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This Issue

In this study we use spectral analysis on SPY (Spiders) options to examine the relation between option spot and implied volatility for this exchange trade fund. We attempt to address the question is there a relation between the option spot and implied volatility or option implied volatility has no relation with the spot exchange trade fund volatility. We find that this relation does exist for SPY at-the-money call and put options and the in-the-money call and out-of-the-money put options. Using two spectral statistics – the coherence and the phase statistics, we find that the SPY option implied volatility and spot volatility have a relation and that the SPY option implied volatility leads the SPY spot volatility.

This paper explores the rationale for and performance of student-managed venture capital funds. In particular, it seeks to identify whether the performance of student-managed funds is inferior to professionally-managed funds. The results suggest that professionally-managed funds may perform better than student managed funds, but this difference disappears when comparing investments made 7 or more years ago – a typical holding period for a VC firm. Pedagogical benefits of having a student-managed fund are discussed, and guidelines of implementing a student-managed VC fund are derived.

This paper explores the possible use of the time State Preference Model from the modern portfolio theory as well as an index bond whose performance is based on the growth in an industry or the national income for possible applications in Islamic financial transactions. This appears to be in line with the provisions of Islamic economic thought as it prohibits receiving a fixed rate of interest on the use of money as well as calling for the need for enhancement of economic and social welfare of all members of the society. Islamic laws, in principle, aim for productive use of capital and earning a reasonable return on investment in the context of risk sharing rules. This is for the purpose of an equitable distribution of profit among the individual investors and banks with the suppliers of human capital and business enterprises.

Money growth and output growth are positively correlated across a small homogeneous group of OECD countries. This relationship has received little attention. I perform a cross-country growth analysis and find that the relationship holds after controlling for standard determinants of economic growth. Estimation of vector autoregressions and tests for Granger Causality reveal that money growth helps drive economic growth in the OECD sample. Evidence indicates that this positive influence is a result of higher levels of economic freedom in more developed nations, which may create an environment where nominal money helps facilitate the production process or expedites capital accumulation.

The significance and the originality of this paper lies in comparing, crisis effected Asian markets during the Asian Financial Crisis 2007, success of macroeconomic policy adjustments and implementation of tightening strategies to that of the impact of Financial crisis 2007 on the same markets. It is vital to introduce the roles of sample markets such as South Korea, China, Singapore, Malaysia, India, Japan, and Taiwan during the Asian crisis. Although the crisis initiated in Thailand, shocks propelled into South Korea, a first degree (where shocks generate) crisis prone market and spilled the crisis over to second degree markets (highly effected by shocks in first degree markets) of the Philippines, Malaysia, China and Singapore, those mark significant co-movement. This paper canvasses evidence for financial contagion and shock propagation that spread into specific Asian markets, generating from US equity markets. While many papers examined the contagion effect applying long term association methods, in a linear model; this paper concentrates on the conditional mean and variance framework in non-linear structure.

GUIDELINES FOR SUBMISSION

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Focus of the articles should be on applications and implications of business, management and economics. Theoretical articles are welcome as long as their focus is in keeping with *JABE's* applied nature.

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- Provide an additional outlet for scholars and experts to contribute their ongoing work in the area of applied cross-functional business and economic topics.

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Include a title page with manuscript which includes the full names, affiliations, address, phone, fax, and e-mail addresses of all authors and identifies one person as the Primary Contact. Put the submission date on the bottom of the title page. On a separate sheet, include the title and an abstract of 200 words or less. Do not include authors' names on this sheet. A final page, "About the authors," should include a brief biographical sketch of 100 words or less on each author. Include current place of employment and degrees held.

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Analysis of the Relation Between the Spiders' Spot and Option Implied Volatility

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In this study we use spectral analysis on SPY (Spiders) options to examine the relation between option spot and implied volatility for this exchange trade fund. We attempt to address the question is there a relation between the option spot and implied volatility or option implied volatility has no relation with the spot exchange trade fund volatility. We find that this relation does exist for SPY at-the-money call and put options and the in-the-money call and out-of-the-money put options. Using two spectral statistics – the coherence and the phase statistics, we find that the SPY option implied volatility and spot volatility have a relation and that the SPY option implied volatility leads the SPY spot volatility.

INTRODUCTION

In this study we address the issue - is there a relation between the spot and implied volatility or option implied volatility has no relation with the spot Exchange Traded Fund (ETF) volatility. The ETF that we choose to study is the Standard & Poor's Depositary Receipts SPDR S&P 500 ETF Trust, with ticker symbol – SPY, and popular name – Spider. The SPY tracks the S&P 500 index and is a Unit Investment Trust. The null hypothesis of the study is SPY spot volatility is not related to the SPY option implied volatility. We extend the work of Canina and Figlewski (1993) and Christensen and Prabhala (1998) who examine the same issue. Both studies use parametric tests to establish if such relation exists. However, financial data is typically non-normally distributed which invalidates conclusions based on parametric tests. In contrast to their studies we use the non-parametric tools of spectral analysis on SPY options to examine the relation between ETF spot and implied option volatility for this ETF.

To the best of our knowledge this is the first study to address this question with non-parametric tools. This helps extend our understanding of ETF option behavior. We find that this relation does exist for the ETF at-the-money call and put options and the ETF in-the-money call and out-of-the-money put categories. Only for these option categories do the coherence spectral statistic is consistently above 50%. Using another spectral statistic, the phase statistic, we also find that the SPY option implied volatility and spot volatility have a lead-lag relation - the SPY option implied volatility leads the SPY spot volatility.

LITERATURE REVIEW

In this study I extend ideas developed and examined by Canina and Figlewski (1993), Christensen and Prabhala (1998), Bakshi, Kapadia and Madan (2003) and Ivanov, Whitworth and Zhang (2011). Both Canina and Figlewski (1993) and Christensen and Prabhala (1998) examine the issue of option implied volatility being related to spot and future spot volatility. Canina and Figlewski (1993) find that S&P 100

(OEX) index options implied volatility does not incorporate spot S&P 100 index volatility information. Christensen and Prabhala (1998) find the opposite. However, both studies use Ordinary Least Squares methodology which is a parametric tool. Financial and option data are typically non-normally distributed which leads to misspecification in parametric models. Therefore, we first show that the data are non-normally distributed and use non-parametric spectral analysis methodology. Additionally, both studies use the Black – Scholes formula to estimate the OEX option implied volatility. However, the OEX option is an American style option, whereas the Black – Scholes formula is used to estimate the implied volatility for European style options. We address and correct this issue as well because the SPY ETF option used in this study is also American style, but we do not use the Black – Scholes formula to estimate its implied volatility. We follow Ivanov, Whitworth and Zhang (2011) methodology and re-compute the SPY option implied volatility based on a 100-step binomial tree model.

Bakshi, Kapadia and Madan (2003) study skewness in stock and option markets. They find that individual stocks are more volatile than the index that they belong to and that the reason for the option implied volatility changes might be due to the difference in the stochastic process governing the returns of the underlying indexes and stocks.

Ivanov, Whitworth and Zhang (2011) study ETF option implied volatility and find that volatility smiles of ETF options are more pronounced than for index options. They also find that the reason for the difference is not due to the proposed by Bakshi, Kapadia and Madan (2003) difference in the stochastic processes of the underlying indexes. Their findings are in agreement with a study by Bollen and Whaley (2004).

Bollen and Whaley (2004) study S&P 500 index options and stock options of the underlying stocks on intradaily basis. Bollen and Whaley (2004) find that S&P 500 index option implied volatility are most often influenced by demand for index puts and by demand for call stock options. Bollen and Whaley (2004) interpretation of the behavior of option implied volatilities based on the differential demand for options is different from the interpretation of Bakshi, Kapadia and Madan (2003) that the reason for the implied volatility changes might be due to the difference in the stochastic process governing the returns of the underlying indexes and stocks.

Therefore, based on these studies and the lack of agreement and consistent evidence in the literature we propose the use of non-parametric tools such as spectral analysis to examine if spot volatility is related to option implied volatility.

DATA AND METHODOLOGY

The options data are obtained from deltaneutral.com but modified to account for the fact that ETF options are American options. The data for the SPY are over the period - 01/10/2005 to 12/30/2005. The SPY was introduced on January 30, 1993 and is designed to be 1/10 of the S&P500. The SPY options are listed on the Chicago Board Options Exchange (CBOE) and started trading in January 2005 that is why we focus on the one ear period - 01/10/2005 to 12/30/2005. SPY options are American style options. Considering that SPY options are American style, whereas the implied volatility in the original database are computed based on the Black-Scholes formula which is for European style options, we follow Ivanov, Whitworth and Zhang (2011) methodology and re-compute the SPY option implied volatility based on a 100-step binomial tree model. The null hypothesis of the study is:

H0: SPY spot volatility is not related to the SPY option implied volatility.

Rejection of the null hypothesis would indicate that such a relation exists. Following the studies of Day and Lewis (1988), Xu and Taylor (1994) and Ivanov, Whitworth and Zhang (2011) we filter the options data to minimize influence of outliers in the analysis that follows. The filtering is conducted based on the following standard criteria:

The time to expiration is filtered to be greater than 7 days and less than 30 days.

a) The option is filtered to satisfy the European option boundary conditions, $c < Se^{-\delta T} - Xe^{-rT}$ and $p < Xe^{-rT} - Se^{-\delta T}$.
b) The option is filtered to satisfy the American option boundary conditions, $C < S - X$ and $P < X - S$.
c) The option is filtered not to be so deep-out of or in-the-money that exercise is either impossible or absolutely certain; i.e., we filter based on the absolute value of the option's hedging delta to be within the bounds 0.02 and 0.98.

To identify moneyness categories we follow the Bollen and Whaley (2004) classification based on the option's delta. The five categories that we examine are identified in Table 1.

TABLE 1
BOLLEN AND WHALEY (2004) CLASSIFICATION OF MONEYNESS CATEGORIES

Category	Labels	Range
1	Deep-in-the-money (DITM) call Deep-out-of-the-money (DOTM) put	0.875<Δc<=0.98 -0.125<Δp<= -0.02
2	In-the-money (ITM) call Out-of-the-money (OTM) put	0.625<Δc<=0.875 -0.375<Δp<= -0.125
3	At-the-money (ATM) call At-the-money (ATM) put	0.375<Δc<=0.625 -0.625<Δp<= -0.375
4	Out-of-the-money (OTM) call In-the-money (ITM) put	0.125<Δc<=0.375 -0.875<Δp<= -0.625
5	Deep-out-of-the-money (DOTM) call Deep-in-the-money (DITM) put	0.02<Δc<=0.125 -0.98<Δp<= -0.875

After we identify the different categories of call and put options we analyze the data by using spectral analysis. We examine if the spot SPY volatility is related to the SPY options implied volatility. Spectral analysis is considered to be a more robust analytic method than traditional regression analysis because it is non-parametric. Spectral analysis does not require a model specification and does not impose structure on the link between dependent and independent variables (Jenkins, 1965). Nevertheless, the nonparametric nature of spectral analysis has inefficiencies because large number of parameters need to be estimated. Additionally, the condition for stationarity of the studied time series is essential to reach any meaningful conclusions.

Consider the covariance stationary random variable 'y_t':

$$y_t = \sum_{j=0}^{\infty} b_j \varepsilon_{t-j} = B(L)\varepsilon_t . \quad (1)$$

B(L) is the polynomial of the lag operator for 'b_j' with:

$$B(L) = b_0 + b_1 L + b_2 L^2 + ... = \sum_{j=0}^{\infty} b_j L^j , \quad (2)$$

where 'y_t' is generated from the random white noise process 'ε_t'.
'ε_t' has the conventional statistical properties:

$$E(\varepsilon_t) = 0, \forall t \tag{3}$$
$$E(\varepsilon_t^2) = \sigma_\varepsilon^2, \forall t \tag{4}$$
$$E(\varepsilon_t \varepsilon_{t-s}) = 0, \forall t \cup \forall s \neq 0 \tag{5}$$

the covariance function for 'y_t' leads to:

$$E(y_t y_{t-k}) = \sigma_\varepsilon^2 \sum_{j=-\infty}^{\infty} b_j b_{j-k} \, . \tag{6}$$

The covariance has a covariance generating function characterized by the following equation:

$$g_y(z) = \sigma_\varepsilon^2 B(z) B(z^{-1}) = \sum_{k=-\infty}^{\infty} c_y(k) z^k \, , \tag{7}$$

Further if 'z' is characterized by

$$z = e^{-i\omega}, \tag{8}$$

the covariance generating function is characterized by:

$$g_y(e^{-i\omega}) = \sum_{k=-\infty}^{\infty} c_y(k) e^{-i\omega k}, (-\pi < \omega < \pi) \, , \tag{9}$$

this is called the spectrum of the variable 'y_t' with 'w' being the frequency. The spectrum is the Fourier transform of the covariogram of the examined variable. The spectrum can be further modified to have more useful geometric properties:

$$g_y(e^{-i\omega}) = \sum_{k=-\infty}^{\infty} c_y(k) e^{-i\omega k} = c_y(0) + 2\sum_{k=1}^{\infty} c_y(k) \cos(\omega k) \, , \tag{10}$$

since $\cos(-\omega k) = \cos(\omega k)$ and $e^{-i\omega} = e^{i\omega}$. The equation in (10) represents the link between the function of the covariogram of variable 'y_t' and the cos-function of the frequency and means that the spectrum is always nonnegative. This also means that the spectrum of a white noise process is a constant number.

This univariate analysis can be extrapolated to a bivariate framework, known as co-spectral analysis and it helps to analyze the covariation between two stationary processes 'x_t' and 'y_t'. The covariance generating function is represented by the equation:

$$g_{yx}(z) = \sum_{k=-\infty}^{\infty} c_{yx}(k) z^k \, , \tag{11}$$

and again substituting in $z = e^{-i\omega}$ we get the bivariate spectrum represented by the following equation:

$$g_{yx}(e^{-i\omega}) = \sum_{k=-\infty}^{\infty} c_{yx}(k) e^{-i\omega k} \, . \tag{12}$$

(for a detailed discussion of this methodology see Sargent, 1979).

Therefore, in the analysis that follows covariance stationarity tests will be performed first, followed by univariate spectral analysis to establish "typical" spectral shape for the variables, cross spectrum calculations will be used last to establish comovement between the spot SPY volatility and the call and put options implied volatilities.

Following Sargent (1979) and Erol, and Koray (1988) kernels are used to smooth the spectral density of the variables by calculating a weighted moving average of nearby periodogram points to get rid of any noise. The theory does not specify a preference of one kernel over another therefore we use three different kernel specifications in the analysis to establish robustness of the results. Andrews (1991) discusses detailed description of the smoothed periodogram using kernels which is defined as:

$$\hat{J}_i(l(q)) = \sum_{\tau=-l(q)}^{l(q)} w(x)\tilde{J}_{i+\tau} \,. \tag{13}$$

Where w(x) is the kernel, x = $\frac{\tau}{l(q)}$, l(q) is the bandwidth parameter over which the smoothing will be performed. The parameter 'q' is the number of periodogram ordinates +1. At the endpoints of the bandwidth a cycle is used to compute averages which is represented by:

$$\tilde{J}_{i+\tau} = \begin{cases} J_{i+\tau} & 0 \le \mathrm{i}+\tau \le \mathrm{q} \\ J_{-(i+\tau)} & \mathrm{i}+\tau < 0 \\ J_{q-(i+\tau)} & \mathrm{i}+\tau > \mathrm{q} \end{cases} . \tag{14}$$

The Bartlett kernel is specified as follows:

$$Bartlett = w(x) = \begin{cases} 1-|x| & |\mathrm{x}| \le 1 \\ 0 & \text{otherwise} \end{cases} \quad \text{with bandwidth } \mathrm{l(q)}=\frac{1}{2}q^{\frac{1}{3}}, \tag{15}$$

the Parzen kernel is specified as follows:

$$Parzen = w(x) = \begin{cases} 1-6x^2+6|\mathrm{x}|^3 & 0 \le |\mathrm{x}| \le \frac{1}{2} \\ 2(1-|\mathrm{x}|)^3 & \frac{1}{2} \le |\mathrm{x}| \le 1 \\ 0 & \text{otherwise} \end{cases} \quad \text{with bandwidth } \mathrm{l(q)}=q^{\frac{1}{5}}, \tag{16}$$

and the Tukey – Hanning kernel is specified as follows:

$$Tukey-Hanning = w(x) = \begin{cases} (1+\cos(\pi x))/2 & |\mathrm{x}| \le 1 \\ 0 & \text{otherwise} \end{cases} \quad \text{with bandwidth } \mathrm{l(q)}=\frac{2}{3}q^{\frac{1}{5}}. \tag{17}$$

Next, we use two spectral analysis statistics to estimate the relationship of the options implied volatility and the spot standard deviation - the coherence statistic and the phase statistic. The coherence from spectral analysis is similar to the correlation coefficient. The coherence represents a percentage of

explanation of one of the variables variation by the second variables variation, but at different frequencies of the spectrum (the frequencies range from 0 to 3.14159(π)). The spectrum is usually used to establish the most typical frequency in the frequency domain where the coherence has most meaning. The coherence statistic is computed as follows:

$$coherence(\omega) = \frac{\left| g_{yx}(e^{-i\omega}) \right|^2}{g_x(e^{-i\omega}) g_y(e^{-i\omega})}, \tag{18}$$

and represents the product of two forward and backward looking gain statistics (Jenkins, 1965) and is in the range 0 to 1. The gain statistic is defined as:

$$g_{yx}(e^{-i\omega}) = \text{co}(\omega) + \text{i qu}(\omega) = \sqrt{\text{co}^2(\omega) + \text{qu}^2(\omega)}\, e^{\,i \tan^{-1}\left[\frac{\text{qu}(\omega)}{\text{co}(\omega)}\right]} = \text{r}(\omega) e^{i\theta(\omega)} \quad . \tag{19}$$

The different elements in the equation are as follows: co(w) is the cospectrum, qu(w) is the quadrature spectrum and 'i' is the imaginary component in the spectral analysis. The phase statistic is considered to measure the shift between the two waves and can be interpreted as a lead-lag relationship of the two series over the frequencies range and may be used to establish statistical causality. The phase statistic is computed as follows:

$$_{\theta(\omega)} = \tan^{-1}\left[\frac{\text{qu}(\omega)}{\text{co}(\omega)}\right]. \tag{20}$$

However, keep in mind that Hause (1971) and Stone (1975) suggest in the spectral analysis literature that the phase statistic cannot be used to establish lead-lag relationships.

ANALYSIS

Table 2 provides summary statistics on the five different categories of call and put options implied volatilities and the twenty day moving average rolling standard deviations. Over the examined period there are 204 observations. The twenty day mean standard deviation is 1.07. The Deep-in-the-money (DITM) call and put options mean implied volatilities are highest among the five moneyness categories.

