 3-

month Treasury Bills. As reported in Table VI, the Money Market (MM) portfolio produces a WR of 1.26 over the early Spider period 1993-1999 (ESP), a score of 1.07 over the early Diamonds period 1998-1999 (EDP), and a WR of 1.22 for the subsequent bearish 2000-2009 period (LBP).

Next, a buy-and-hold portfolio was structured for each ETF. Again, from Table VI, a Spider investment over the ESP produced a WR of 3.79, surpassing the MM portfolio by a wide margin. In the LBP, however, the Spider buy-and-hold WR of 0.83 was crushed by the more conservative MM. Likewise, the Diamonds buy-and-hold strategy produced WR of 1.51 in EDP, which dwarfed the MM's 1.07. Again, in the LBP, buy-and-hold Diamonds posted WR of just 1.01, while the more defensive MM strategy posted a 1.22 score.

Inspection of the descriptive results in tables I through V suggests that one efficacious TOM strategy might involve switching from defensive MM to aggressive ETF once a month, and that the duration of the switch might plausibly be for six trading days. Since this design moves the investor's wealth between aggressive and defensive strategies, with the aggressive stance selected approximately 27% (6 ETF days / 22 trading days) of the time, we sought a baseline for the performance to be expected from portfolios that are, once each month, switched into an ETF for six days, and then switched back out. Our third portfolio is a random period switching structure (RANDOM). For each month, we selected at random, six daily returns from the ETF price series, and replaced the MM returns for those days with the ETF returns. As seen in Table VI, the RANDOM Spider portfolio expressed a WR during the ESP (1.44) that reflected an averaging of the performances of the conservative MM (1.26) and the aggressive Spider Buy & Hold (3.79). Surprisingly, however, the RANDOM Spider portfolio (1.33) outperformed both the MM (1.22) and Buy & Hold (0.83) during the LBP of 2000-09. For Diamonds, the early period RANDOM (1.04) trailed both the conservative and aggressive strategies. In the late period, however, RANDOM Diamonds (1.46) surpassed both the MM and Diamonds Buy & Hold.

Now with RANDOM Spiders and RANDOM Diamonds established as baselines, we investigate the performance of a similar once-monthly, in-and-out trading strategy that calibrates its entry and exit points to the trading day calendar. Specifically, we define a TOM portfolio to be a MM based account that is switched into ETF on trading day -4 and switched back to MM on day +2. In the early period, TOM Spiders (1.73) outperform RANDOM Spiders (1.44), while in the later bearish period, the TOMs (2.48) are also much better (RANDOM = 1.33). For Diamonds, the early period TOMs (1.02) are comparable to RANDOM (1.04), but in the late period, the TOMs (2.32) are much stronger than RANDOM (1.46).

IV. Discussion

In the early "bullish" period before 2000, TOM Spiders outperformed MM and RANDOM Spiders, but, by parking in MM for much of the time, missed much of the price appreciation that was captured by Buy & Hold Spiders. Early period TOM Diamonds were even less impressive, with Buy & Hold Diamonds and MM both beating the TOM portfolio. In the later "bearish" period from 2000 to 2009, however, the potential value of a TOM ETF strategy is apparent. In these years, our TOM Spiders solidly advanced (WR=2.48) while MM gained much less (WR=1.22) and Buy & Hold Spiders actually lost value (WR=0.83). During the same

bearish period, TOM Diamonds advanced (WR=2.32) much more than the defensive MM (WR=1.22) and relatively static Buy & Hold Diamonds (WR=1.01).

The mixed reviews of TOM during market expansion suggests that positive effects posited to surround the monthly turning of the calendar page may be overwhelmed by the general rise in the market motivated by randomly appearing positive news. Buy & Hold alternatives capture the full rise, while TOM sits out 73% of the time. Quite strikingly, though, TOM charges ahead of its competitors when market sentiment is less enthusiastic. By sitting out 73% of the time, TOM misses the declines that accompany the receipt of a lot of bad news, but, by being in the market during the critical turn-of-month period, is the beneficiary of systematic TOM events.

V. Conclusion:

While earlier research has shown that opportunities to profitably exploit calendar effects such as the January effect and the week-end effect have waned in recent years, this study suggests that opportunities remain to capture excess returns from the Turn-of-Month (TOM) effect. We find compelling evidence, especially during periods of bearish sentiment, that a TOM motivated switching strategy can be profitably applied in a discount brokerage IRA utilizing broad market ETFs.