TABLE 2
SUMMARY STATISTICS, IMPLIED VOLATILITY OF SPY CALL AND PUT OPTIONS FOR THE PERIOD JANUARY 10, 2005 TO DECEMBER 30, 2005

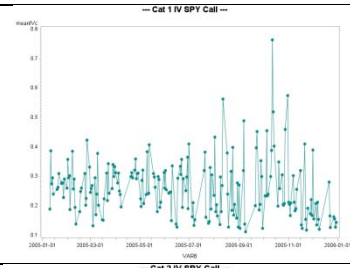
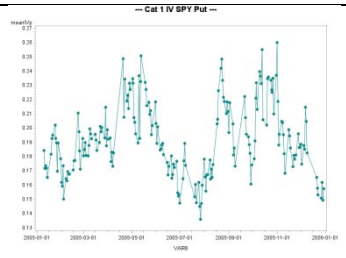
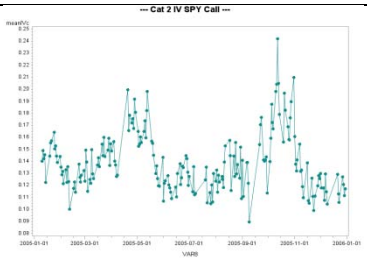
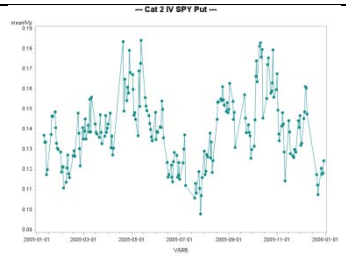
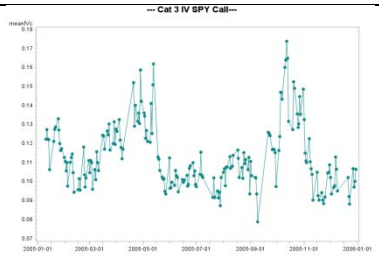
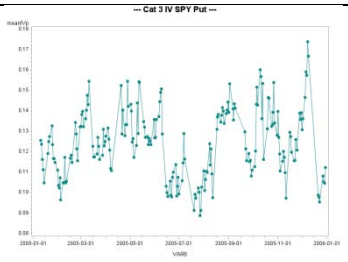
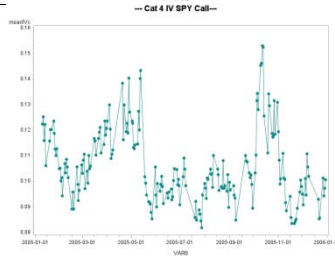
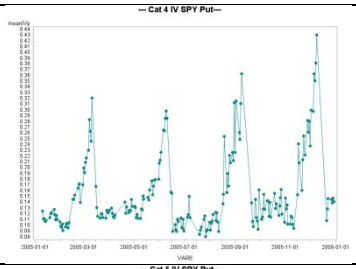
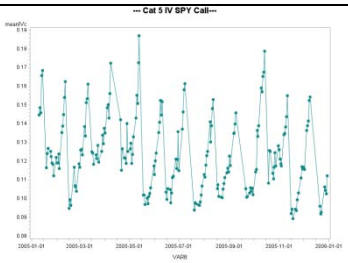
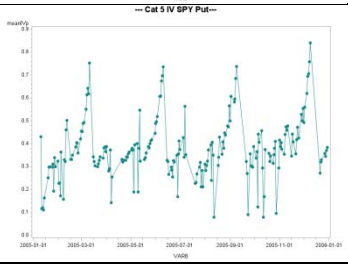
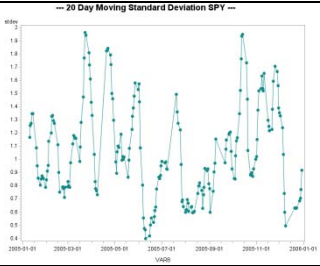
	Category 1		Category 2		Category 3		Category 4		Category 5		20 day
	Mean IVc	Mean IVp	Mean IVc	Mean IVp	Mean IVc	Mean IVp	Mean IVc	Mean IVp	Mean IVc	Mean IVp	stdev
Mean	0.26	0.19	0.14	0.14	0.11	0.12	0.11	0.16	0.12	0.38	1.07
Median	0.25	0.19	0.14	0.14	0.11	0.12	0.10	0.13	0.12	0.36	1.00
Std Dev	0.10	0.03	0.02	0.02	0.02	0.02	0.01	0.07	0.02	0.14	0.36
Minimum	0.11	0.14	0.09	0.10	0.08	0.09	0.08	0.08	0.09	0.08	0.40
Maximum	0.76	0.26	0.24	0.18	0.17	0.17	0.15	0.43	0.19	0.84	1.96
Skewness	1.23	0.39	1.02	0.34	1.00	0.19	0.86	1.63	0.58	0.66	0.52
Kurtosis	3.46	-0.38	1.39	-0.18	0.94	-0.44	0.58	2.29	-0.23	1.13	-0.43
20 day stdev Correlation	0.17	0.27	0.31	0.23	0.31	0.12	0.29	-0.10	0.14	-0.08	1

The mean DITM call option implied volatility is 0.26, whereas the DITM put option mean implied volatility is 0.38. All of the rest of the mean implied volatilities are less than 0.19 and much less than the mean twenty day standard deviations. This suggests that the factors forming option implied volatilities might be different than the spot volatility, motivating and providing evidence that this study is needed, and evidence against the null hypothesis of the study of spot volatility influencing option implied volatility.

In the table correlation coefficients are also provided with the twenty day standard deviations. All of the correlation coefficients are equal or less than 0.31, which also provides evidence against the null hypothesis of the study of spot volatility influencing option implied volatility. . However, keep in mind that correlation coefficients might lead to erroneous conclusions because the data are non-normally distributed.

Spectral analysis requires stationarity in the time series, without stationarity in the time series spectral analysis the results of the analysis are meaningless. To examine in more detail the implied volatility and standard deviation distributions, we also compute the third and fourth moments for the variables. These variables are also reported in the table. The results for the skewness indicate that the distributions of both implied volatility and spot standard deviation are positively skewed, which suggests difference from normal distribution. The results for kurtosis, similar to the skewness results, suggest non-normal distribution. The non-normality indicates that parametric tests results would be meaningless. However, normality is not essential for conducting spectral analysis, stationarity is, considering that spectral analysis is a non-parametric methodology. Therefore, stationarity of the call and put options implied volatilities needs to be established first.

FIGURE 1
SPY SPOT AND OPTION IMPLIED VOLATILITY

Labels	Calls	Puts
Cat 1 DITM call DOTM put		
Cat 2 ITM call OTM put		
Cat 3 ATM call ATM put		
Cat 4 OTM call ITM put		
Cat 5 DOTM call DITM put		
SPY Spot Volatility		

Visually all option implied volatility series and twenty day moving standard deviation series are stationary as shown visually in Figure 1. However, stationarity needs to be tested formally. The tests for stationarity that we use in the analysis are the Augmented Dickey Fuller (ADF) test for unit roots and White Noise Tests - Fisher's Kappa and Bartlett's Kolmogorov-Smirnov. Fisher's Kappa tests if the largest value of the periodogram J_k is statistically different from the mean value of the periodogram. The basic idea is that if J_k is a white noise process it would have a constant mean and constant variance at any period of the periodogram. The Kolmogorov-Smirnov test examines if the normalized cumulative periodogram of J_k represented by:

$$F_j = \frac{\sum_{k=1}^{j} J_k}{\sum_{k=1}^{m} J_k}; j = 1, 2, 3, ..., m-1; \begin{cases} \text{m}=\frac{\text{n}}{2}, \text{ if n is even} \\ \text{m}=\frac{\text{n-1}}{2}, \text{ if n is odd} \end{cases}$$

is statistically different from the cumulative distribution function of a uniform (0,1) random variable. The null hypothesis of the Kolmogorov-Smirnov test is: the periodogram is a white noise process.

The stationarity test results are presented in Table 3. Based on the stationarity tests results that the call and put options implied volatilities and standard deviations are stationary we can proceed with the spectral analysis.

TABLE 3
WHITE NOISE TEST RESULTS USING AUGMENTED DICKEY FULLER (ADF) TEST FOR UNIT ROOTS (P-VALUES REPORTED), FISHER'S KAPPA (WITH AN APPROXIMATE CRITICAL VALUE OF AROUND 9.707) AND BARTLETT'S KOLMOGOROV-SMIRNOV (BKS) STATISTIC (P-VALUES REPORTED) ON IMPLIED VOLATILITIES AND 20 DAY SPOT STANDARD DEVIATION

	Cat 1		Cat 2		Cat 3		CaT 4		Cat 5		Stdev
	call	put	call	put	call	put	call	put	call	put	
ADF Zero Mean	0.0291	0.5751	0.4703	0.5739	0.5267	0.5197	0.5380	0.1794	0.3822	0.1564	0.1722
ADF Single Mean	0.0001	0.0020	0.0014	0.0014	0.0015	0.0014	0.0017	0.0014	0.0014	0.0014	0.0014
ADF Trend	0.0001	0.0155	0.0029	0.0048	0.0106	0.0006	0.0102	0.0041	0.0006	0.0006	0.0006
Kappa	5.056	44.534	32.169	44.292	32.432	22.919	25.262	45.195	41.003	33.966	23.980
BKS	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001

Next we determine the SPY call and put option implied volatility spectral density. For the different moneyness categories the periodicity cycles are with different lengths. The periodicities range between 17 to 100 days. The periodicity ranges are presented in Table 4. The table shows that the periodicity is different for the different types of options and moneyness categories of these options. The periodicity is lowest for DOTM call options, 17 days, and highest for the DOTM puts, OTM and ATM puts, and ITM and ATM calls, 102 days.

TABLE 4
SPECTRAL DENSITY PERIODICITY OF SPY CALL AND PUT OPTIONS IMPLIED VOLATILITY FOR THE PERIOD JANUARY 10, 2005 TO DECEMBER 30, 2005

	Category 1	Category 2	Category 3	Category 4	Category 5
call	68	102	102	51	17
put	102	102	102	51	51

After establishing the periodicity of the SPY option implied volatility wave we can examine the relation between SPY option call and put option implied volatility and the SPY spot volatility. Table 5 presents results for coherence and phase statistics for this relation. The table also reports different kernel specifications for robustness. The coherence statistic, across kernel specifications, is highest and thus rejecting the null hypothesis for the ATM (Category 3) call and put options, coherence in the range – 0.64 to 0.85, which are double than the simple correlation coefficients reported earlier in the paper. The next highest coherences are for the call ITM and put OTM categories - ITM call and OTM put (Category 2), and DITM call and DOTM put (Category 1) options. The coherence ranges are - 0.30 to 0.78, which are again almost double than the simple correlation coefficients reported earlier in the paper. However, keep in mind that correlation coefficients might be wrong because the data are non-normally distributed.

TABLE 5
COHERENCE AND PHASE OF SPY CALL AND PUT OPTIONS IMPLIED VOLATILITY RELATIVE TO THE SPY SPOT STANDARD DEVIATION FOR THE PERIOD JANUARY 10, 2005 TO DECEMBER 30, 2005 AT THE SPECTRAL DENSITY PERIODICITY

	Category 1	Category 2	Category 3	Category 4	Category 5
Bartlett					
coherence					
call	0.30	0.65	0.72	0.17	0.01
put	0.60	0.64	0.64	0.16	0.11
phase					
call	0.94	0.39	0.39	0.38	0.70
put	0.23	0.29	0.26	-3.05	-3.14
Parzen					
coherence					
call	0.32	0.75	0.81	0.24	0.02
put	0.71	0.74	0.75	0.40	0.33
phase					
call	1.03	0.39	0.40	0.22	1.04
put	0.23	0.28	0.26	3.09	3.04
Tukey-Hanning					
coherence					
call	0.32	0.79	0.85	0.33	0.03
put	0.76	0.78	0.80	0.55	0.48
phase					
call	1.12	0.38	0.40	0.18	1.14
put	0.23	0.28	0.26	3.04	3.02

The coherences for the Category 4 and Category 5 options are low, which suggests acceptance of the null hypothesis. These are the OTM and DOTM call options and the ITM and DITM put options. The phase statistics are all positive with the exception of the phase statistics produced by the Bartlett kernel for Category 4 and 5 put options. This suggests that the option implied volatility leads the spot volatility of SPY. Hause (1971) and Stone (1975) suggest that the phase statistic cannot be used to establish lead-lag relations. Nevertheless, one thing is clear the SPY option implied volatility and spot volatility have a lead-lag relation. This also is evidence rejecting the null hypothesis of the study, which suggests the existence of a relation between the ETF spot and ETF option implied volatility.

CONCLUSION

In this study we use spectral analysis on SPY options to examine the relation between spot and implied option volatility for these exchange traded funds (ETF). We attempt to address the question is there a relation between spot and implied volatility or option implied volatility has no relation with the spot ETF volatility. The null hypothesis of the study is spot volatility influencing option implied volatility. To the best of our knowledge this is the first study to address this question. This helps extend our understanding of ETF option behavior. We find that this relation does exist; however, consistently this is true only for the at-the-money call and put options and the in-the-money call and out-of-the-money put categories. Only for these categories of options the coherence statistic is consistently in the range – 0.64 to 0.85.

Using another spectral statistic, the phase statistic, we also find that the SPY option implied volatility and spot volatility have a lead-lag relation - the SPY option implied volatility leads the SPY spot volatility. This is also evidence suggesting that a relation between the ETF spot and ETF option implied volatility exists.

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Considering a Student Managed Venture Capital Fund? Approaches, Benefits, and Performance

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This paper explores the rationale for and performance of student-managed venture capital funds. In particular, it seeks to identify whether the performance of student-managed funds is inferior to professionally-managed funds. The results suggest that professionally-managed funds may perform better than student managed funds, but this difference disappears when comparing investments made 7 or more years ago – a typical holding period for a VC firm. Pedagogical benefits of having a student-managed fund are discussed, and guidelines of implementing a student-managed VC fund are derived.

INTRODUCTION

According to Dayton University's Redefining Investment Strategy Education (RISE) conference, more than 200 universities have programs that teach portfolio and investment management through student-managed funds using real money. Fund assets consist of publically traded securities where company information is readily available and where a market price exists for each issue. By contrast, very few universities sponsor student-managed venture funds where students invest in privately held companies at the start-up, early or growth stages. The purpose of this paper is to describe the benefits, approaches and challenges to launching a student-managed venture fund, and to make some preliminary analysis of the performance of such funds relative to their professionally-managed counterparts. We explore the experience and subsequent economic performance of portfolio companies in student-oriented venture funds and compare their performance with that of professionally-managed venture capital (VC) investments. In addition, we describe factors that relate to the feasibility of a university initiating a student managed fund. Finally, we discuss the unique pedagogical benefits of a student managed VC fund.

DEFINITIONS

Identifying student-managed funds proved to be more difficult than anticipated because there were a number of fund-types that were university-oriented but not technically student-managed. University-oriented funds can be divided into three subcategories:

- Student-managed funds (SMFs) where students make investments by themselves or in collaboration with faculty, program staff or unpaid advisors. These are the funds of particular

interest in this research. Michigan's Wolverine Fund, North Dakota's Dakota Vantures and Utah's University Venture Fund follow this design and 4oothers follow this model.

- Funds that allow students to "eavesdrop" on the venture-investment process, but the final decision is made by investment professionals. Here, students may participate in sourcing and structuring deals, business planning, due diligence, and portfolio monitoring, but the actual investment decision is left to professional investors – typically a venture fund. These were called "Intern-type Associations" (ITAs). StartX at Stanford and University of Maryland's association with New Market Venture Partners illustrate this approach.
- A "fund" that functions more as an angel network for university inventions than a true fund. Often born of an alumni network, this type of program may actively invest in university-generated technology, but decisions are made by individual investors as to their participation in a particular deal. The university typically out-licenses the technology to the company seeking funding, and the angel network invests in the company; students tend to be only incidentally involved in the investment process. These were termed Angel-Alumni Networks (AANs). Columbia University's Columbia Technology Ventures exemplifies this approach.

While all three types of university associations are of interest in the descriptive part of this research, the analytical section of this manuscript focused only on SMF performance relative to professionally managed venture funds. All three offer pedagogical advantages over a strictly class-based pedagogy.

LITERATURE OVERVIEW AND RESEARCH PROPOSITIONS

In a study of 64 German companies that were venture-backed, Streletzki and Schulte (2013) found that one of the correlates of a highly-successful exit (>5x return) was professional VC guidance at a very early stage (pre proof-of-concept). In a study covering 25 years of performance data, Puri and Zarutskie (2012) found no difference between the performance of VC-backed versus non-VC- backed firms (survivors), especially in the early years of a company's life, though they noted that failure rates were lower in VC-backed firms than in non-VC backed firms, suggesting again that professional VCs add value, especially in the early stages. Hsu (2004) shed light on the extent to which this value was derived simply from the money or from the expertise. He found that entrepreneurs were willing to pay a 10-14 percent premium for funding coming from top-tier VCs compared to funding coming from lesser-known VCs. Moreover, Park and Steensma (2012) corroborated Hsu conclusion that the entrepreneurs were willing to "pay" for the extra value-added associated with VC expertise, while providing context for when strategic VC partners (contrasted with financial/institutional partners) may create conflicts of interest that might dissipate founders' returns.

These studies provide empirical support for the industry axiom that "if all you get from your VC is money, you did not get enough." Rather, complementary assets, industry operating experience, and an extensive professional network allow the VC firm to add significant value to the portfolio company (Streletski and Reinhardt 2013). The assumption is that VC participation is related to highly successful exits and fewer early-stage failures – i.e., entrepreneurs are willing to pay a premium for the experience and connections that marquee VCs can bring to the firm. Student-oriented VC firms are presumed to lack the depth of these resources that would be found in professional VC firms, thereby suggesting that performance of university venture investments do not perform as well. Therefore, we address the following three research propositions.

- Proposition 1: Student-managed funds will underperform conventional funds as they will, in general, be managed by those lacking industry operating experience, business connections, and the financial reputation of professionally-managed funds.
- Proposition 2: Student-managed funds will underperform Angel-Alumni networks, as the latter will tend to have broader industry operating experience, industry connections and financial reputation than SMFs (Shane 2008).

- Proposition 3: Investments made prior to 2006 will outperform investments made in 2006 or later due to the "maturation effect" (3-7 years) cited previously.

SAMPLE SELECTION, RESEARCH DESIGN, AND STATISTICAL METHODS

Sample Frame

The sample frame was determined to be US funds, as no international student-managed funds were identified. Nine universities in the US have funds for investing in start-ups. Of these, only 7 were student managed (see appendix 1 of university-oriented funds). One was an Angel-Alumni network, and three were managed professionally by either VC funds or university administrators. The Student-managed funds have owned 74 portfolio companies in total including exits, failures, and active investments. Data was collected through fund websites and through telephone interviews. Industry-wide data showing results of professionally managed firms was extracted from the National Venture Capital Association (NCVA 2011).

Measuring Performance

Measuring performance was more difficult than anticipated. Funds were unanimously unwilling to share deal-level internal rate of returns (IRR) - the standard industry performance benchmark when attempting to raise capital. Moreover, the oldest SMF was about 15 years old, and holding periods were typically anticipated at 3-7 years. As a result, some of the newer funds had no exists, so gauging performance became all the more difficult. Finally, VC returns are cyclical with the IPO market, general economic conditions and cost of capital (all influence exit valuations). The sample size did not allow us to control for "vintage" (year of investment). However, we did perform an analysis of pre-2006, allowing for adequate time for a portfolio company to mature and be sold. As a result of the foregoing challenges, overall group performance of SMFs was designated by the number of exits through IPO or sale. Tracking failures directly was difficult for two reasons: (1) Companies die quietly; dead and dying companies were not normally reported in the news, so they were difficult to identify; (2) contrary to an exit by sale or IPO, no one rings a bell when a company fails. It tends to be a long slow process making the line between the dead and the dying somewhat arbitrary. To wit, over

Thirty percent of VC investments made prior to 2001 (giving them ample time to mature, were identified as neither dead nor sold. Hence, we did not use failure rates as an indication of relative success. We compared exits from student-managed funds to the historical performance of the group of 11,686 companies funded by VC from 1991 through 2000 (NVCA 2012). Because most firms designate holding periods of three to seven years, we subdivided the SMF portfolio companies into those investments made prior to 2006 and those made in 2006 or later. It should be noted that prior to 2006, only three student-managed VCs were operating. So on one hand, we did not want to discard the investment performance of the other 4 SMFs with exits, yet we recognized that investments take time to mature. For this reason, we compared performance of student-managed investments made prior to 2006 separately from the comparison involving all student-managed portfolio companies.

Statistical Method

Sample sizes were small, and thus required the use of non-parametric statistics to gauge statistically significant differences. The Fisher's Exact Test, a non-parametric statistic, was used to test the null hypothesis that the SMF performance was no different than the industry-wide performance. Fisher's Test is appropriate for very small sample sizes when using categorical variables in a contingency table (2x2) format (Fisher, 1922). The test was also used to assess whether a difference could be determined between SMFs and ITAs.

Results

Research Proposition 1: Student-managed funds will underperform conventional funds as they will, in general, be managed by those lacking industry operating experience, business connections, and the financial reputation of professionally-managed funds.

TABLE 1
STUDENT MANAGED VERSUS PROFESSIONALLY MANAGED BY SALE OF FIRM

	Was Firm in Student Managed VC Fund?		
Was Firm Sold?	No	Yes	Total
No	7,830 (67.0%)	77 (83.7%)	7,907 (67.1%)
Yes	3,856 (33.0%)	15 (16.3%)	3,871 (32.9%)
Total	11,686 (100.0%)	92 (100.0%)	11,778 (100.0%)
Fisher's Exact Test Significance (1-sided) = .001			

When judged by the performance metric of whether the portfolio company was sold, professionally managed funds had almost double the rate of "exit-by-sale" as did the student managed funds. Moreover, this difference was significant at the .001 level. When evaluated on the basis of "IPO-as-exit", the results were similarly significant at the .046 level.

TABLE 2
STUDENT MANAGED VERSUS PROFESSIONALLY MANAGED BY IPO OF FIRM

	Was Firm in Student Managed VC Fund?		
Did Firm Have IPO?	No	Yes	Total
No	10,050 (86.0%)	85 (92.4%)	10,135 (86.1%)
Yes	1,636 (14.0%)	7 (7.6%)	1,643 (13.9%)
Total	11,686 (100.0%)	92 (100.0%)	11,778 (100.0%)
Fisher's Exact Test Significance (1-sided) = .046			

However, since the entire database of non-university oriented, professionally managed VC investments included only investments made prior to 2001, it is safe to assume that all would have had time to fully mature (2011 data). However, because most of the student- managed investments were made after 2006, it is possible that this difference in performance is an artifact of not having held the investment to maturity. A 3 to 7-year holding period is common in venture capital. Surprisingly, when testing the professionally managed funds against only those student-managed investments made prior to 2006 (a 7 year holding period), the difference between the professionally managed and student-managed funds disappears for both the IPO measure and the Sale measure:

TABLE 3
PRE-2006 STUDENT MANAGED VERSUS PROFESSIONALLY MANAGED BY SALE OF FIRM

	Was Firm in Student Managed VC Fund?		
Was Firm Sold?	No	Yes	Total
No	7,830 (67.0%)	9 (56.3%)	7,839 (67.0%)
Yes	3,856 (33.0%)	7 (43.8%)	3,863 (33.0%)
Total	11,686 (100.0%)	16 (100.0%)	11,702 (100.0%)
Fisher's Exact Test Significance (1-sided) = .253			

TABLE 4
PRE-2006 STUDENT MANAGED VERSUS PROFESSIONALLY MANAGED BY IPO OF FIRM

	Was Firm in Student Managed VC Fund?		
Was Firm Sold?	No	Yes	Total
No	10,050 (86.0%)	12 (75.0%)	10,062 (86.0%)
Yes	1,636 (14.0%)	4 (25.0%)	1,640 (14.0%)
Total	11,686 (100.0%)	16 (100.0%)	11,702 (100.0%)
Fisher's Exact Test Significance (1-sided) = .177			

Research Proposition 2: Student-managed funds will underperform Angel-Alumni networks, as the latter will tend to have broader industry operating experience, industry connections and financial reputation than SMFs.

Since Columbia Technology Ventures, our only representative in this category, did not distinguish between IPOs and Sales, we collapsed IPOs and Sales into "successful exits" in order to test this proposition. Surprisingly, no significant difference was found between the performance of this angel network and the student-managed VC investments.

TABLE 5
STUDENT MANAGED VERSUS ANGEL/ALUMNI NETWORK BY "SUCCESSFUL EXIT"

	Was Firm in Student Managed VC Fund?		
Successful Exit?	Student Fund	Angel Fund	Total
No	70 (76.1%)	120 (81.6.0%)	190 (79.5%)
Yes	22 (23.9%)	27 (18.4%)	49 (20.5%)
Total	92 (100.0%)	147 (100.0%)	239 (100.0%)
Fisher's Exact Test Significance (1-sided) = .192			

These results would suggest that the active guiding, mentoring and advising of portfolio firms typical of VC investors does not occur to the same extent in angel networks. The implications of this for entrepreneurs could be significant: angels provide money and little else.

Research Proposition 3: Investments made prior to 2006 will outperform investments made in 2006 or later due to the "maturation effect" (3-7 years) cited previously. To test this proposition, we compared the results of portfolio investments made by student managed funds prior to 2006 with those made by student-managed funds in 2006 or later.

TABLE 6
STUDENT MANAGED FUNDS PRE-2006 VS. LATER BY SALE OF FIRM

	Timeframe		
Was Firm Sold?	Pre-2006	2006 or later	Total
No	9 (56.3%)	62 (88.6%)	71 (82.6%)
Yes	7 (43.8%)	8 (11.4%)	15 (17.4%)
Total	16 (100.0%)	70 (100.0%)	86 (100.0%)
Fisher's Exact Test Significance (1-sided) = .006			

TABLE 7
STUDENT MANAGED FUNDS PRE-2006 VS. LATER BY IPO OF FIRM

	Timeframe		
Was Firm Sold?	Pre-2006	2006 or later	Total
No	12 (75.0%)	67 (95.7%)	79 (91.9%)
Yes	4 (25.0%)	3 (4.3%)	15 (17.4%)
Total	16 (100.0%)	70 (100.0%)	86 (100.0%)
Fisher's Exact Test Significance (1-sided) = .021			

The results indicated that investments made prior to 2006 were more likely to have been exited successfully, whether by Sale or IPO, than those made in 2006 or later. The implications of this are intriguing for schools contemplating starting a venture fund, as they corroborate the finding of "no difference" between student-managed and professionally-managed funds when adjusted for a longer student holding period (see results under P1 above).

Research Conclusions

While more research needs to be done, our finding suggest that any claim that professionally-managed funds perform better than student-managed funds is largely attributable to the fact that student-managed funds are in general a relatively new phenomenon and their portfolios have not had time to mature. When controlled for a reasonable period for maturing, no difference in performance was observed between student-managed and professionally-managed funds.

FACTORS INFLUENCING FUND DESIGN

In evaluating the feasibility of initiating a fund, six observations from our sample seem noteworthy. The following items can help one assess whether a fund would be a good fit for a particular university, how large it should be, and what challenges should be anticipated. It should be further noted that internal resistance to operating a fund is common, typically from the risk management or investment sides of the administration.

1) Fund size is critically important. Huntsman and Homan (1972) analyzed performance of private investments tracked for 15 years and found that of 110 investments, the average fund's ROI was an 18.9% p.a. However, these returns were highly conditioned on having a very small number of very highly successful investments. A "significant number" of randomly selected portfolios of 10 companies from the sample of 110 actually had negative returns. This suggests that venture funds will want to be large enough to allow for adequate diversification, targeting more than 10 portfolio companies. In our survey, reported fund sizes range from $18.6 million to $100,000.

2) Stage matters (Cumming 2006). The majority of university-oriented funds focus on pre-seed, seed and early stage investments. While this allows meaningful investments to be smaller, which in turn allows for greater diversification, it also implies that holding periods may be longer and risk of failure is higher. Complicating this early-stage bias is that fact that early investors should be prepared to invest in follow-on rounds when a company has been successful and requires more capital. Doing so may burden a small fund's diversification plan, but not doing so sends a bad signal to potential next-round investors.

3) University research is important. Strong engineering, computer science, and bioscience research programs often provide the fund with preferential and early access to technology. Moreover, the fund can provide assistance to the university's licensing office as to which technologies may have the most commercial potential, thereby helping determine which inventions should be patented. In the absence of strong science research at the university, the fund needs to define a clear strategy for assuring deal-flow.

4) University geography matters. Porter's (1986) volume on global competitive advantage has application to starting a student-managed VC business. According to Porter, skills and resources cluster

geographically and interact with demanding consumers to continually refine products. Universities situated in communities with thriving commercial/industrial cultures will be better situated to identify and develop potential start-ups than universities located in less progressive business environments. While portfolio companies are typically highly scalable and may reach customers across the globe, venture capital is local or regional, since the process of funding, developing, and monitoring these companies is contact-intensive. If a university is not part of a vibrant business community, it may have to lean more heavily on its AAN.

5) Angel-Alumni development is important. Regardless of whether a university operates an SMF or an AAN, developing the alumni/angel network should be a high priority. Even among the student managed funds, angels and alumni often served as speakers, advisors or consultants in the funds we examined. Considerable expertise, contacts and even future funding can come for an AAN. If the university's VC initiative is through an ITA, developing an AAN is less important since the sponsoring VC firm is likely to have a well-developed network itself.

6) Who are the LPs? In all of the cases of student-managed funds that we examined, the limited partner was the school itself (the school owned the fund). However, by allowing investors the option of investing directly into the fund as a limited partner, the investor /donor could more closely tailor his personal financial planning objectives by deciding whether to donate and take a tax write-off or invest now and perhaps donate later. This could be especially attractive to donors who still want to help the school, but have "donor fatigue" from previous "asks".

IMPLICATIONS: WHY REAL MONEY IS IMPORTANT WHEN TEACHING ENTREPRENEURSHIP

The failure rates of start-up businesses are frightening. Depending on which sources one cites and what criteria are used, ½ to 2/3^{rds} of businesses fail in the first 5 years. Recent research suggests that up to 75% of venture-backed businesses fail (Blank 2013) .Given those odds, it stands to reason that only four types of individuals would take the entrepreneurial plunge: (1) the ignorant, (2) the arrogant, (3) the desperate, or (4) the confident. However, the difference between the confident and the arrogant (or presumptuous) can be a very fine line. A careful entrepreneurial education should be designed to give students the confidence to take well-calculated risks about which they are well-informed. Having real money available as a pedagogical tool initiates three critical processes that build real-world confidence in entrepreneurs.

First, if an academic program has real money to invest, it can attract real deal flow. Real deal flow allows the student-entrepreneur the opportunity to examine perhaps 10 or 20 business plans in a semester in the context of peer and professional scrutiny. Students receive fast feedback from their peers and from professionals associated with the fund on their own assessments of the possibility of a plan's success. In effect, the student learns what constitutes a successful plan from having critiqued many and observed what was funded. The validation of a student's own ability to assess the likelihood of a plan's success provides a basis for a student to place confidence in his or hers own ability to successfully formulate and craft a plan. By contrast, entrepreneurship pedagogy built around student business planning in effect asks the student to learn from his sample size of 1 (his or her own project).

Secondly, real money invites adequate disclosure that supports careful due diligence. Too often, students are asked to write business plans without having much experience in the industry or without having formed a real founding team. Companies pursuing funding will likely have both. The level of disclosure that is expected from companies seeking real funding ensures that students can learn what data should be presented, how it should be analyzed and where to access it. Thorough analysis of a business model can increase confidence in its success, or identify areas where change would be required.

Finally, once a student-managed fund invests, it adds a portfolio company. The fund typically receives regular operating reports. This level of visibility into the struggles of a privately held early-stage company is difficult - if not impossible - without being invested. As operational challenges arise, the students can gain insights into the reasons for the problems, whether they were successfully resolved, and

how they were resolved. In effect, they receive operating experience – though of an indirect kind. Operating experience is very difficult to teach in a classroom, but critical to developing confidence in business.

It has been said that one is not an entrepreneur until one "pays his money and takes his chances". Prior to that, one is merely a student. Yet it is precisely the lack of confidence that keeps many from initiating good ideas. However, a program that funds and operates real businesses gives entrepreneurship students the opportunity to develop the confidence gained from overcoming obstacles and achieving milestones. Moreover, real profits and losses force entrepreneurs to live within their true risk threshold. If there is nothing to lose, economic theory suggests one will game the system by taking inordinate risks in hopes of extraordinary returns. Much entrepreneurship education seems to discount this reality by asking students for go/no-go decisions on case-based presentations.

To summarize, real money generates deal flow. Without real money to invest, few start-ups will be interested in presenting their story to a class for analysis. Secondly, real deal flow allows entrepreneurs to assess real management teams, real opportunities, and real capabilities, thereby learning the discipline of due diligence. Thirdly, overseeing portfolio companies gives students insights into operational challenges and solutions in start-ups. Finally, by examining many deals over the course of the semester, students get a feel for the profiles of promising companies versus less promising ones – a substantial improvement over the "sample size = 1" of business plan development. When coupled with the prospects that student-managed funds perform equally as well as professionally managed firms, universities considering launching such a program should take heart.

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APPENDIX 1

UNIVERSITY-ORIENTED FUNDS

Name	University	Portfolio companies (total since inception) / successful exits	Managed by /begun in
Wolverine Fund	U. Michigan	18/3	Students/1998
Laurie Commercialization	U. Michigan	7/1	Students/2006
Big Red Ventures	Cornell	10/2	Students/1999
University Venture Fund	U. of Utah	23/7	Students/2004
Dakota Venture Fund	U. of N. Dakota	13/2	Students/2006
Garber VC Fund	Penn State	8/3	Students/2002
NYU Innovation Venture Fund	NYU	6/1	Students/2011
Hop-On Venture Fund	U. of Akron	0/0	Students/2011 (fund-raising)
Uncertain	Miami University (Ohio)	2/0	Students/ 2007 (restart)
TOTALS		74/17	
Columbia Tech Ventures	Columbia Univ.	147/	Angel/tech. network
New Markets Venture Fund	Univ. of Maryland	----	Professional VC Firm/
StartX	Stanford	---	Univ. admin/2013
-------	Creighton Univ.	---	Produces business plans for biotechs in incubator

Socially Responsive Investments: A Case For Islamic Finance

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This paper explores the possible use of the time State Preference Model from the modern portfolio theory as well as an index bond whose performance is based on the growth in an industry or the national income for possible applications in Islamic financial transactions. This appears to be in line with the provisions of Islamic economic thought as it prohibits receiving a fixed rate of interest on the use of money as well as calling for the need for enhancement of economic and social welfare of all members of the society. Islamic laws, in principle, aim for productive use of capital and earning a reasonable return on investment in the context of risk sharing rules. This is for the purpose of an equitable distribution of profit among the individual investors and banks with the suppliers of human capital and business enterprises.

INTRODUCTION

The idea that individuals pursue their self interest for achieving maximum utility with its resulting increase in wealth has been dominant in the economics literature. However in the past several decades numerous investor groups have stressed the need for social and ethical consideration in economic and financial transactions. Herbert Simon, the Nobel Prize winner in economics in 1978, showed that rather than maximizing the utility of final wealth for the stockholders corporate agents tend to pursue a satisfying goal given the constrained environment. That is, corporate managers may pursue an optimization process aiming for an acceptable outcome for all stakeholders. In this context one can hypothesize that the firm's objective could be to earn a reasonably good return on invested capital while meeting socially desired goals. Robert Shiller, the 2013 Nobel Laureate, has further been developing economic thought for enhancing social welfare of the society.

In addition, the world Commission on Environment and Sustainable Development aims for policies meeting the needs of the present without comprising the welfare of the future generations as shown in Scholtens (2009). In line with this, companies with a record of charitable character appear to have a better long term performance as shown by Brammer and Millington (2008) and have a lower cost of capital as noted by Haigh and Hazelton (2004), with a more stable cash flow reflected in Bollen, (2007).

Religions of the world which evolved during various centuries have further been striving at instilling ethical, spiritual and humane behavior towards the world and nature. As noted in Korn (2013) such faith based actions are purported to show "how business might serve others–from satisfying customers to providing employment and creating wealth." Social and ethical consideration dates back to the 19th century to Quaker and Methodist religious movements and the later establishment of the Pioneer Investment Fund in 1928 as shown in Gold and Ali (2002).

During the past two decades global investors have embraced Islamic investments which advocate socially responsive behavior in its provisions of permissible activities and for enhancing the welfare of the society at large. For example, as earning interest is prohibited, Islamic banks make a joint partnership with depositors and entrepreneurs sharing both the risk and the resulting profit. In this manner, the interests of the owners of the capital, financial intermediaries and the economic firms are well integrated and aligned with the society at large, removing any conflicts of interest among the various stakeholders. In addition, business transactions that can harm the society are prohibited. Instead, business activities should be socially beneficial to the society. Principles of corporate governance in Islam are centered on accountability, transparency, and trustworthiness which are among the recent regulations of the 2000s in the U.S. capital markets.

In reviewing the vast literature in the area of socially responsive investments, the case for Islamic finance has received special attention during the past two decades in the western capital markets especially in North America and Western Europe. Islamic finance, while socially and ethically responsive, has at the minimum an added provision against the use of the term *riba* or the excessive fixed rate of interest for compounding the value of money in that money is not viewed as a commodity but simply a medium of exchange and store of value. Since all financial instruments in the western capital markets are interest-based and the varying rates of interest affect the prices of bonds, common stocks and their derivative products in the market, they may not be easily applicable to Islamic transactions. Various financial institutions around the world however have designed and established rules and provisions which have received general agreement by Moslem scholars in facilitating financial transactions.

This paper brings attention to the possible applications of the Time State Preference Model in the context of the modern portfolio theory and an index bond whose total return would depend on the growth in profit in an industry or the rate of growth in the national income for their use in Islamic financial transactions. The return or the payoff function in the context of the Time State Preference Model does not depend on the rate of interest as it depends on, for example, the degree of completion of a project. Similarly, the return on a bond whose performance is based on the rate of growth in the economy known as a GDP bond depends on the real growth in national income and not the rate of interest. As all individuals are expected to benefit from the growth in the economy a GDP bond appears to be in line with the provisions of Islamic economic thought as it calls for the need for enhancement of economic and social welfare of all members of the society.

Islamic laws, in principle, aim for productive use of capital and earning a reasonable return on investment in the context of risk sharing rules. This is for the purpose of an equitable distribution of profit among the individual investors and banks with the suppliers of human capital and business enterprises. The theory and empirical evidence in financial economics has shown the need for such a consideration as for example one can infer from Statman (2010) that investors are interested in not just increasing the utility of financial wealth but also attaining an emotional benefit in line with reaching a socially directed goal. As such a socially responsive investment criterion is not a constraint, but a factor in investment management. Earning a satisfying return instead of a maximizing one is explored by Simon (1978).

Socially responsive investments are a must as noted for example in Shanmugam and Zahari (2009) "a company's managers and staff, by virtue of their individual responsibility to religious principles, are accountable to the shareholders, customers, regulatory bodies, and society at large … acting responsibly toward others and being responsible toward others and being responsible for oneself is … act of the free will given by God. Neglecting personal and social responsibilities is a form of betrayal in the eyes of God." In the context of the Islamic trades and transactions this is made possible by various provisions of partnerships, cooperatives and funding provided to individuals and small businesses.

The rationale for the provision of risk sharing rules is that profits and losses are known only after the results of an action are observed and a reasonable, pre-agreed sharing of the profits and losses need to be arranged in advance among all factors of production. In particular, placing a fixed rate of interest on the use of money is prohibited as it is perceived to be unfair to place solely human capital and labor at risk for the use of money. In effect there should be no increase for the use of money over time. That is, money cannot earn interest over time. As noted by Shanmugam and Zahari (2009) Islamic banking system is

based on providing depositors with a rate of return commensurate with a fair and agreeable proportional ex-post profit as compared to a fixed rate of interest. That is, the bank as supplier of capital is viewed as partner with entrepreneurs and they both should help in enhancing the welfare of the society while earning a risk adjusted return on investment.