Table I
SPDR Average Daily Returns For All Trading Days

1% is light shadow dark font, underlined and italics; 5% is dark shadow white font; 10% medium shadow dark font

Trade Day	2009	2008	2007	2006	2005	2004	2003	2002	2001	2000	1999	1998-2009	2000-2009	1993-1999	1993-2009	
10	0.73%	-0.86%	-0.04%	0.28%	0.05%	0.05%	0.03%	0.78%	-0.52%	0.48%	-0.26%	-0.21%	0.03%	0.08%	0.06%	0.07%
9	-0.22%	1.38%	0.37%	-0.19%	-0.10%	-0.21%	0.45%	-0.03%	0.32%	-0.15%	-0.21%	0.15%	0.14%	0.17%	0.12%	0.15%
8	0.48%	-0.68%	0.04%	-0.08%	0.11%	-0.13%	0.45%	0.07%	0.13%	-0.93%	-0.03%	0.51%	-0.03%	-0.07%	0.04%	-0.02%
7	0.08%	-0.58%	-0.46%	-0.23%	-0.18%	0.28%	-0.23%	-0.73%	-0.16%	-0.11%	-0.31%	0.28%	-0.22%	-0.24%	0.05%	-0.12%
6	0.06%	-0.38%	0.26%	0.17%	-0.01%	-0.27%	-0.25%	0.42%	-0.59%	-0.19%	-0.02%	-0.73%	-0.10%	-0.08%	-0.11%	-0.09%
5	0.20%	-0.25%	-0.19%	-0.15%	0.00%	-0.19%	-0.16%	-0.35%	0.01%	0.23%	0.16%	0.67%	0.00%	-0.09%	0.15%	0.01%
4	-0.55%	-1.15%	0.46%	0.00%	0.21%	0.15%	0.32%	0.21%	-0.15%	0.05%	0.30%	0.20%	0.01%	-0.03%	0.06%	0.01%
3	0.27%	-0.70%	-0.27%	-0.04%	-0.06%	-0.03%	0.04%	-0.47%	0.04%	0.37%	0.74%	-0.44%	-0.04%	-0.09%	0.18%	0.02%
2	0.44%	-0.11%	0.00%	0.14%	0.07%	0.16%	0.30%	-0.56%	0.23%	-0.57%	0.14%	-0.10%	0.00%	0.00%	0.13%	0.05%
1	0.30%	-0.40%	0.12%	0.11%	0.23%	0.42%	0.79%	-0.02%	0.09%	0.52%	0.28%	0.77%	0.27%	0.21%	0.38%	0.28%
-1	-0.40%	0.40%	0.13%	-0.07%	0.05%	0.04%	0.13%	-0.10%	0.07%	0.42%	0.14%	-1.20%	-0.01%	0.10%	-0.18%	-0.02%
-2	-0.38%	0.10%	-0.14%	0.19%	0.23%	0.03%	-0.06%	0.45%	0.01%	-0.15%	-0.23%	0.48%	0.06%	0.04%	0.06%	0.05%
-3	-0.21%	0.05%	0.31%	0.30%	0.08%	0.14%	0.31%	-0.54%	-0.44%	-0.03%	0.06%	-0.07%	0.00%	0.00%	0.08%	0.03%
-4	1.25%	1.83%	-0.23%	0.06%	-0.03%	0.20%	0.19%	0.04%	0.14%	-0.13%	-0.07%	-0.62%	0.19%	0.30%	0.00%	0.18%
-5	0.09%	-0.06%	-0.41%	0.18%	-0.16%	0.25%	-0.18%	-0.16%	0.48%	0.44%	0.21%	0.08%	0.06%	0.05%	0.08%	0.06%
-6	-0.32%	-1.15%	0.19%	0.06%	0.05%	-0.10%	-0.51%	-0.01%	-0.15%	-0.44%	-0.01%	0.59%	-0.15%	-0.23%	0.03%	-0.12%
-7	0.51%	-0.73%	0.06%	-0.18%	0.04%	0.00%	0.35%	0.04%	-0.79%	-0.75%	-0.33%	0.07%	-0.16%	-0.17%	-0.05%	-0.12%
-8	0.63%	-0.21%	0.14%	0.10%	-0.31%	-0.09%	-0.48%	-0.89%	0.02%	-0.25%	0.55%	0.20%	-0.07%	-0.16%	0.16%	-0.03%
-9	-1.31%	-0.06%	0.18%	0.18%	0.29%	-0.12%	0.06%	-0.69%	0.26%	0.69%	-0.25%	0.07%	-0.02%	-0.01%	-0.12%	-0.06%
-10	0.44%	-0.79%	-0.08%	-0.11%	0.03%	-0.05%	0.10%	0.11%	-0.07%	-1.02%	0.39%	0.47%	-0.07%	-0.16%	-0.22%	0.00%
other	-0.13%	1.11%	-0.20%	0.37%	-0.18%	0.33%	1.07%	-0.65%	0.45%	1.50%	-0.45%	0.61%	0.34%	0.42%	-0.01%	0.23%
11	-0.91%	-2.28%	-0.52%	0.98%	-0.08%	-0.04%	-0.45%	0.59%	-0.14%	0.93%	0.76%	1.38%	0.11%	-0.12%	0.47%	0.14%
-11	1.22%	1.92%	0.63%	-0.17%	-0.23%	0.54%	-0.67%	0.95%	-0.86%	-0.14%	0.64%	0.37%	0.32%	0.28%	0.30%	0.30%