Compliance with the Islamic financial rules is enforced by the members of the Sharia board who oversee the activities in the financial markets and the executive board of the firms. The profit sharing agreements, referred to as *mudharabah*, joint venture and partnership known as *musharakah* help in economic growth and distribution of wealth among productive forces in the economy. These arrangements are purported for attaining economic justice and fair distribution of resources. The Islamic law, Sharia, does not allow passive earning of interest on money (prohibition against *riba*), directs attention to clarity in terms of trade (prohibition against *gharar*), prohibits consumption of products and services that are viewed hazardous and known as sin such as alcoholic products and gambling, and promotes philanthropy and charity to the community and society at large as noted by Shanmugam and Zahari (2009).

These provisions are aimed at managing the risk to the society as can be inferred from Zweig (2010) as social signals of danger which is explained in neurosciences in that an amygdalae in the brain helps in perception and reaction to fear in say running out of money, or going bankrupt if the only person at risk is the entrepreneur. Similar state of uncertainty exists when the supplier of capital is solely facing the interest rate risk, or when the community is at risk of consumption or production of hazardous materials.

ISLAMIC FINANCE

Prudent management of business enterprises in the context of Islamic law, known as Sharia, requires the availability of complete information regarding business transactions, promotes profit sharing within the risk sharing rules, encourages joint ventures, entrepreneurship and directs business ventures toward permissible (*halal*) activities which excludes earning passive interest, gambling and activities harmful to the society at large as noted in Shanmugam and Zahari (2009). In particular, receiving passive interest by compounding the value of money (*riba*) is prohibited and both parties to a transaction must make a charitable contribution of their respective shares of profit (*zakat*).

Investments in the form of short to medium term bonds (*sukuk*) have been available since the late 1990s in the form of asset-backed securities whose performance is based on total return on the underlying investment reported by Igbal, and Tsubota (2006). Profit rate swaps are also observed in which one party pays a fixed return while will be receiving a variable return during a stated time. As a result of changes in interest rates and commodity prices however one side of the contract would remain at risk as reflected in Ghani (2004). An Islamic bond–sukuk– cannot be interest rate-based. In a thorough coverage of Islamic bonds Mirakhor and Zaidi (2007) show that performance of an Islamic bond is tied to the performance of the underlying project.

In effect bonds that are based on a profit sharing (*mudharabah*) or partnership agreements (*musharakah*) are equity type in nature while those financing properties based on lease agreement–*ijarah*–provide fixed or variable returns. In addition it appears that the bondholder has recourse to the underlying asset. Some Islamic mutual funds appear to concentrate in higher dividend yielding investments and writing call options for added income. Although writing a call option is in effect gambling on the likely direction of the stock, the written call options that are covered by the underlying investments of the fund are assumed to be a slight form of hedging. The written calls may however limit the upside potential with not much protection provided on the downside risk. In addition, the various forms of derivative contracts are interest rate based. For example the fair value or equilibrium price of a call option is determined by the difference between the stochastic price of the stock less the present value or discounted value of the expected value of the final wealth in a fully neutral hedged position. It is thus noted that option prices are interest-based and that the final wealth depends on the probability distribution of past prices. Futures contracts are further affected by the changes in interest rates as well as prices of the underlying securities.

Reward and Risk Sharing Securities

Shiller (2013) expresses through examples the various ways in which investors in the market can obtain adequate return on investment while pursuing socially desirable goals. One example noted by Shiller is a "social impact bond," in which payoffs are tied to achieving a stated outcome. In this regard Hayat (2013b) referring to Islamic finance as sustainable and responsible investing notes the Australian solar Islamic bond (sukuk) in 2012 promoting environmental friendly financing. The other innovation noted by Shiller is the "Benefit Corporation," for helping the community while earning a profit for the suppliers of capital. The third is the "crowd funding" as a way of financing a project by a large number of small investors.

Risk sharing in Islamic banking is proportional to capital participation, while distribution of profit is based on an agreed upon schedule very much similar to the crowd funding. Of particular notice in Shiller's remarks is the GDP bond. The GDP bond is, in principle, a financial instrument which appears to fulfill the requirements of the Islamic financial and economic rules. Imagine a country with 1000 units of gross domestic product or national income which would like to borrow 100. It can issue 100 bonds in the country's currency to finance its infrastructures. In return, the borrower promises to pay the rate of growth in the economy on an annual basis. Such payments may further be modified on the basis of risk involved, for example to pay growth in the economy minus 2 percent.

Meanwhile, the proceeds from the sale of the bond and its subsequent investment in the production activities would raise the national wealth and welfare of the society due to the growth in the economy. In addition, a GDP bond tends to store wealth and the purchasing value of money for the bondholder. This is because the growth in this bond includes the real growth adjusted for inflation and it should further be fully marketable and traded at par value and in line with the changing level of national income. An index bond tied to the gross domestic product or the national income of the country thereby appears to exhibit the desirable properties of an Islamic investment such as preservation of capital, reasonable return on investment, risk sharing, and raising the welfare of the society at large.

An Islamic-based economic firm may issue an intermediate to long term bond whose return would be based on annual growth in the country's economy minus say 2 percent which would be necessary to cover the administrative costs of the firm. There would then exist only one class of shareholders; GDP bondholders. This is in line with Mirakhor and Zaidi (2007) who state that an Islamic bank needs to "focus on the return on the physical investment, because its own profitability is directly linked to the real rate of return … to improve the links between the real and financial sides of the economy …" Furthermore, Ahmad and Khan (2007) note that the liability side of an Islamic bank consists of profit sharing deposits while the asset side includes either a cost plus or profit sharing loans. This would place the bank at risk of changes in the rate of interest which is in part due to the changes in the economic growth and inflation.

Furthermore, a GDP index bond appears to remove the uncertainty and speculation in financial transactions. Hayat (2013a) stresses the impact of uncertainty in transactions which is prohibited in Islamic finance by the notion of prohibition against "*gharar*" as asymmetric information between lenders and borrowers in structured products might have caused the financial crisis during the latter part of the decade of 2000. He further notes that Islamic finance aims at including social values in economic firms away from the sole profit maximization.

When financing is provided by a bond whose performance is tied to the future outcome of a particular industry or the economy of the country, both investors and savers are safeguarded against changes in the monetary policy of the country. For example, at times, such as the financial crisis that occurred in 2007 the central banks may pursue monetary policies that result in a negative real return to savers (negative real cost to entrepreneurs), clearly resulting in asymmetric changes in wealth in the economy. The return on investment on a GDP-based bond however as shown by Kamal et. al (2012) is expected to stay equal to the real growth in the economy for both parties and in addition its performance would dominate a high quality bond.

Time State Preference Model

The various provisions in Islamic law regarding investments further may be executed in the context of the Time State Preference Model as well. In the following notes which are adapted from Martin, Cox and MacMinn (1988), one may consider "when a dollar is received," and "the state of nature in which it is received." That is, an investment provides a return or payoff in accordance with the existing state of nature. These states of nature may relate to the possible future state of the economy such as expansion, moderate growth or a recession. Alternatively, the states of nature may be tied to the degree of completion of a project in each year. While the occurrence of each state is unknown, the payoff in each state is known in advance. For example, the state of economy with a 2 percent growth is not known; it could be next year or three years from now, but the payoff is known as 2 percent.

An individual may search for a satisfying level of wealth by constructing a portfolio resulting in a certain payoff across the states of nature. This is done by a combination of a "primitive" as well as a "complex" security. A primitive security pays one dollar at the end of each period if a given state occurs. A complex security provides a payoff in two or more states of nature providing perhaps a minimum and a maximum payoff. Thus the uncertainty about future wealth at a particular time can be reduced by building a portfolio of primitive and complex securities. With partial information, a certain level of payoff can be obtained by investing equal amounts in each primitive security corresponding to all states of nature. It should be noted that the rate of interest plays no role in this construct and thereby the Time State Preference Model appears to be a reasonable construct in Islamic finance. Various bonds such as GDP bond, social impact bond and securities tied to the benefit corporation appear to be in line with the Time State Preference Model.

A Review of Empirical Evidence

Empirical evidence shows that Islamic investments have generally fared well over time and perhaps done better in the down cycles of the financial markets because of their defensive nature due to their beta being less than one. Lobe, Roble and Walkshäusl (2012) find that while performance of investments in line with Islamic principles are similar to the average performance during 2001-2012, fund performance during the three-year bear market of 2007-2009 was superior to the rest of the stock market due to their lower beta. The authors employed the capital asset pricing model as well as other factors accounting for size, value and momentum effects. Similarly, Shah, Hijazi and Hamdani (2005) review and measure performance of mutual funds in Pakistan using the Sharpe, Treynor and Jensen measures which reveal their outperformance during 1997-2004 as compared with the Pakistani stock index averages.

Elfakhani, Hassan and Sidani (2007) as well as Elfakhani, Sidani and Fahel (2004) report performance of mutual funds pursuing Islamic finance guidelines together with their appropriate benchmarks during 1997-2002. This is an interesting time horizon as it is equally divided into a strong positive performance of the stock market at the beginning and a sharp decline in the latter part of the period. While the Islamic mutual funds' performance were mostly in line or below their respective benchmarks, they fared quite well during the sharp decline of the financial markets revealing their defensive characteristics, which is shown by their lower value of beta. Meanwhile, due to various constraints imposed on the investment activities, at times, returns may be sub-par. Mueller (1994) finds performance of ethical funds to be less than their comparative averages.

Other investments based on religious or socially desired beliefs are shown to have performed either somewhat better or the same as the averages in various time horizons. Bengtsson (2008) cites various examples in which socially responsive investments in Scandinavia were initiated by religious values and were later modified to include a variety of social and cultural values within an institutional context. They further prohibited investments in alcohol, gambling, armament, firearms and tobacco. Swedish socially responsive funds that were later developed in the latter part of the 1980s further extended their objectives to environmental sustainability and charitable contribution. A similar pattern is noted for Norway and Denmark, and the adaptation of the United Nations principles for responsible investing.

It appears that both the conventional and socially responsive investments are affected by the same factors in the market. Shank, Manullang and Hill (2005) study performance of socially responsive firms

during a five-year interval of June 1998 – May 2003 and find no statistically significant excess return indicating "no market pricing of value expressive features." However, funds with ten years of data outperformed the market by about 1.5 percent. The authors state that socially responsive investors "will not be economically penalized." Cortez, Silva and Areal (2009) study performance of European socially responsible funds during 1996-2007 in the context of the capital asset pricing model in the original as well as conditional forms searching for a risk adjusted excess return, alpha. The conditional model incorporates the impacts of the lagged information available in the market. Their extensive empirical studies show neither superior nor inferior performance for socially responsive investments relative to the benchmarks. However it appears that socially responsive funds and conventional funds are both influenced by the same factors.

In comparing the conventional and socially responsive funds one needs to account for the style of investment, such as the value or small size. Fernandez–Izquierdo (2008) examine the performance of ethical and socially responsible funds with other funds using the style analysis and find that the ethical and socially responsive funds do better or at least the same as the benchmark during the mid 1998 to the mid 2001. Their multi-factor analysis included the Spanish market premium over risk free rate, the difference in global return and the Spanish market, and the term spread between long term and short term bonds. In addition, the distribution of returns on socially responsive funds deviates away from normal.

Mallin, Saadouni and Briston (1995) provide extensive empirical analysis of ethical investment results for the UK investment trusts. They compare return and risk of investments that pursue both positive and negative criteria for inclusion in a portfolio with a matched sample of similar size portfolios as well as the average market performance. The inclusion of a matched sample is for the purpose of comparison across market capitalization value as ethical investment portfolios tend to include more of a small cap stocks. The financial times all-share actuaries is used as the benchmark on a monthly basis during 1986-1993. They find the ethical investments to have a lower risk as shown by their low beta reflecting a less volatile performance. In addition, ethical investments generally possess positive alphas reflecting outperforming the market. Furthermore, in most cases ethical investments tend to outperform the non-ethical ones on the basis of ranking criteria of Jensen, Treynor and Sharpe, however underperforming the overall market.

Bollen (2007) finds that while a better return on investment appears to attract investors to socially responsive funds, deterioration in performance leads to a lower level of out flows in such funds as compared to the regular mutual funds. In addition, socially responsive funds show a more moderate volatility in their cash flows. The study covers the period 1961-2002 using risk adjusted returns in the context of both the capital asset pricing model and a four-factor model for measuring risk. Bollen notes that socially directed investment criteria serve as a constraint on the portfolio structure which may affect performance and flow of funds. In particular socially concerned investors possess behavioral characteristics which may differ from those with no such constraints.

That is, satisfaction derived from the socially concerned goals of their invested companies may supplement the desire to obtain the required risk adjusted return. Bollen finds that mature funds as well as the newer socially responsive funds appear to have a different flow of funds than the conventional funds as their cash flow volatility is lower, outflows are at a slower pace following poor returns and inflows are stronger when returns are strong. Bollen's results are important as a relatively stable cash flow and reduced volatility characteristics of socially desired investments could reduce the cost of capital for socially responsive companies.

Statman (2000) finds similar performance from the Domini social index and S&P 500 during 1990-98. These two indexes are similar in terms of structure while the former includes exclusionary screens such that firms involved in production or trading of alcohol, tobacco, weapons or gaming are excluded. Domini social index further emphasizes inclusion of companies with positive attributes on employee relations, diversity, environmental safety and the like. Statman further concludes that socially responsible funds and the unconstraint funds have similar performance. Statman uses the Jensen alpha, Sharpe ratio as well as the adjusted Sharpe ratio. These gauges provide a risk adjusted measure of performance. Hamilton, Jo and Statman (1993) review the risk adjusted return of socially desired firms during 1981-

1990 in the context of the capital asset pricing model and find their performance to be the same as conventional firms.

Bauer, Derwall and Otten (2007) provide a single-factor model, four-factor model as well as allowing for dynamic asset allocation in the appraisal of Canadian socially responsible funds during 1994-2003. The authors found that the ethical funds had a slightly lower return and higher standard deviation as compared with conventional funds. The single-factor model however shows no statistically significant differences between the ethical and conventional funds. They further provide empirical evidence regarding the multi-factor models that includes the market, size, and market to book value ratio. Overall, there appears to be no difference in performance between the conventional and socially responsive index. However, a graphical representation of the two shows that the socially responsive funds show more sensitivity to the ratio of market in relation to book value or are value oriented and are further influenced by the momentum factors. In addition, the multi-factor betas appear to change over time for both funds.

Shank, Manullang and Hill (2005) reviewed performance of socially responsive mutual funds and their top holding companies during 1993-2003 each based on specific characteristics such as community development, responsibility toward their work force, and service to the society at large. In the context of the capital asset pricing model, they found that socially responsive funds' performance does not differ from the average performance.

CONCLUSIONS AND MANAGERIAL IMPLICATIONS

As shown in this paper Islamic investments must be permissible under Islamic law (Sharia), which excludes the compounded value of money due to interest rate, should not involve speculation so as to reduce the uncertainty of the final outcome and should be beneficial to the society at large. Islamic finance, in essence, provides a vehicle for sharing reward and risk between entrepreneur investors and the providers of the capital who in effect become an equity owner instead of being a pure lender. Both parties in the transactions would, in turn, make a contribution to the society at large out of their respective shares of the profit. Alternatively, losses will have to be borne by both parties.

In addition, trading or investments in certain activities such as gambling and alcohol industries are prohibited. In any transaction, investment or partnership, all parties are obligated to elaborate on the sharing of information, assessment of risk and the likely outcome. As explained in detail in Shanmugam and Zahari (2009), the foundation of Islamic finance is based on faith, belief, and creed (*aqidah*), ethics (*akhlag*) and Sharia rules conducive to establishing moral, social and ethical behavior. The rank ordering of Sharia rules are categorized as obligatory (*wajib*); recommended, such as extra charitable acts (sunnat/mandub); permissible acts (mubah); discouraged (*makruh*) and forbidden (*haram*) which are permanent. Islamic finance rules are further based on provisions made by religious scholars by comparison, precedents, consensus interpretation in the public interest, custom (*urf*) and agreement of Islamic scholars across a wide region (*ijma*).

Within this construct various forms of financial instruments have been designed some of which resemble financial securities in the western capital markets. This paper provides one way of designing a financial product that is not based on interest rate in the context of the Time State Preference Theory and an index bond whose performance depends on the outcomes in an industry or the economy. One may think of socially oriented financial securities such as the social impact bond and investments that are tied to the benefit corporation as examples in line with the Time State Preference Theory. This is because the payoff resulting from the investment is associated with an outcome in the future which is beneficial to the society as well. One however does not know the probability or the timing of the payoff. An index bond whose performance depends on the future outcome in the production cycle is further free of the rate of interest. The return to the bondholder is in effect contingent upon the return on the underlying project which is financed. Such index bonds may be constructed for various industries or could be based on the performance of the entire economy. This in turn will help the creditors to share the risk as well as the resulting profit.

A review of empirical evidence shows that Islamic investments in line with socially responsive investments have performed somewhat better during the down cycle of the financial markets due to their lower beta, value style of management and lower outflows in time of financial distress. Some studies show a better performance in the long run. It is however noted that both conventional and socially responsive investments are influenced by the same factors. Some studies show similar performance or somewhat lower return for socially responsive investments.

Managerial implications of this paper may include the feasibility of controlling the cost of financing of investment projects of a business enterprise and aligning its activities towards socially desired outcomes. This is because the shareholders appear to show patience at time of distress in the downturn of the economy. This paper further provides one way to converge the interests of the stockholders and bondholders by offering a payoff function in line with performance of the overall economy. That is, financing investment projects by issuing a security whose performance follows the return on the undertaken project, the overall performance of that industry or the average growth in the economy. In this manner the providers of the capital, entrepreneurs, and the suppliers of human capital will all share in the prosperity of the firm. Meanwhile, the overall growth of the economy will be beneficial to all especially within a generally accepted accountability criteria to the society at large by the business enterprises.

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Money Growth and Economic Growth in Developed Nations: An Empirical Analysis

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Money growth and output growth are positively correlated across a small homogeneous group of OECD countries. This relationship has received little attention. I perform a cross-country growth analysis and find that the relationship holds after controlling for standard determinants of economic growth. Estimation of vector autoregressions and tests for Granger Causality reveal that money growth helps drive economic growth in the OECD sample. Evidence indicates that this positive influence is a result of higher levels of economic freedom in more developed nations, which may create an environment where nominal money helps facilitate the production process or expedites capital accumulation.

INTRODUCTION

The general conclusion among macro and monetary economists is that there is no correlation between money growth and real output growth. One study often referenced in support of this conclusion is that of McCandless and Weber (2001). This is not a surprise given the thorough nature of their approach; they examine long-run cross-country correlations based on data over a thirty year period for 110 countries using the M0, M1 and M2 definitions of money. In addition, they calculate correlation coefficients based on two subsamples – one consisting of 21 OECD countries and the other consisting of 14 Latin American Countries.[1] Interestingly enough, for the subsample of OECD countries money growth and real output growth are positively correlated. Why? Are there specific characteristics exhibited only by developed nations that lead to a positive correlation between money growth and real output growth?

I consider these questions. I find that money growth and output growth remain positively correlated for a subsample of OECD countries after controlling for standard determinants of economic growth. Estimation of vector autoregressions and tests for Granger Causality reveal that money growth helps drive economic growth in the OECD sample. Evidence indicates that this positive influence is a result of higher levels of economic freedom in more developed nations, which may create an environment where nominal money helps facilitate the production process or expedites capital accumulation.

MONEY GROWTH AND ECONOMIC GROWTH – EXISTING EMPIRICAL EVIDENCE

A brief summary of the literature examining the relationship between money growth and real output growth is useful. Kormendi and Meguire (1985) in a cross-section analysis regress the mean growth of real output on a number of proposed macroeconomic determinants of growth including the mean of money supply growth and the standard deviation of money supply shocks. The time period for this study is 1950-77, and the data set consists of 47 countries. Kormendi and Meguire find that mean money

growth is positively correlated with the mean growth rate of real output while the standard deviation of money supply shocks is negatively correlated with real output growth.

Dwyer and Hafer (1988) use a data set consisting of 62 countries and find that the coefficient on the growth rate of money in a cross-country regression of the growth rate of real income on the growth rate of money is negative. The growth rates used in this study are the averages of annual growth rates for the six years 1979-1985; this seems like a relatively short time period for an analysis involving growth, and the authors acknowledge this by noting that the study was aimed at addressing specific money related questions prevalent at the time.

McCandless and Weber analyze the period 1960-1990. Measures of money growth and real output growth are calculated as the geometric average rates of growth over this 30 year time period. The correlation coefficients for money growth and real output growth in the full sample are found to be -0.027, -0.050 and -0.014 for the M0, M1 and M2 definitions of money, respectively. In the subsample of Latin American countries the correlation coefficients are found to be -0.171, -0.239 and -0.243. Finally, the OECD sample yields correlation coefficients of 0.707, 0.511 and 0.518, each of which turns out to be statistically significant. This finding prompts the authors to regress real output growth on real money growth for the OECD subsample, and the slope parameter turns out to be about 0.1 for all three definitions of money. McCandless and Weber do not investigate this finding any further but acknowledge that further analysis is needed and hypothesize that the positive correlation may be a reflection of the fact that the institutional structure of the OECD countries permits separation of fiscal and monetary policies which is not observed in the rest of the world. I have found nothing in the literature that further explores the positive relationship between money growth and real output growth in the OECD countries.

THEORETICAL FRAMEWORK

As a theoretical framework for the analysis, I consider the Solow model with exogenous technical progress and a production function which includes labor and physical capital. Recall that the fundamental differential equation associated with this model is

$$\dot{k} = sy - (n + d + g)k \tag{1}$$

where k is capital per effective worker; $\dot{k}$ represents the differentiation of capital per effective worker with respect to time; s is the saving rate or the ratio of investment in physical capital to total income;[2] y is output per worker; $(n+d+g)$ represents augmented depreciation where n is the growth rate of the labor force, d is the rate at which physical capital depreciates and g is the rate at which technology grows. It follows that in the steady state, equation (1) can be written as

$$sy = (n + d + g)k\,. \tag{2}$$

Thus, the determinants of the steady state levels of output per worker and capital per worker are s and $(n+d+g)$. Finally, conditional convergence tells us that an economy grows faster the further it is from its own steady state position; so, an empirical growth equation should include initial output per worker to control for differences in steady states across countries.

ESTIMATING EQUATION

That being said and specifying the model to be log linear, economic growth can be estimated in a cross-country setting as follows:

$$\ln y_t - \ln y_0 = \beta_0 + \beta_1 \ln y_0 + \beta_2 \ln(n + d + g) + \beta_3 \ln s + \varepsilon\,. \tag{3}$$

Equation (3) comes directly from what the simple Solow model tells us about growth.[3] However, I am interested in the relationship between real output growth and money growth in a subsample of OECD countries. Adding a money growth regressor to equation (3) seems valid if we assume that money growth affects productivity or factor accumulation.[4] Thus, the following equation replaces equation (3):

$$\ln y_t - \ln y_0 = \beta_0 + \beta_1 \ln y_0 + \beta_2 \ln(n + d + g) + \beta_3 \ln s + \beta_4 (\ln m_t - \ln m_0) + \varepsilon . \quad (4)$$

The variable *y* denotes real GDP per worker and *m* is the nominal money supply; the subscripts 0 and t refer to the initial and terminal dates of the period to be analyzed. Therefore, ($\ln y_t - \ln y_0$) represents the growth rate in real GDP per worker over the sample period, and ($\ln m_t - \ln m_0$) represents the growth rate of the nominal money supply over the sample period. All other variables have been previously defined.

I use the sample period 1979-1997. This is the longest period of time for which the data is available for the maximum number of countries. Summers and Heston (2002) is the data source used for output per worker and augmented depreciation. The dependent variable is computed from the *rdgdpwok* series in the Summers and Heston data set. The annual average over the sample period is used for $n+g+d$. Mankiw, Romer and Weil (1992) assume $g+d = 0.05$; thus, a proxy for $n+g+d$ is obtained by adding 0.05 to the annual average rate of growth of the labor force. There is no explicit labor force series in the Summers and Heston dataset, but it can be calculated implicitly.[5] As a proxy for *s*, I use the annual average ratio of gross fixed capital formation to GDP reported in the OECD's fact book of Economic, Environmental, and Social statistics (2006). Finally, the International Monetary Fund's *International Financial Statistics* (IFS) *Yearbook* provides data for the nominal money supply. For many of the countries in the McCandless and Weber OECD subsample, national definitions of money (M0, M1, M2, M3) are not reported in the online version of the IFS yearbook nor the hardcopy versions. That being said, in order to include the maximum possible number of countries over the longest period of time, I use the *Money plus Quasi-Money* definition, which is given in line 35l of the IFS yearbook (1999). The value of *Money plus Quasi-Money* generally lies between the M2 and M3 definitions of money. OLS is used to estimate equation (4), and all reported standard errors are corrected for possible heteroskedasticity using White's (1980) correction.

CROSS-COUNTRY RESULTS

Table 1 presents the cross-country estimates of the growth equation for a subsample of OECD countries.[6] Column 1 presents estimates of the model when initial income is the only covariate. As is apparent, the coefficient on initial income is negative and highly significant indicating conditional convergence among the subsample of OECD countries. However, it can be seen from column 2 that when augmented depreciation and the investment share are included with initial income, the estimated coefficient on initial income increases dramatically and becomes statistically insignificant.

TABLE 1
CROSS-COUNTRY GROWTH REGRESSIONS – OECD SUBSAMPLE, 1979-1997

	Equation		
	1	2	3
Variable			
Intercept	3.752***	-1.494	-4.930*
	(0.657)	(1.556)	(2.738)
Initial Income	-0.332***	-0.093	0.117
	-0.064	(0.080)	(0.144)
Augmented Depreciation	---	-0.580***	-0.760***
		(0.182)	(0.228)
Investment Share	---	0.368***	0.579**
		(0.136)	(0.212)
Nominal Money Growth	---	---	0.063*
			(0.037)
Adjusted R^2	0.483	0.636	0.655
Sample	15 obs.	15 obs.	15 obs.

The dependent variable is the cumulative growth rate in real GDP per worker, 1979-1997.
All explanatory variables are entered as natural logarithms except nominal money growth.
Parentheses ( ) contain White corrected standard errors.
* indicates significance at the 10% level, ** at the 5% level, and *** at the 1% level.

Others, such as Mankiw, Romer, and Weil (1992), have estimated the same equation and found initial income to be significant. My result may reflect multicollinearity. For example, given that the sample period covers only 18 years, and all OECD countries have similar steady state characteristics, it may be that initially poor countries also have relatively low average annual investment shares. Nonetheless, the estimated coefficients on augmented depreciation and investment share have the expected signs and are both highly significant. Moreover, the inclusion of the aforementioned regressors improves substantially the fit of the regression as is apparent in the increase in the adjusted R^2 from 0.483 to 0.636.

Column 3 of Table 1 presents the results of estimating equation (4). Note that the estimated coefficient on nominal money growth is statistically significant at the 10% level. The estimate suggests that a 1% increase in the rate of nominal money growth over the period 1979-1997 is associated with a 0.06% increase in economic growth over the same period. Adding money growth to the model increases the adjusted R^2 from 0.636 to 0.655. This increase in explanatory power, albeit small, along with the significance of nominal money growth, implies that it is possible that money growth affects economic growth directly through an effect on productivity. However, correlation does not imply causality, and so the results must be interpreted carefully. It could be that we are seeing reverse causality. That is, the OECD countries effectively control inflation, and faster real output growth requires faster nominal money supply growth to meet the growth in money demand caused by real output growth. For completeness, I estimated the same equations for the McCandless and Weber subsample of Latin American countries and found nominal money growth to be insignificant. These results are reported in Appendix 2.

INVESTIGATING CAUSALITY

The positive correlation between nominal money growth and economic growth may arise from economic growth causing money growth, not money growth causing economic growth. To address this

issue, I collect annual data for nominal money growth and economic growth over the period 1979-1997 for seven of the 15 OECD countries. Only seven countries have the necessary data. I then take the two times series and estimate a vector autoregression (VAR) to determine whether or not economic growth Granger causes nominal money growth.

It is imperative that the data being used in the estimation of a VAR be stationary. Therefore, before estimating the VARs, I first test for the presence of a unit root in each of the two series. Results of the Augmented Dickey-Fuller test are given in the top portion of Table 2.

TABLE 2
STATIONARITY AND REVERSE CAUSALITY

	Australia	Canada	Denmark	Japan	Norway	UK	USA
Augmented Dickey-Fuller Test							
Economic Growth	-3.53	-3.40	-3.87	-2.70	-3.64	-4.29	-4.54
	(0.015)	(0.020)	(0.006)	(0.087)	(0.011)	(0.002)	(0.001)
Money Growth	-4.23	-1.92*	-2.34*	-2.62*	-1.46*	-3.03	-2.21*
	(0.003)	(0.321)	(0.166)	(0.102)	(0.536)	(0.044)	(0.206)
VAR							
order	2	1	1	1	1	2	1
differencing	none	1	1	1	1	none	1
Granger Causality Wald Test	4.59	0.77	1.23	3.25‡	2.00	0.52	1.30
	[0.331]	[0.380]	[0.268]	[0.071]	[0.157]	[0.771]	[0.255]

The statistic reported for the Augmented Dickey-Fuller test is the tau statistic for the single mean case with one lag. Numbers in parentheses ( ) represent the probability less than tau.
* indicates the presence of a unit root.
The statistic reported for the Granger Causality Wald test is a chi-square statistic.
Brackets [ ] contain p-values. ‡ indicates significance at the 10% level.

The statistic reported is the tau statistic for the single mean case with one lag. Recall that the null hypothesis of the test is that a unit root is present in the series. Evidence indicates that the economic growth series is stationary for all seven countries. However, the null cannot be rejected for five of the seven money growth series, and so annual money growth in Canada, Denmark, Japan, Norway and the United States is a unit root process. That being said, when I estimate the VAR, I first difference the data for both series in each of the aforementioned five countries; first differencing is sufficient for creating a stationary series in all cases. For these countries, I estimate a first order VAR. A second order VAR is estimated for Australia and the UK, the two countries for which both economic growth and money growth are stationary over the sample period.[7] The last two rows of Table 2 present the chi-square statistic for the Granger Causality Wald test and its corresponding p-value. The null hypothesis is that economic growth does not Granger Cause nominal money growth. As can be seen from the table, the chi-square statistic is statistically significant only for Japan. Thus, reverse causality has no statistical support for six out of the seven countries.

WHY DOES THE RELATIONSHIP BETWEEN MONEY GROWTH AND ECONOMIC GROWTH ONLY HOLD FOR A SUBSAMPLE OF OECD COUNTRIES?

Even if nominal money growth were insignificant in the estimation of equation (4), the correlation between nominal money growth and economic growth could not be dismissed. Rather, such a finding

would imply that money growth is related to economic growth indirectly via a correlation with one or more determinants of the steady state. Otherwise, McCandless and Weber would not have found a positive correlation between money growth and real output growth. Moreover, the evidence from the previous section does not support reverse causality, and so it seems that nominal money growth is positively influencing economic growth. An interesting question is why this relationship does not hold across all countries or a subsample of Latin American countries. McCandless and Weber hypothesize that the institutional structure of the OECD countries permits separation of fiscal and monetary policies not observed in the rest of the world. Given the lack of support for reverse causality, for this to be the explanation behind the positive relationship between economic growth and money growth, it must be that such a separation positively influences money's ability to affect productivity or some determinant of the steady state. Extending this hypothesis, I submit that developed nations, in addition to exhibiting separability of monetary and fiscal policy, tend to have less government regulation, better legal structure, and more clearly defined property rights than their less developed counterparts. In other words, the OECD countries embrace the free market system more than the rest of the world. That being said, could it be that a higher degree of economic freedom yields an environment where money is a productive input? Or perhaps money only allows resources such as capital and labor to be used more efficiently in developed nations.

Testing the aforementioned hypothesis empirically seems far from a straightforward task. Gwartney and Lawson (2005) quantify economic freedom for a large number of countries by creating an index intended to capture aspects of economic freedom such as freedom to decide what is produced and consumed, freedom to keep what you earn, freedom of exchange with foreigners, and protection of money as a store of value and medium of exchange. The index is based on a zero-to-ten scale where higher ratings are indicative of institutions and policies more consistent with economic freedom. Gwartney and Lawson calculate the index every five years over the period 1970-2000 and then yearly starting in 2001. Given the existence of this index, if high levels of economic freedom create an environment where money is a productive input or at least increases the productivity of other inputs, then the change in the economic freedom index should be positively correlated with money growth for the subsample of OECD countries. To test this hypothesis, I consider OLS estimation of the equation

$$\ln m_t - \ln m_0 = \beta_0 + \beta_1 \Delta F + \varepsilon \tag{5}$$

where ΔF is the change in the economic freedom index from 1980 to 1995 and $(\ln m_t - \ln m_0)$ is the growth rate of the nominal money supply over the period 1980-1995. Results of the cross-country estimates of equation (5) are reported in column 1 of Table 3. Note that the change in economic freedom is statistically significant at the 5% level. Thus, increases in economic freedom are associated with increases in nominal money growth, and the hypothesis that high levels of economic freedom create an environment where money is productive has empirical support.[8]

TABLE 3
MONEY GROWTH AND ECONOMIC FREEDOM

	OECD Subsample		Latin American Subsample
	1	2	3
Variable			
Intercept	0.553*	29.629**	3.248***
	(0.272)	(5.883)	(0.450)
Change in Economic Freedom	0.686**	0.428*	-0.089
	(0.237)	(0.222)	(0.120)
Initial Income	---	-1.940***	
		(0.397)	
Augmented Depreciation	---	1.429*	
		(0.715)	
Investment Share	---	-1.464**	
		(0.630)	
Adjusted R^2	0.405	0.589	-0.079
Sample	15 obs.	15 obs.	14 obs.

The dependent variable is the cumulative growth rate in nominal money, 1980-1995.
Parentheses ( ) contain White corrected standard errors.
* indicates significance at the 10% level, ** at the 5% level, and *** at the 1% level.

Now, one may argue that the positive correlation between the change in economic freedom and money growth is simply a result of the fact that both nominal money and economic freedom tend to increase over time and there is no fundamental relationship between the two variables. To address this, I add other regressors that are significantly correlated with money growth to the right hand side of equation (5) and estimate the following equation:

$$\ln m_t - \ln m_0 = \beta_0 + \beta_1 \Delta F + \beta_2 \ln y_0 + \beta_3 \ln(n + d + g) + \beta_4 \ln s + \varepsilon \,.^{9} \quad (6)$$

As is apparent from column 2 of Table 3, the change in economic freedom remains significant at the 10% level even in the presence of the additional covariates. Thus, the change in economic freedom is explaining variation in nominal money growth not captured by initial income, augmented depreciation, or the investment share; this implies that the relationship between the change in economic freedom and nominal money growth is not trivial, and moreover, it further solidifies the argument that better institutions, better legal structure and less government regulation lead to faster nominal money growth.

Nominal money growth contributes to economic growth in developed nations. Empirical evidence in this section indicates that this may be because developed nations are more economically free, thereby yielding an environment where nominal money helps facilitate the production process or expedites capital accumulation. If the aforementioned conclusion is to have any merit, estimation of equation (5) for the subsample of Latin American countries should not yield a significant coefficient on ΔF. Recall that economic growth and money growth are not correlated in the subsample of Latin American countries (Appendix 2), and so improvements in economic freedom should not be correlated with nominal money growth. Column 3 of Table 3 presents the results of estimating equation (5) for the Latin American subsample. The coefficient on ΔF is negative but insignificant. This result is in line with what is expected.

CONCLUSION

This paper investigates the relationship between nominal money growth and economic growth in a subsample of OECD countries. Specifically, using the Solow model as a theoretical framework, I estimate a cross-country growth equation and find a positive and significant relationship between nominal money growth and economic growth. Moreover, the lack of evidence for reverse causality implies that money growth positively influences economic growth. Finally, my findings suggest that this positive influence is a result of the higher levels of economic freedom exhibited by the OECD countries; it seems that in countries with well developed institutions, nominal money helps facilitate the production process or expedites capital accumulation.

This result warrants further consideration. Theoretical analyses aimed at fleshing out the underlying forces of the mechanism by which institutional development enhances the productivity of money would be very useful. Empirically, it would be worthwhile to investigate causality for a larger number of OECD countries. Recall that I only estimated VARs for seven of the fifteen countries in my OECD subsample. Finding alternative data sources that would yield the necessary data to test for Granger Causality in all OECD countries would enhance the robustness of the results.

The simple Solow framework assumes economies are closed. However, most economies, especially the OECD economies, exhibit a high degree of openness. The effects of trade on growth are significant and have been well documented in the literature. Trade allows countries to import a larger variety of specialized inputs, which in turn has a positive effect on output. In addition, if capital is internationally mobile, capital deepening is not limited by national saving. Altering the underlying theoretical framework of the empirical analysis to allow for openness could prove to be a useful exercise and would serve as an additional robustness check of the positive relationship between nominal money growth and economic growth found herein.

ENDNOTES

1. The OECD subsample includes Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Japan, the Netherlands, New Zealand, Norway, Portugal, Spain, Switzerland, the United Kingdom, and the United States. Countries included in the Latin American subsample include Argentina, Bolivia, Chile, Colombia, Costa Rica, the Dominican Republic, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Paraguay, Uruguay, and Venezuela.
2. In the Solow model, it is assumed that saving equals investment. In an open economy, capital is internationally mobile and thus saving and investment are not necessarily equal. A change in investment may not be related at all to a change in saving; the change in investment may just reflect a change in borrowing. However, over long periods of time, saving minus investment is stationary and so in the context of economic growth, which itself is a long run phenomenon, it should not make much difference whether we think of *s* as the saving rate or the ratio of investment in physical capital to total income.
3. This specification is consistent with the one presented in Mankiw, Romer and Weil (1992).
4. See Appendix 1 for a discussion of theoretical models that relate money growth to real output and real output growth.
5. Following Summers and Heston (1991), I calculate the labor force as follows. The proportion of the population under age 15 (PPU15) can be calculated as $PPU15 = 2 \times (1 - RGDPCH / RGDPEA)$. The labor force participation rate (LFPR) is equal to $RGDPCH / RGDPWOK$. Given explicit data on the total population (*POP*), the Labor Force is defined as $LF = LFPR \times (1 - PPU15) \times POP$. *RGDPCH, RDPEA,* and *POP* represent real GDP per person, real GDP per equivalent adult and total population, respectively. All three series are in the Summers and Heston (2002) dataset.
6. The sample I use contains only 15 of the 21 OECD countries used in the McCandless and Weber study. The fifteen countries are Australia, Austria, Belgium, Canada, Denmark, Finland, France, Italy, Japan, the Netherlands, Norway, Portugal, Spain, the United Kingdom, and the United States.
7. I considered the results for first, second, and third order VARs in all seven cases. The Granger Causality test led to the same conclusion regardless of the order.