Table II
DIAMOND Average Daily Returns For All Trading Days

1% is light shadow dark font, underlined and italics; 5% is dark shadow white font; 10% medium shadow dark font

Trade Day	2009	2008	2007	2006	2005	2004	2003	2002	2001	2000	1999	1998	1998-2009	2000-2009
10	0.0074	-0.0073	0.0003	0.0031	0.0000	-0.0004	0.0009	0.0050	-0.0033	0.0033	0.0012	0.0010	0.0007	0.0006
9	-0.0025	0.0133	0.0040	-0.0021	-0.0010	-0.0018	0.0047	-0.0022	0.0029	-0.0038	-0.0018	0.0003	0.0009	0.0013
8	0.0041	-0.0061	0.0003	-0.0004	0.0024	-0.0009	0.0035	0.0020	0.0016	-0.0065	-0.0003	0.0037	0.0001	-0.0001
7	0.0007	-0.0051	-0.0041	-0.0018	-0.0018	0.0023	-0.0006	-0.0070	0.0003	0.0010	-0.0033	0.0006	-0.0016	-0.0017
6	-0.0011	-0.0039	0.0024	0.0018	0.0000	-0.0031	-0.0007	0.0038	-0.0049	0.0001	-0.0007	-0.0051	-0.0009	-0.0005
5	0.0024	-0.0030	-0.0013	-0.0002	0.0007	-0.0018	-0.0009	-0.0024	0.0003	-0.0011	0.0034	0.0099	0.0004	-0.0008
4	-0.0059	-0.0098	0.0030	-0.0008	0.0021	0.0009	0.0024	-0.0016	-0.0015	0.0055	0.0021	0.0000	-0.0008	-0.0008
3	0.0023	-0.0073	-0.0021	0.0004	-0.0002	-0.0001	0.0002	-0.0037	0.0034	0.0042	0.0070	-0.0035	0.0000	-0.0004
2	0.0035	0.0001	0.0001	0.0009	0.0002	0.0016	0.0032	-0.0034	0.0025	-0.0024	0.0026	-0.0008	0.0006	0.0005
1	0.0030	-0.0043	0.0015	0.0017	0.0013	0.0030	0.0071	0.0010	0.0038	0.0050	0.0054	0.0087	0.0030	0.0023
-1	-0.0025	0.0024	0.0016	0.0000	-0.0005	-0.0006	0.0013	-0.0011	-0.0005	-0.0005	-0.0009	-0.0127	-0.0011	0.0001
-2	-0.0029	0.0023	-0.0014	0.0011	0.0014	0.0004	-0.0015	0.0036	0.0005	0.0008	-0.0027	0.0034	0.0005	0.0006
-3	-0.0033	0.0002	0.0026	0.0036	0.0012	0.0010	0.0024	-0.0038	-0.0037	-0.0010	-0.0004	-0.0010	-0.0001	0.0000
-4	0.0118	0.0168	-0.0015	-0.0002	-0.0004	0.0020	0.0010	0.0000	0.0004	-0.0011	0.0011	-0.0045	0.0018	0.0026
-5	-0.0007	-0.0005	-0.0027	0.0011	-0.0017	0.0024	-0.0024	-0.0011	0.0067	0.0026	0.0003	0.0010	0.0004	0.0004
-6	-0.0048	-0.0096	0.0017	0.0001	-0.0002	-0.0016	-0.0056	-0.0012	-0.0012	0.0022	-0.0002	0.0061	-0.0012	-0.0018
-7	0.0050	-0.0042	0.0010	-0.0007	-0.0003	0.0002	0.0036	0.0024	-0.0099	-0.0054	-0.0028	-0.0026	-0.0016	-0.0010
-8	-0.0039	-0.0032	0.0010	0.0002	-0.0029	-0.0009	-0.0045	-0.0075	-0.0004	-0.0026	0.0047	0.0026	-0.0013	-0.0019
-9	-0.0091	-0.0022	0.0007	0.0029	-0.0014	0.0002	-0.0066	0.0018	0.0060	-0.0045	-0.0018	-0.0010	-0.0010	-0.0002
-10	-0.0028	-0.0064	0.0002	-0.0004	-0.0003	-0.0010	0.0015	0.0016	-0.0032	-0.0092	0.0055	0.0033	-0.0009	-0.0016
other	-0.0038	0.0113	-0.0012	0.0045	-0.0009	0.0034	0.0094	-0.0071	0.0041	0.0169	-0.0054	0.0057	0.0032	0.0044
11	-0.0030	-0.0186	-0.0041	0.0096	0.0000	0.0006	-0.0022	0.0052	-0.0008	0.0094	0.0068	0.0133	0.0020	0.0001
-11	0.0047	0.0147	0.0042	-0.0003	-0.0021	0.0061	-0.0011	0.0095	-0.0066	-0.0078	0.0037	0.0027	0.0017	0.0019