8. Note that if the results of the previous section had supported reverse causality, then the following argument could be made. The OECD countries, which exhibit high degrees of economic freedom, have central banks that follow similar feedback rules. That is, the central banks increase nominal money growth as real output growth increases. Therefore, countries that experience larger positive changes in economic freedom should experience higher rates of economic growth and thus higher rates of nominal money growth. In this case, a positive correlation between economic freedom and money growth could be attributed entirely to reverse causality. However, this is exactly the interpretation that has been ruled out by the results in the INVESTIGATING CAUSALITY section.
9. Results of regressing money growth on the determinants of the steady state for the period 1979-1997 are given in Appendix 3. These results provide the empirical justification for including the additional regressors in equation (6).

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APPENDIX 1

Money Growth And Economic Growth – What Does Theory Say?

Is there any theoretical justification for including money growth as a regressor in equation (4)? A discussion of the theory relating money growth to real output and real output growth is warranted.

Consider first the Sidrauski (1967) MIU model. In this model, the representative agent maximizes an infinite sum of discounted utilities subject to a resource constraint where utility is dependent on per capita consumption and real per capita money holdings. It turns out that money is superneutral in this model. Thus, the Sidrauski model predicts that there is no long run relationship between nominal money growth and real output growth. However, in representative agent models, everyone is identical, so there is no reason to believe that there is exchange of any sort. Therefore, just sticking money in the utility function is questionable because it is not clear how money would provide any benefit.

Cash-In-Advance models provide an avenue for introducing money into an economy without directly inserting it into the utility function. CIA models where the Clower constraint is applied to consumption exhibit superneutrality, but if the Clower constraint is applied to capital, superneutrality does not hold. The constraint on capital implies that inflation taxes the transfer of resources from the present to the future. Thus, higher rates of money growth will lead to higher rates of inflation which will tend to discourage capital accumulation. Moreover, Stockman (1981) develops a model in which higher money growth leads to a lower steady state capital per worker ratio if the cash-in-advance constraint applies to both consumption and investment goods. By appealing to the Solow framework, Stockman's result implies that the economy will experience slower economic growth as a result of faster money growth. In similar spirit, Marquis and Reffet (1991) using an endogenous growth model conclude that higher money growth has a negative effect on long term economic growth as long as the cash-in-advance constraint applies to investment in either physical or human capital. Keep in mind though that in an economy where credit cards and other forms of financing via debt are prevalent, a cash- in-advance constraint is a bit of a stretch. However, in developing economies where financial institutions are not well established and credit markets are largely absent, a cash-in-advance constraint seems reasonable.

One drawback of the aforementioned theories is that they all employ representative agent models. Weil (1987) claims that in an economy with heterogeneous agents, changes in monetary policy have redistributional effects and will influence capital accumulation. Mino and Shibata (1994) focus on the redistributional effects of inflation and monetary policy in an overlapping generations model that yields endogenous growth; the model they develop concludes that money growth and economic growth are positively correlated.

The point to be made is that the literature includes theoretical models that predict no relationship, a negative relationship and a positive relationship between money growth and real output growth. Therefore, estimating an equation such as equation (4) is theoretically justified.

APPENDIX 2

I use the OECD's fact book of Economic, Environmental, and Social statistics (2006) to obtain my proxy for *s* when I estimate the growth equations for the OECD subsample. In the Latin American case, I use the annual average of the investment share of real gross domestic product per capita, which is the series *ci* in the Summers and Heston (2002) data set.

TABLE 4
CROSS-COUNTRY GROWTH REGRESSIONS – LATIN AMERICAN SUBSAMPLE, 1979-1997

	Equation		
	1	2	3
Variable			
Intercept	0.090	-0.925	-0.697
	(1.432)	(1.280)	(1.249)
Initial Income	-0.014	-0.255	-0.284
	(0.147)	(0.184)	(0.183)
Augmented Depreciation	---	-0.968**	-1.036**
		(0.383)	(0.394)
Investment Share	---	0.353	0.267
		(0.241)	(0.256)
Nominal Money Growth	---	---	0.025
			(0.030)
Adjusted R^2	-0.083	0.039	-0.044
Sample	14 obs.	14 obs.	14 obs.

The dependent variable is the cumulative growth rate in real GDP per worker, 1979-1997.
All explanatory variables are entered as natural logarithms except nominal money growth.
Parentheses ( ) contain White corrected standard errors.
* indicates significance at the 10% level, ** at the 5% level, and *** at the 1% level.

APPENDIX 3

TABLE 5
CROSS-COUNTRY MONEY GROWTH REGRESSION – OECD SUBSAMPLE, 1979-1997

Variable	
Intercept	54.600***
	(7.484)
Initial Income	-3.329***
	(0.416)
Augmented Depreciation	2.858**
	(1.014)
Investment Share	-3.349*
	(0.896)
Adjusted R^2	0.575
Sample	15 obs.

The dependent variable is the cumulative growth rate in nominal money, 1979-1997.
All explanatory variables are entered as natural logarithms.
Parentheses ( ) contain White corrected standard errors.
* indicates significance at the 10% level, ** at the 5% level, and *** at the 1% level.

Arkansas Banks vs. Florida Banks and the Subprime Mortgage Crisis

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In the wake of the Great Recession, Arkansas banks found themselves across the negotiating table from Florida banks in transactions backed by the FDIC. The goal of this research is to identify performance characteristics that contributed to Arkansas banks having a stronger balance sheet prior to and during the crisis. The study finds that Arkansas banks are more conservative in having smaller percentage of their assets devoted to loans and a smaller percentage of their loans devoted to real estate. Arkansas banks are also more conservative in assessing the credit risk of their loan portfolios.

INTRODUCTION

> *"A financial crisis is a disruption to financial markets in which adverse selection and moral hazard problems become much worse, so that financial markets are unable to efficiently channel funds to those who have the most productive investment opportunities" Frederic S. Mishkin*

The Great Recession put a significant strain on the US economy and helped to unveil gross lack of regulation and excessive risk taking by the financial services industry. The main problem behind the credit meltdown was subprime mortgage lending. In the US, the subprime mortgage market has a rightfully earned negative perception in the US. However, the intent of its creation was positive. The market provided a path to homeownership to millions of Americans whose credit history would not allow them to qualify for a prime mortgage. The downside of such loans is a default rate that is six times higher than on prime mortgages (Chomsisengphet et. al., (2006)). Prior to 2005, subprime mortgage lending averaged about 8% of all mortgages originated in the US, by the end of 2006, the portion of subprime mortgages climbed to 20% (Krinsman (2007)). The dramatic spike was the result of insufficient regulation of the underwriting process, which in addition to lax standards pertaining to due diligence of the underwriters, allowed for stated income mortgages that did not require borrowers to prove their income. Low mortgage rates and rising real estate values, as well as the willingness of investment banks to purchase and securitize mortgages in the secondary markets created a perfect storm that swept up the nation's most regulated industry into a swift and violent collapse. Indeed, Demyanyk et. al., (2011) states that the evidence of the upcoming crisis was apparent long before the downfall began, however, rising real estate prices in 2003 through 2005, helped to obscure the evidence of the impending problems.

Credit rating agencies, compensated by the very entities they were analyzing, were willing to assign investment grade credit ratings to collateralized debt obligations (CDOs) laced with subprime mortgages, in large part because they were projecting unsustainable growth in the value of US real estate to continue in perpetuity. The deregulation, subprime lending, interest only lending and negative amortization loans

helped to further inflate real estate values, which in turn perpetuated poor lending practices (Pavlov et. al., (2010)). According to Pavlov, US regions that experienced greater degrees of subprime lending, demonstrated higher growth rates in real estate prices and subsequently experienced greater declines in real estate prices. The warning signs have been there long before the crises unfolded, Andrews (2007) stated that seven years prior to the credit crunch, a Federal Reserve Governor, Edward Gramlich, tried to sound an alarm, warning that a new generation of mortgage lenders was using unsavory practices in order to lure subprime borrowers into mortgages that they potentially could not afford.

In fact, loan originators were able to sell the mortgages in the secondary markets with absolutely no recourse, while pocketing the hefty fees, this breed of unregulated lenders used these tactics and helped to further exacerbate the eventual crisis. Piskorski et. al., (2010) and Keys et. al., (2010) find that default rates are significantly lower on loans that banks originate and hold on their books than on loans that banks originate and sell in the secondary markets. Thus, the ability to shift risk post origination process intensified moral hazard and resulted in greater lending to borrowers not capable of ever paying back the loans. The subprime crisis impacted commercial lending as well, Santos (2011) finds that firms that borrowed money from banks that incurred large losses tended to pay higher spreads and were able to borrow less per transaction, than firms who borrowed from healthier banks that avoided the subprime markets.

Indeed, the Great Recession was the greatest crisis since the Great Depression of the 1930s. Bernanke (1983) finds that in addition to the reduction of the money supply and the reduction in the wealth of bank shareholders, a credit crisis reduces the ability of financial intermediaries to bridge the information gap between market participants, lenders and borrowers. As a result, the credit tightens further and the borrowing costs increase, which further intensifies the economic downdraft. Even though there are many similarities between the Great Depression and the Great Recession, there are some obvious differences (Mishkin (2011) and Brunnermeier (2009)) instead of the 1930s style bank with people lining up at the banks, the money flowed out electronically or was simply not lent to banks on short term basis by lenders who required the use of existing mortgage bank securities on the banks' balance sheet as collateral. Short-term lenders enforced substantial haircuts to the value of the collateral, thus further exacerbating the borrowing problems for banks, causing them tremendous liquidity problems.

The purpose of this paper is to examine banks in two different regions of the US prior to the credit crisis. I look at all banks in the state of Arkansas and compare them to banks in Florida. Arkansas banks proved to be prudent leading up to the credit crisis, avoiding the temptation to join the race to increased profitability through by augmenting risk on their balance sheets. Florida banks, on the other hand, limped out of the credit crisis looking for potential acquirers to rescue them from being shut down. Indeed, Dell'Ariccia et. al., (2006) finds that regions that exhibited faster credit growth were also identified as regions with declining credit standards. As a result of this discrepancy in the appetite for risk, few of the Florida banks were acquired by the prudent banks in Arkansas. Arkansas' Centennial Bank closed seven such FDIC assisted purchases of Florida banks (Walden (2012)). I will look at the financial ratios of the Arkansas and Florida banks to establish differences in risk taking, lending, capital and the degree to which the banks in the two states rely on purchased funds versus their respective deposit bases. Gambacorta et. al., (2011) confirms that bank characteristics impact the lending decision, especially during a credit crisis. In particular, Gambacorta et. al., states that bank with less capital and a stronger reliance on purchased funds and on noninterest income were more likely to reduce credit availability. Thus, this paper will be able to identify any substantial differences in balance sheet structure of the banks in both states that impacted their lending behavior. In case of Florida banks, such actions likely further perpetuated already weakened economic conditions in the region.

DATA

The data for this study was collected from the Call Report data filed with the Federal Reserve Bank. The complete list of all commercial banks that submitted Call Reports in 2005 and 2008 was obtained from the Federal Reserve Bank of Chicago website. The year 2005 was selected because it was identified

as the last full year before the onset of the subprime mortgage crisis, and 2008 was selected because it represents the period when the crisis reached its most destructive period, culminating in the failure of Lehman Brothers. The data was collected on the unit bank level and aggregated based on the bank holding company codes. From the complete list of banks in 2005 and 2008, banks operating in Florida and Arkansas were isolated. Table 1 contains the definitions of all variables that were utilized in the study. Additionally, Table 1 serves as a key to the data abbreviations used throughout the paper, and demonstrates how the variables were calculated. The descriptive statistics are in Tables 2 and 3. Specifically, Table 2 contains descriptive statistics for the sample of Florida and Arkansas banks operating in 2005, and Table 3 presents the statistics for the sample of Florida and Arkansas banks operating in 2008.

METHODOLOGY

The goal of this research is to isolate differences in factors that differentiated the performance of Florida and Arkansas banks leading to and during the subprime credit crisis. The samples of banks and their respective performance data is obtained for all commercial banks doing business in Florida and Arkansas that filed Call Reports with the Federal Reserve in 2005 and 2008. There were 232 and 244 banks in Florida in 2005 and 2008, respectively. There were 123 and 114 banks in Arkansas in 2005 and 2008, respectively. Only those banks that furnished all of the required data were retained in the samples.

To conduct the analyses, two logit models are constructed to evaluate the bank samples. The first logit model looks at the difference between bank characteristics between Florida and Arkansas banks in 2005, and the second logit model examines the same variables in 2008. The logit model has a binomial dependent variable. In these regressions, the dependent variable is given a value of 1 for all Arkansas based banks, and is assigned a value of 0 for all Florida based banks. The following models are analyzed for both samples of banks:

STATE DUMMY = ROE + PRFMRG + ASSUTIL + LOANLOS + NINEXOP + INTMRG + OVREFF + LOANASS + COMLOAN + REALOAN + DEPDEBT

Prior to the analysis, the correlations between variables are examined to avoid problems with multicollinearity. The goal of the models is to identify bank characteristics that differentiated business practices of the Florida and Arkansas banks. This analysis will help to understand why the banking industry in Arkansas fared better during and after the crisis, fostering a string of acquisitions by Arkansas banks in Florida as the direct result of the crisis.

RESULTS

The goal of this paper is to identify structural differences between the balance sheets of Arkansas and Florida banks in 2005 and 2008. As was stated above, at the conclusion of the crisis, Arkansas banks were in an enviable position to be able to acquire Florida's failing commercial banks. This paper will reveal why these two groups of banks ended up on the opposite sides of the bargaining table coming out of the Great Recession. The year 2005 is selected because it is the last full year before the onset of the subprime mortgage crisis and 2008 represents the trough. The results of the logit regression examining banks in the 2005 sample are presented in Table 4. It is evident that Arkansas banks had smaller INTMRG (-92.69, z-statistic= -3.86). This result provides some evidence that Arkansas banks were less inclined to chase higher yielding, riskier investments, which hurt their net interest margin. Arkansas banks had a lower LOANASS and REALASS (-2.48, z-statistic=-2.17 and -11.56, z-statistic=-5.52, respectively.) This result indicates that smaller proportion of Arkansas banks' assets were invested in the loan portfolio, the riskiest and most profitable asset category on a bank's balance sheet. Furthermore, Arkansas banks had fewer real estate loans as a percent of total assets than their Florida counterparts. This result further highlights a greater aversion to risk by Arkansas banks than the Florida banks. Even though Arkansas

banks devoted a smaller percentage of their assets to the loan portfolio, they were more conservative in assessing the potential credit risk of their loans with significantly higher LOANLOS (5.25, z-statistic=1.66), thus once again demonstrating a more conservative approach to banking than the sample of Florida banks. Also, Arkansas banks were more efficient in managing their overhead. In Table 5, OVREFF is higher for Arkansas banks than Florida banks (1.98, z-statistic=1.68.)

Table 5 presents the results of a similar logit regression comparing samples of Arkansas and Florida banks in 2008, which is recognized as the year when the credit crisis reached its greatest depth. The 2008 model offers a couple of similar results, but also shows a few additional differences between the two samples of banks. The two characteristics significant in 2008 that were not significant in 2005 are ASSUTIL and NINTEXOP (46.93, z-statistic=2.29 and -7.47, z-statistic=-3.9, respectively.) Thus, Arkansas banks were producing higher levels of operating income as a percent of total assets, proving to be able to use their assets more efficiently to produce an industrial's firm equivalent to sales. Significantly higher noninterest expenses by Florida's banks may indicate the burden of dealing with the costs of foreclosures. The remaining results are similar to 2005. Arkansas banks have lower LOANASS and REALASS (-5.26, z-statistic=-3.68 and -5.57, z-statistic=-2.31, respectively.) Arkansas banks also continue to demonstrate higher levels of efficiency by producing higher levels of noninterest income per dollar of noninterest expense (OVREFF, 3.25, z-statistic=2.3.)

CONCLUSION

This paper aimed to identify differences in performance metrics between Arkansas and Florida banks prior to and during the subprime mortgage crisis. The study aimed to highlight the characteristics that may have aided Arkansas banks in assuming the role of acquirers of Florida banks in the wake of the credit meltdown. Profound differences were illuminated between the two groups of banks. Arkansas banks demonstrate a more conservative approach to doing business by devoting a smaller proportion of their assets to loans and a smaller percentage of their loans to real estate. In 2005, Arkansas banks were also more conservative in assessing the riskiness of their loan portfolios by allocating higher loan loss reserves than Florida banks. In the trough of the recession, Arkansas banks are more efficient in using their assets to produce revenues and are better able to manage their noninterest expenses. These results clearly show a difference in philosophical approach to banking by firms in the two regions. These results should be considered by state and federal bank regulators in order to reduce risk and increase efficiency of commercial banks across the country.

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TABLE 1
THIS TABLE CONTAINS DEFINITIONS AND ABBREVIATED NAMES OF THE VARIABLES USED IN THE PAPER.

Variable Name	Variable Definition
ROE (%)	Return on equity (net income/equity)
PRFMRG (%)	Profit margin (net income/operating income)
ASSUTIL (%)	Asset utilization (operating income/assets)
LOANLOS (%)	Provision for loan losses to operating income
INTMRG (%)	Net interest margin (interest income - interest expense) / (earning assets)
OVREFF (%)	Overhead efficiency (non-interest income/non-interest expense)
LOANASS(%)	Total loans to total assets
COMLOAN (%)	C&I loans to total loans
REALASS (%)	Real estate loans to total loans
DEPDEBT (%)	Total deposits to total debt

TABLE 2
DESCRIPTIVE STATISTICS OF THE 2005 SAMPLES.
FLORIDA (N=232) ARKANSAS (N=123).

	Panel A: Arkansas Banks					Panel B: Florida Banks				
Variable	**Min**	**Max**	**Mean**	**Std. Error**	**Std. Dev.**	**Min**	**Max**	**Mean**	**Std. Error**	**Std. Dev.**
ROE	-.782	.394	.090	.009	.104	-.221	.397	.085	.006	.097
PRFMRG	-1.149	.412	.137	.017	.191	-4.425	.477	.022	.037	.565
ASSUTIL	.021	.142	.062	.001	.013	.009	.591	.058	.003	.038
LOANLOS	-.053	.917	.046	.009	.101	-.106	.515	.056	.006	.087
NINEXOP	.249	1.987	.493	.017	.184	.109	5.519	.631	.042	.643
INTMRG	.015	.066	.041	.001	.008	.010	.196	.043	.001	.017
OVREFF	.009	.834	.279	.012	.132	.000	1.395	.206	.011	.168
LOANASS	.094	.912	.605	.013	.147	.019	.951	.683	.011	.168
COMLOAN	.035	.743	.236	.013	.141	-.067	.926	.134	.008	.117
REALOAN	.219	.923	.647	.014	.156	.000	1.000	.823	.009	.141
DEPDEBT	.689	.998	.922	.006	.067	.000	.999	.916	.007	.109

TABLE 3
DESCRIPTIVE STATISTICS OF THE 2008 SAMPLES.
FLORIDA (N=244) ARKANSAS (N=114).