Table VI

Wealth Relatives various periods SPDR

	T-Bill	Buy/Hold	Random	TOM
Time Period	WR	WR	WR	WR
93-2009	1.53	3.16	1.92	4.2820953
2000-09	1.22	0.83	1.33	2.4756301
1993-1999	1.26	3.79	1.44	1.7296991

Wealth Relatives various periods DIA

	T-Bill	Buy/Hold	Random	TOM
Time Period	WR	WR	WR	WR
98-2009	1.30	1.52	1.52	2.36
2000-09	1.22	1.01	1.46	2.32
1998-1999	1.07	1.51	1.04	1.02

References

- Ariel, R. "A monthly effect in stock returns." *Journal of Financial Economics* 18 (1987), 164-174.
- Cross, F. "The behavior of stock prices on Fridays and Mondays." *Financial Analysts Journal* (November-December 1973), 67-69.
- Henzel, R. and W. Ziemba. "Investment results from exploiting turn-of-the-month effects." *Journal of Portfolio Management* (Spring 1996), 17-23.
- Kamara, A. "New evidence on the Monday seasonal in stock returns." *Journal of Business* 70 (1997), 63-84.
- Kunkel, R. and W. Compton. "A tax-free exploitation of the turn-of-the-month effect: C.R.E.F." *Financial Services Review* 7(1) (1998), 11-23.
- Kunkel, R., W. Compton and S. Beyer. "The turn-of-the-month effect still lives: the international evidence." *International Review of Financial Analysis*, 12:2 (2003), 207-222.
- Lakonishok, J. and S. Smidt. "Are seasonal anomalies real? A ninety-year perspective." *Review of Financial Studies* 1 (1988), 403-425.
- Odgen, J. "Turn-of-month evaluations of liquid profits and stock returns: A common explanation for monthly and January effects." *Journal of Finance* 45 (1990), 1259-1272.
- Riepe, M. "Is publicity killing the January effect?" *Journal of Financial Planning* 11 (1998), 64-70.
- Rayhorn, C., K. Janson, and J. Drosen, "Switching Strategies for Individual Investors: Recent Evidence from The Self-directed Family of CREF Retirement Accounts." forthcoming in *Journal of the Academy of Finance*, 2009.
- Wachtel, S. "Certain observations on seasonal movements in stock prices." *Journal of Business* 15 (1942), 184-193.

International Index Investing During the Financial Crisis

C. Edward Chang H. Doug Witte Tsu-Hong Yen

A Comparative Performance Analysis of Three Model Portfolios of Value Line

Jamshid Mehran Robert Balik Raj K. Kohli

Women on the Board: Diversity and Firm Performance

Sharon K. Lee

International Diversification

Robert Balik Jamshid Mehran

Do Jim Cramer's Mad Money Recommendations Have the Same Impact in a Bear Market as in a Bull Market?

Peppi M. Kenny Don T. Johnson

Exchange Traded Funds as a Vehicle for Implementing End-of-Month Trading Strategies

Charles Rayhorn Kenneth Janson James Drosen