	Panel A: Arkansas Banks					Panel B: Florida Banks				
Variable	**Min**	**Max**	**Mean**	**Std. Error**	**Std. Dev.**	**Min**	**Max**	**Mean**	**Std. Error**	**Std. Dev.**
ROE	-.782	.394	.090	.009	.104	-2.781	18.976	.016	.081	1.258
PRFMRG	-1.149	.412	.137	.017	.191	-7.436	.319	-.263	.045	.706
ASSUTIL	.021	.142	.062	.001	.013	.006	.162	.057	.001	.016
LOANLOS	-.053	.917	.046	.009	.101	-.010	2.416	.220	.016	.255
NINEXOP	.249	1.987	.493	.017	.184	.110	7.564	.689	.042	.663
INTMRG	.015	.066	.041	.001	.008	.006	8.244	.068	.034	.526
OVREFF	.009	.834	.279	.012	.132	-1.289	.859	.130	.011	.167
LOANASS	.094	.912	.605	.013	.147	.009	.923	.706	.009	.145
COMLOAN	.035	.743	.236	.013	.141	.000	1.000	.138	.008	.122
REALOAN	.219	.923	.647	.014	.156	.000	.995	.828	.009	.141
DEPDEBT	.689	.998	.922	.006	.067	.339	.999	.897	.006	.090

TABLE 4
RESULTS OF A LOGIT REGRESSION WHERE THE DEPENDENT VARIABLE IS EQUAL TO 1 FOR ALL BANKS BASED IN ARKANSAS IN 2005 AND EQUAL 0 FOR ALL FLORIDA BASED BANKS.

Variable	Coefficient	Std. Error	Z-Statistic	95% Conf. Interval	
ROE	3.39	2.60	1.30	-1.71	8.49
PRFMRG	1.05	2.32	0.45	-3.50	5.60
ASSUTIL	9.96	6.49	1.53	-2.77	22.69
LOANLOS	5.25	3.16	1.66*	-0.93	11.44
NINEXOP	-1.41	1.48	-0.95	-4.32	1.50
INTMRG	-92.69	24.04	-3.86***	-139.82	-45.57
OVREFF	1.98	1.18	1.68*	-0.33	4.30
LOANASS	-2.48	1.15	-2.17**	-4.73	-0.24
COMLOAN	-3.49	2.35	-1.48	-8.09	1.12
REALOAN	-11.56	2.09	-5.52***	-15.66	-7.45
DEPDEBT	0.93	1.76	0.53	-2.53	4.39
Constant	12.21	2.96	4.12***	6.40	18.02

Model chi2 =153.05***
* Indicates statistical significance at 0.10 level.
** Indicates statistical significance at 0.05 level.
***Indicates statistical significance at 0.05 level.

TABLE 5
RESULTS OF A LOGIT REGRESSION WHERE THE DEPENDENT VARIABLE IS EQUAL TO 1 FOR ALL BANKS BASED IN ARKANSAS IN 2008 AND EQUAL 0 FOR ALL FLORIDA BASED BANKS.

Variable	Coefficient	Std. Error	Z-Statistic	95% Conf. Interval	
ROE	-1.49	1.13	-1.32	-3.70	0.72
PRFMRG	0.24	2.66	0.09	-4.97	5.46
ASSUTIL	46.93	20.47	2.29**	6.81	87.04
LOANLOS	-3.54	2.44	-1.45	-8.32	1.25
NINEXOP	-7.47	1.92	-3.9***	-11.23	-3.71
INTMRG	-2.33	3.50	-0.67	-9.2	4.53
OVREFF	3.25	1.41	2.3**	0.48	6.01
LOANASS	-5.26	1.43	-3.68***	-8.07	-2.46
COMLOAN	0.03	2.74	0.01	-5.35	5.41
REALOAN	-5.57	2.41	-2.31**	-10.30	-0.84
DEPDEBT	0.54	2.00	0.27	-3.38	4.45
Constant	7.13	3.44	2.07**	0.39	13.88

Model chi2 =189.72***
* Indicates statistical significance at 0.10 level.
** Indicates statistical significance at 0.05 level.
***Indicates statistical significance at 0.05 level.

Integrating Direct Marketing Programs/Courses into Business Schools: An Examination of its Penetration and Scope

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Efforts by Marketing EDGE (Direct Marketing Educational Foundation) have borne fruit. Direct/ interactive marketing is now recognized as an important component of companies' marketing toolbox along with more traditional tools in marketing. This paper estimates how far programs/courses in direct marketing have been included in a broad sample of schools by examining websites of a systematic sample of AACSB-accredited colleges and universities to determine their course offerings in direct/interactive marketing. Findings from the initial sample showed less than 13% had courses in direct/interactive marketing. An expansion of the search to DME attendees in 2012 then later the list of schools in the Marketing Edge website found one full program and a variety of sub-programs among schools actively participating in the DMEF conference. This paper is a general review of where the discipline stands with regards to course availability among AACSB accredited U.S. universities and demonstrates the discipline's expansion into new and different areas largely because of technology.

BACKGROUND

The Direct Marketing Educational Foundation (DMEF), now renamed Marketing EDGE, has been very active in promoting Direct/Interactive Marketing as a viable program in colleges and universities for more than two decades. Today, with the variety of activities sponsored by Marketing EDGE as well as resources allocated in the form of grants, workshops, conferences and publications in the last twenty years, more and more colleges and universities have been offering courses -- and even whole programs in direct/interactive marketing (Spiller and Scovotti, 2008; Katzenstein, et. al., 1993; McCorkle, 1997).

Direct marketing has been practitioner-driven throughout its history. Scovotti and Spiller (2006) chronicled the evolution of the practice of direct marketing from its origins as early as 1667 to what it has become today. Practitioners took advantage of available resources and technology to reach out to customers in primarily non-store situations. In the course of doing so, they have tried and tested techniques as they progressed, establishing what works and what didn't for more than a century.

In the 1980s and 1990s, academics, with the support of the DMEF became involved in teaching and exposing their students to this growing field. In order to promote its visibility among students, DMEF engaged in a myriad of activities to keep academics interested in doing research and publishing in the field as well as exposing them to the state of the art in practitioner techniques through sessions in the Direct Marketing Association's (DMA) conference. Scovotti and Spiller (2006) sought to clarify the exact

nature of direct marketing by trying to reconcile perceptions between practitioners and academics. In an effort to arrive at a definition, they did a content analysis of textbook definitions from introductory marketing, integrated marketing communications (IMC), and advertising and found 19 different definitions. They then surveyed practitioners to determine how strongly terms used by academics in textbooks and conference publications were related to practitioners' ideas of direct marketing. The definition they came up with was that direct/interactive marketing is "a database-driven interactive process of directly communicating with targeted customers or prospects using any medium to obtain a measurable response or transaction via one or multiple channels" (Scovotti and Spiller, 2006).

Over the years, courses in direct/interactive marketing include separate courses representing different aspects of this definition. In the 1990s, books were written on "Database Marketing" (Nash, 1993), and the 2000s, "E-Commerce," "E-Marketing" (Strauss and Frost, 2009), "Customer Relationship Marketing" (Greenberg, 2001) and "RFM (Recency, frequency, and monetary value)" (Libey and Pickering, 2005). These textbooks were critical tools that facilitated instructors' attempts to develop courses in various aspects of direct/interactive marketing. However, some of the more passionate and enthusiastic instructors designed their courses with no required books, putting together their own materials.

Although colleges and universities listed in Marketing EDGE provided specific courses in Direct/Interactive Marketing, many other colleges and universities could be covering concepts related to direct/interactive marketing through other courses. Textbooks in marketing can no longer ignore digital, social, and mobile marketing without being criticized for lack of currency in the field. Zahay et.al., (2010) attempted to approach direct/interactive marketing by trying to distill the myriad activities into fundamental competencies necessary for implementing direct/interactive marketing activities. Their conceptual model of the direct marketing process breaks down the activities to where it would be easier to find coverage of competencies in marketing courses not specifically labeled "direct marketing" or "interactive marketing." It also enables measurement of competencies for purposes of assessment of programs.

In the 1990s, the early editions of direct marketing textbooks primarily contained chapters that detailed traditional direct marketing media, i.e., print (catalogs, direct mail), television (infomercials, home shopping), telephone (telemarketing); while incorporating database (Katzenstein et. al., 1993) and emphasizing the need for tracking success (David Shepard Asso., 1995; Rogers and Berger, 1997). Since then, the development of technological tools have exploded in the marketplace as the internet became the alternative of choice during the second half of the 1990s culminating in the dot.com bubble bursting (James, 2000). As marketers stepped back to regroup, more realistic, profit-oriented business models have taken over.

Partly in response to Marketing EDGE's efforts as well as faculty interface with practitioners, courses were developed in direct marketing (Mitchell and Strauss, 2001). Over the years, these included incorporating Direct/Interactive Marketing in overview courses like Principles of Marketing and Principles of Advertising, then to designing courses in direct/interactive marketing (Roberts and Berger, 1999; Stone and Jacobs, 2008; Spiller and Baier, 2012), as well as to more specific courses like Database Marketing (Nash, 1993), Electronic Commerce/Marketing, Internet Marketing, and Social Media Marketing (James, 2000; Mitchell and Strauss, 2001; Barker et. al., 2012; Schneider, 2013).

In 2008, Spiller and Scovotti reported findings of their study on the currency of the Introductory Marketing Courses, as it pertains to its treatment of direct/interactive marketing. Their findings showed a gradual increase in the coverage -- though with varying degrees -- among textbooks. They also found a pattern among faculty regarding amount of coverage in courses. Younger faculty members who were closer to the start of their careers were more likely to report coverage while faculty members who were late in their careers were less likely to do so.

The http://www.marketingedge.org/students/marketing-education-resources (2013) website of the Marketing EDGE reported 183 colleges and universities who offered courses in direct/interactive marketing in 2013. This reflected around 20 percent increase from 1997 (McCorkle, 1997). In 2010, Zahay et.al., reported that according to the DMEF in 2011, "less than 15 percent of universities offer

courses in direct or interactive marketing and less than 2 percent offer related degrees, certifications and specializations within related majors."

PURPOSE OF THE STUDY

Since the direct/interactive techniques have become so important a tool in the marketing arsenal, colleges and universities should try to keep up by training students in the most effective techniques of marketing for when they reach the workplace. The purpose of this study is to measure the success of all these efforts on a broader scale. In other words, to what degree has the teaching of direct/interactive marketing kept pace with its growing importance in business among colleges and universities in the United States.

METHODOLOGY

The authors examined topics covered in a sample of textbooks in direct/interactive marketing as well as books on specific aspects of direct/interactive marketing to show the expansion of coverage in the area as the industry has evolved. This was done through a content analysis of each book's table of contents recording the number of pages devoted to each of eighteen major topics. The variations in topics reflected the current scope of direct/interactive marketing covered in courses.

Where initial textbooks focused on traditional direct marketing media (e.g. catalogs, direct mail, etc.), current textbooks are expanding their coverage of digital marketing (e.g. social media, mobile, etc.). Based on the major topics covered in direct marketing textbooks, the authors searched for courses on "direct marketing," "interactive marketing," "database marketing," "e-Commerce," "e-Marketing," "Internet Marketing," "Digital Marketing," "Social Media Marketing," etc. among the colleges and universities in the sample

The authors selected the list of schools accredited by the Association to Advance Collegiate Schools of Business (AACSB) -- a premier accrediting body for business schools -- as of October, 2012. A systematic sample of a third of all accredited schools in the United States was taken resulting in 162 schools. To be accredited, universities must meet 21 standards, some of which emphasize continuous improvement. Having a course in direct/interactive marketing represents innovation in the marketing curriculum and it is expected that AACSB accredited schools would offer this course.

All universities have websites containing course offerings and course catalogs online making it relatively simple to examine and keep track of direct/interactive marketing course offerings – both graduate and undergraduate. Each school's website was analyzed to search for direct/interactive marketing from their catalog (bulletin) in the marketing department and, 1) whether they had a full program in direct/interactive marketing or just courses, 2) whether courses were required or elective, 3) course titles and 4) how often they were offered. Most schools have more than one semester's schedule online. So, it was easy to see whether the class was offered once a year or both semesters in a year. The bookstore link identified the textbooks being used by the course.

Unexpectedly, the authors found that the resulting percentages turned out to be quite low, (12.3%) for the sample. The authors had speculated that the prevalence of offering courses in direct/interactive marketing in AACSB accredited schools would have been more than the 15 percent (DMEF, 2011) that was reported among colleges and universities overall. So, it was decided to take the list of universities represented by the participants from U.S. universities in the Direct Marketing Educators' Research Summit in October, 2012. It was anticipated that most if not all of those schools will have some direct/interactive marketing courses. This second sample totaled 53.

Then, with rather dismal results, the list of schools in the Marketing Edge website was examined to verify whether there were any schools that had degrees in direct/interactive marketing but were not included in either list (http://www.marketingedge.org/students/marketing-education-resources).

LIMITATIONS OF THE STUDY

There are several limitations to this study. First, only marketing departments' websites were included in the study for every school in the sample. There may be some direct/interactive marketing courses housed in other departments or other colleges/divisions. Since the availability and advocacy for any course rests on faculty, faculty who develop a passion for keeping up with direct/interactive marketing developments are likely to develop and teach those courses. So, database marketing could be housed in a computer information systems department and other courses like social media or viral advertising could be housed in communications or journalism departments.

Second, the authors are only able to report what is in the schools website. If any particular direct/interactive marketing certificate or concentration exists but is not found in the marketing department's website and/or the course catalog (university bulletin), it may not be included in the tally. Third, although there was an attempt to use a systematic sample to enable generalization, because of the low percentages found, the authors resorted into selecting a non-random sample to be able to make a rough comparison.

FINDINGS

Textbook and Topics

An examination of a sample of textbooks shows the topics included in direct/interactive marketing textbooks as well as textbooks on direct/interactive marketing activities, i.e., internet marketing, and social media marketing. Table 1 summarizes these topics and the number of pages devoted to each according to the table on contents. In presenting this table, the authors are trying to show the expansion of topics covered by direct/interactive marketing over the years. First, a comparison of the 1st and the 3rd edition of the Spiller and Baier texts (2005 and 2012) show differences between the seven years of publication. Where mobile marketing didn't exist as a viable area in 2005, the textbook authors devoted nine pages to this topic in the current edition. Another major contrast is the amount of space allotted to digital and social media, where the amount of space increased by 30%.

In 1999, Roberts and Berger devoted 100 pages to print. The 30 pages for digital/social media was really only on digital or internet marketing. Stone and Jacobs (2008) put more emphasis on research (i.e., testing, measurement, and analysis) and designing the message.

The other texts included in Table 1 are of specialized direct/interactive marketing activities, i.e., electronic commerce, social media marketing, internet marketing, and business to business direct marketing. As digital marketing evolved from the late 1990s to the mid-2000s, new search engines were developed, websites were introduced that enabled individuals and companies to offer services that streamlined their own operations and proved to be invaluable for customers. Marketers recognized the power of digital media and implemented strategies to capitalize on its capabilities. Textbooks were written on electronic commerce, electronic marketing, internet marketing, and now social media marketing.

When courses were being offered, it was also relatively easy to determine the textbooks assigned to the course. Only four course offerings in both samples were available. Mostly courses either had a custom book or no textbook was listed.

TABLE 1
CONTENT ANALYSIS OF DIRECT/INTERACTIVE MARKETING TEXTBOOKS

Author	Spiller 3rd ed	Spiller 1st ed	Roberts 2nd ed.	Stone 8th ed.	Schneider 10th ed.	Barker	Roberts	Miller	Scott
Subject	DM	DM	DM	DM	eCommerce	Social M	Internet	Digital	Mktg/PR
Year/Topics	2012	2005	1999	2008	2013	2008	2013	2012	2013
Characteristics	17	17	30	11					29
Growth	3	7							15
Strategic Plan'g				12	21		16	52	30
Databases	20	16	13	13			9		5
Lifetime Value	6	7	21	18	3		30		
Lists	20	21	45	23	12	15		12	
Research	26	26	28	68			29	131	2
Offer	19	24	24	20					20
Message	15	23	18	74					30
Print	17	16	100	36					
Broadcast	10	8	22	18			3		
Mobile	9				5	16	23	16	10
Telephone	9	14	24	20					
Digital/Social Media	31	19	30	44	168	216	159		128
Fulfillment	20	25	16					14	
B2B		14		33	30		28	179	
Ethics and Environment	19	32		2	84		25		
Global	20	21		23					

Programs and Courses

Only 12.3% of the sample of AACSB-accredited universities offered a course in direct/interactive marketing. Most of the courses offered were at the undergraduate level and all of them were elective courses. The pre-requisite for all the courses was the principles of marketing course. With such a small percentage of schools in this broad sample reporting a course in either direct/interactive marketing or specific direct/interactive marketing activities (e.g. electronic marketing, social media marketing, database marketing, etc.), the authors decided to examine the schools represented in the 2012 DMEF conference in Las Vegas (n=53). These, although non-random, were likelier to include schools active in offering programs or courses in direct/interactive marketing. There were 9 universities that appeared in both samples. Five of the nine universities offered a direct/interactive marketing course. Forty percent of the DMEF sample had a direct/interactive marketing course, mostly elective undergraduate courses. Results of the two samples are shown in Table 2.

In addition, nine of the universities that list a course in direct/interactive marketing have not offered the course within the last two semesters (academic year: 2012-2013). Six universities offer the course both semesters and the rest offered the course once a year. Only four universities named the textbook assigned to the course.

TABLE 2
DIRECT/INTERACTIVE MARKETING COURSE OFFERINGS

	AACSB Universities		Universities Attending 2012 DMEF	
	Number	**Percent**	**Number**	**Percent**
Total sample size	162	100.0%	53	100.0%
Direct marketing course offerings				
Undergraduate	20	12.3%	18	40.0%
More than one undergraduate course	1	0.6%	5	9.4%
Graduate	3	1.9%	1	1.9%
Both undergraduate/graduate courses	3	1.9%	1	1.9%
Elective undergraduate	20	12.3%	18	40.0%
Required undergraduate	0	0.0%	0	0.0%

Table 3 shows the course titles of the direct/interactive marketing courses. The table shows a variety of course titles used for direct/interactive marketing, in some cases incorporating specific areas of direct/interactive marketing and in others, courses in specific direct/interactive marketing tools. The majority of the AACSB universities named the course the more traditional "Direct Marketing." More of the Universities attending the Marketing EDGE's Research Summit conference named their course "Interactive Marketing."

TABLE 3
COURSE TITLE OF DIRECT/INTERACTIVE MARKETING COURSES

	AACSB Universities	Universities Attending 2012 DMEF
Direct marketing	11	5
Direct marketing and sales promotion	2	
Direct marketing strategy	2	
Direct and interactive marketing		3
Direct response marketing		2
Direct and database marketing	1	
Direct and multichannel marketing	1	
Direct marketing methods	1	
Interactive marketing	1	3
Interactive retailing	1	
Direct, digital and social media marketing		1
Interactive and digital marketing		1
Interactive digital advertising		1
Interactive marketing strategy		1
Interactive media marketing		1
Internet and direct marketing		1
Multi-channel interactive marketing		1
Creative approaches to direct interactive marketing		1

One possible reason for the low percentage of universities offering a direct/interactive marketing course is that the inclusion of direct/interactive marketing course materials are incorporated in the internet/electronic marketing course or that the internet/electronic marketing course replaced the direct/interactive marketing course. Of the 162 universities, seven (or 4%) offer a direct/interactive marketing course without offering an internet/electronic marketing course. Fifty-five (or 33.7%) universities offer an internet/electronic marketing course without offering a direct/interactive marketing course, and 13 (or 8%) offer both a direct/interactive marketing and an internet/electronic marketing courses.

Marketing EDGE

The seemingly low percentage of direct/interactive marketing courses in the sample led to the examination of the Marketing EDGE'S www.marketingedge.org website. Out of the 183 universities listed on the website as having a direct/interactive marketing course, 38 universities were in the original AACSB sample. Of these, only 8 universities (21%) have a direct/interactive marketing course. Three of these universities did not offer the course within the last academic school year. Twenty-eight (73%) universities have an internet/electronic marketing course listed in their bulletins. Five universities do not have a direct/interactive marketing or an internet/electronic marketing course. These universities may have offered this course in the past but the course could have been removed from their bulletins if they have not been offered for some time or they could have been offered as a special topics course in the past. Most universities have a policy of removing a course from their bulletin when the course has not been offered for two years.

Bachelor's Degrees and Certificate Programs in Direct/Interactive Marketing

The number of universities offering courses in direct/interactive marketing grew to 183 in 2013 from approximately 150 in 1995 (McCorkle, 1997). One hundred eighty three universities and colleges offer their direct/interactive marketing course in their bachelor's degree in Marketing. According to the Marketing EDGE listing, three universities offer a bachelor' degree in direct/interactive marketing:

Alabama State University	B.S.B.A. in Direct Marketing
Fashion Institute of Technology	B.S. in Direct and Interactive Marketing
Mercy College	B.S.B.A in Direct and Interactive Marketing

The websites of the three universities were examined to compare their curricula. Only the Fashion Institute of Technology (FIT) offered a B.S. degree in Direct and Interactive Marketing. See: http://www.fitnyc.edu/2059.asp for a description of their program. Mercy College offers a degree in Master of Science in Direct Marketing, not a bachelor's degree. The curriculum includes a number of direct marketing courses as illustrated on their website:
https://www.mercy.edu/acadivisions/busacctg/grad/directmarketing/grad_dir_mktg.pdf.

Alabama State University offers a B.S. degree in Marketing. There was no reference to a BS degree in Direct Marketing and two courses on direct marketing were listed in their bulletin:

MKT321 Elements of Marketing and Direct Marketing, and
MKT335 Creating Direct Marketing Response, Advertising and Promotion.

(http://www.alasu.edu/academics/colleges--departments/college-of-business-administration/college-of-business-academics/business-administration/bs-in-marketing/index.aspx)

Four universities offer a certificate in direct/interactive marketing:

DePaul University	Pennebaker Direct and Interactive Marketing Certificate
Ferris State University	Certificate in Direct Marketing, course of study includes Introduction to Data Mining.
University of Minnesota - Twin Cities	Direct Marketing Certificate
Southern Oregon University	Certificate in Interactive Marketing and e-Commerce

DISCUSSION AND FINDINGS

Marketing EDGE, through their website and their annual research summit has done a commendable job of supporting the research and teaching of direct/interactive marketing. Despite continued support by Marketing EDGE, the degree of penetration of direct/interactive marketing courses in business schools is low. Since AACSB is a prestigious accrediting body for business, targeting more of the AACSB accredited schools will enhance the visibility of direct/interactive marketing to students.

This study has found that there is some evidence that universities are using the internet/electronic marketing course to cover the material included in a direct/interactive marketing. More universities offer an internet/electronic marketing course than direct/interactive marketing. There was also some evidence that some universities use a textbook on internet marketing for their direct/interactive marketing course.

In most universities the direct/interactive marketing course is an elective. The complement of elective course offerings is usually dependent on faculty interest and expertise as well as universities' budgets. Offering direct/interactive marketing courses depend not only on faculty interest and expertise, but also availability. Marketing EDGE has made strides in increasing faculty interest and expertise in several ways. First, in order to catch doctoral students early, Marketing Edge offers a Best Dissertation Proposal Award which provides $6,000 in financial assistance to conduct research and data collection to support doctoral dissertations. In contrast, other institutions offer a Best Dissertation Award. One idea to encourage dissertation chairs to increase doctoral students' interest in direct/interactive marketing is to offer an award to the doctoral candidate as well as their dissertation chair. Marketing EDGE also offers awards for Outstanding Educator as well as Best Case Writers.

For those schools that were in the forefront of research and courses in direct/interactive marketing, faculty retirements have affected course offerings. There was evidence of schools that listed a direct/interactive marketing course but had not offered the class in a year. As anecdotal evidence, one of the authors comes from a school that has offered a direct marketing course for more than twenty years and had students place honorary mention in the Collegiate ECHO Competition in the past, the retirement of the faculty in charge has resulted in reliance on adjuncts to teach the class while the department seeks a replacement with a similar passion in direct/interactive marketing.

Books and supplementary materials (end of chapter problems, cases, test banks, etc.) in direct/interactive marketing are not as readily available as other marketing courses as indicated by our search for commonly used textbook material. Faculty must be passionate about teaching direct/interactive marketing to spend the time and effort to supplement material in their courses. The DMEF set up the Professor's Academy to provide research and teaching materials to faculty.

Direct/interactive marketing is a lucrative industry for student jobs. One of the authors is from a public university in Southern California. Direct Marketing has resulted in 90,000 jobs in California alone (DMA 2013). A large proportion of student internships for that university's marketing students consist of companies hiring students to handle their online presence. Some jobs involve social media marketing. Students need to be exposed to the panoply of opportunities offered by direct/interactive marketing, both in term of careers and knowledge about what works and what doesn't. Some students and oftentimes faculty do not recognize the connection between direct/interactive marketing and online marketing. Offering courses in direct/interactive marketing or electronic/internet marketing will arm students with some of the skills they need to provide value to companies they work for.

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The Effectiveness of Online Advertising: Consumer's Perceptions of Ads on Facebook, Twitter and YouTube

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The growth of Internet usage has created a platform for businesses to attract and retain customers. While online advertising strategies are used by many businesses, the effectiveness of these methods being used can be debated. This study will provide an analysis of online advertising and its effectiveness. A study was conducted to test the consumer's perception of online advertising on the popular social webpages: Facebook, YouTube and Twitter. Steps were also taken to test a possible gender difference when it comes to consumer's receptiveness to online advertising on these sites.

INTRODUCTION

In 2012, there were 245,203,319 internet users in the United States. This means 78.1% of the American population is on the web (New Media TrendWatch). Many of these users are spending their time on the Internet visiting the most popular social networking sites of today. A study was conducted to test American's perception of online advertising on the popular web pages Face book, YouTube and Twitter. If online advertising strategies are formulated correctly, marketers can target this large segment of Americans who are spending a significant of time on the Internet and the popular social webpages of today.

LITERATURE REVIEW

Today adults of all ages are accessing their favorite websites using their tablets, smartphones, and computers. For some time the Internet has been popular with younger Americans, but research shows that this trend is evolving. Generation X (ages 31 to 44) and Younger Baby Boomers (ages 45 to 54) are beginning to spend a significant amount of time online(Indvik).In fact in 2011 it was reported that 65% of adults use social networking sites (Madden & Zickuhr).

Social networking sites are defined as "web-based services that allow individuals to (1) construct a public or semi-public profile within a bounded system, (2) articulate a list of other users with whom they share a connection, and (3) view and traverse their list of connections and those made by others within the system" (Boyd& Ellison, 2007, p. 211). The three most popular social networking sites of today are Facebook, YouTube and Twitter. Each of these webpages can be accessed through a consumer's tablet, smartphone, and/or computer.

Accounting for 7.07% of all American web traffic, Facebook is the most visited website in the United States (Dougherty, 2010). There are over one billion Facebook users worldwide. In the United States, there are currently 159,646,460 active users on this social webpage (Rezab). In April of 2013, there were 618 million active users and 680 million mobile users. On average there were 2.7 billion "likes" daily and 240 billion photos uploaded daily in April (Smith C).

With over 200 million users, Twitter also earns a spot as one of the most popular social websites of today. Twitter is a social networking/micro blogging site that attracts over 35 million users to its website monthly (Nielson, 2013). It is also reported that 27 million users access the site through their mobile phone's Twitter application (Nielson, 2013).

After pulling in 124,073,000 unique users in January, YouTube was identified by Nielsen as the Top Entertainment brand of 2013 (Nielson, 2013). YouTube is defined as a video sharing website, but is more recently positioning itself as a social networking webpage. YouTube has many of the social features that Facebook and Twitter users have access. Similar to Facebook and Twitter, YouTube users have the ability to comment on media, upload media, share media, and be exposed to real time updates. YouTube users also have the ability to rate and "favorite" videos they view. YouTube account holders can subscribe to different channels just as a Facebook user could "like" a page or a Twitter user could "follow" another person or company. In April 2013, YouTube had 1 billion unique monthly visitors (McCue, 2013).This statistic illustrates the popularity and usage of this social networking page.

Consumer's usage of Facebook, Twitter and YouTube has caught the attention of many businesses. Out of the all the Fortune 500 companies 365 (73%) have created a Twitter account, 330 (66%) have an active Facebook account and 309 (62%) have a YouTube account (Berkman, 2013). While many businesses have an online presence, they may not be effectively communicating with their target market.

MOTIVATIONS FOR USING FACEBOOK, YOUTUBE, AND TWITTER

In order to develop a successful online advertising strategy using Facebook, YouTube, and Twitter, marketers must question what makes these web pages so popular. Research proves that the main motivators for using these web pages are driven by consumer's need to build and nurture social relationships.

It is reported that adults ages 18-65+ use social networking to staying in touch with current friends, family members and old friends they have lost touch with (Smith, A). Another market research publication reports that consumers ranging from 18 to 25 years old use Facebook as an outlet to (1) voyeuristically peer into others' lives, (2) to create a distinctive identity for themselves, and (3) to act on their inner narcissistic tendencies (Sashittal, Sriramach and Ramurthy, Hodis, 2012, p. 1). These findings support the notion that consumers spend time on Facebook, YouTube and Twitter due to their need for social capital. Social capital is defined as "the benefits [consumers] receive from our social relationships" (Lin, 1999). Similar research reports "the major motives for using social network sites [include] – seeking friends, social support, entertainment, information, and convenience" (Kim, Y., Sohn, D., & Choi, S.). The key word in this report is "seeking" which suggests that customers are taking the initiative and may want the authority to choose what they are exposed to in an online environment.

Seth Godin speaks about this marketing strategy when he writes, "By talking only to volunteers, Permission Marketing guarantees that consumers pay more attention to the marketing message. It serves both consumers and marketers in a symbolic exchange" (Godin, 1999). Godin further explains this strategy when he states, "Permission Marketing is the privilege (not the right) of delivering anticipated, personal and relevant messages to people who actually want to get them. It recognizes the new power of the best consumers to ignore marketing. It realizes that treating people with respect is the best way to earn their attention" (Goden). Consumers are constantly surrounded by intrusive advertising, but this does not guarantee the target market is paying attention. Permission Marketing suggests that instead of forcing an audience to view your company's ads ask them if they would like to be exposed to the information.

Some social media web sites have honed in on these Permission Marketing tactics. For example, consumers have the ability to "like" a page on Facebook and the option to "follow" a company on

Twitter. These techniques allow the consumer to *choose* whether or not they would like to be exposed to information, marketing and other online advertising techniques. These less intrusive strategies could prove to be more effective.

It can be argued that there is not a positive relationship between an annoying and ineffective advertisement, but the general consensus is that social web pages such as Facebook, Twitter and YouTube are not the place for an annoying and intrusive marketing strategy. Because Facebook, YouTube and Twitter are very social web pages it is argued that these web pages require unique strategies. Mikołaj Jan Piskorski writes about the difference between digital a social strategies. After analyzing 60 companies that attempted to enter the online social platform this scholar reports, "What the poorly performing companies shared was that they merely imported their *digital strategies* into social environments by broadcasting commercial messages or seeking customer feedback. Customers reject such overtures because their main goal on the platforms is to connect with other people, not with companies" (Piskorski, 2011). Based on this information, businesses may need to learn how to become a part of the conversation to connect with their target audience.

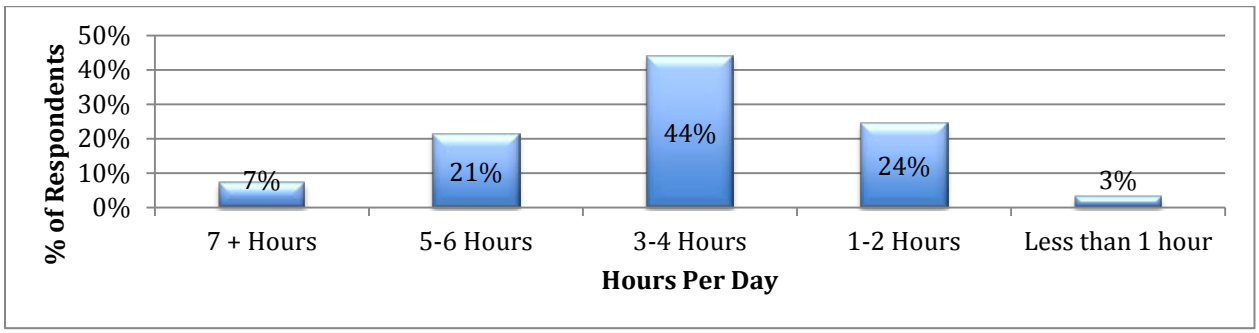
Scholars Pashkevich, Dorai-raj, Kellar, and Zigmond would agree with Piskorski and the notions of Permission Marketing. They write, "Giving users the choice to view (or not view) may actually increase this advertising effectiveness by engaging users in the advertising process. In this way, empowering users to choose the advertisements they watch online need not come at the cost of advertiser value but actually appears to serve the interests of advertisers, content owners and users" (Pashkevich, Dorai-Raj, Kellar, Zigmond, 2012).Many scholars and business professionals agree that by engaging consumers one can increase the effectiveness of their advertisements. But in the world of pop ups and banner ads it does not seem as though marketers are getting the hint.

In order to gauge whether businesses ought to implement a social strategy marketers need to understand and evaluate consumer's opinions towards online advertisements.

RESEARCH AND QUESTIONNAIRE ANALYSIS

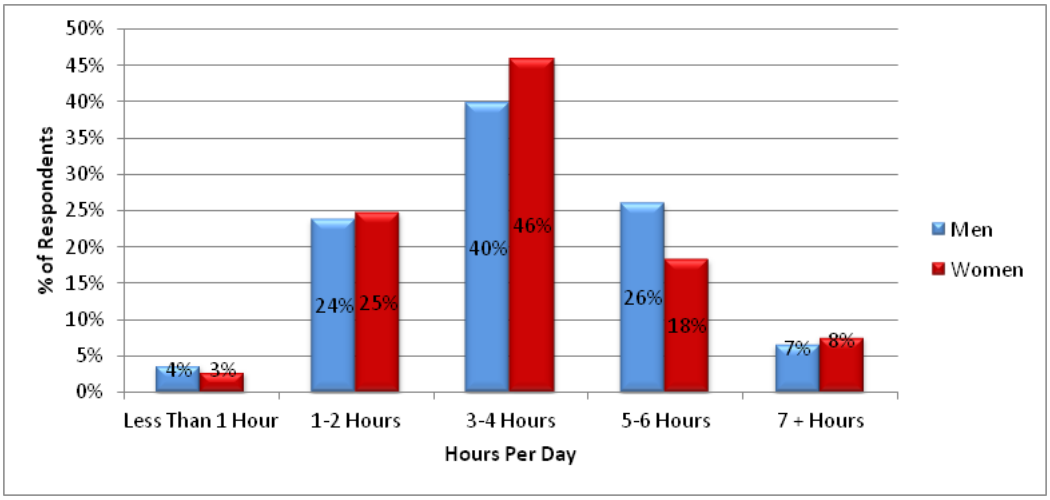
In order to obtain data on this topic, a questionnaire was developed. The following charts and analytical results represent the questions contained in the survey regarding online advertising techniques. The questionnaire was conducted randomly and anonymously in order to get an unbiased and representative sample. From the population, a sample of 388 useable responses were completed of which 64.4% were female and 36.6% were male. Within the sample, a variety of academic majors and professional occupations of all ages were represented. The results reported in this paper will represent a significance level of .05 level and greater. In order to test the assumption that Americans spend a lot of time online, respondents were asked "In a typical day, how much time do you spend on the Internet?" (see FIGURE 1 and 2).

FIGURE 1
TIME SPENT ON INTERNET DAILY



44% of the survey respondents stated they spent 3-4 hours per day online. The results of the survey identified that the majority of respondents spend 12.5-16.67% of their day surfing the web.

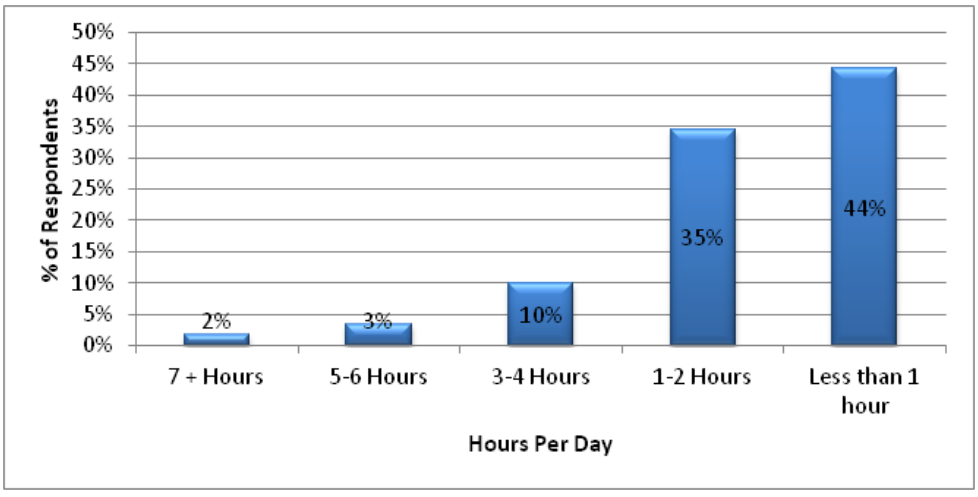
FIGURE 2
TIME SPENT ON THE INTERNET DAILY



The relationship between respondent's gender and amount of time spent online daily is not significant (see FIGURE 2). There was only 1% difference between men and women who identified they spend less than one hour, 1-2 hours, and 7+ hours per day on the web. There was only a 6% difference between men and women within the 3-4 hour category and an 8% difference within the 5-6 hour category. Based on respondents' feedback, it is apparent that men and women spend similar amounts of time on the Internet per day.

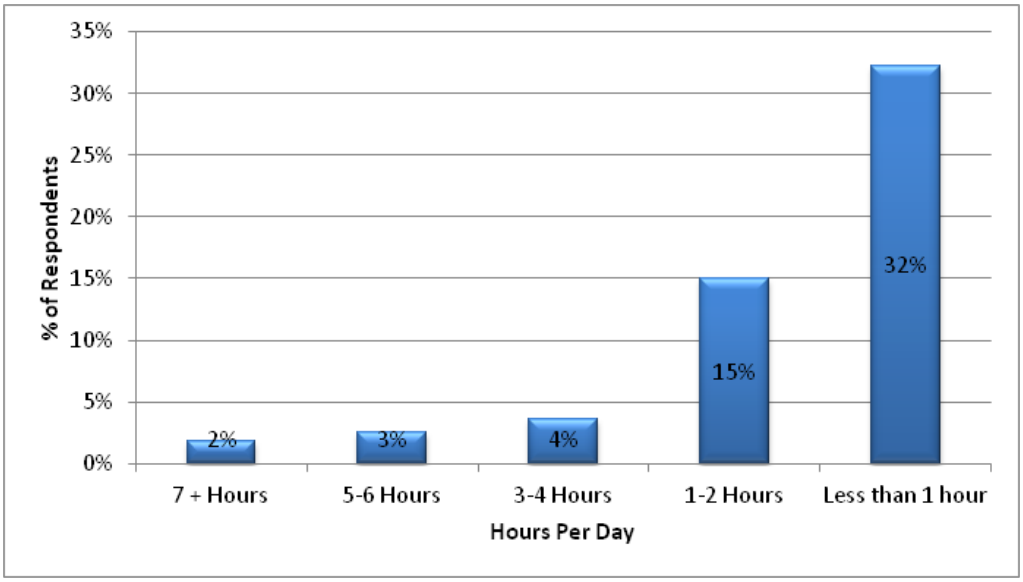
To identify how much of respondent's time spent online was spent visiting the social networking sites Facebook, Twitter and YouTube respondents were asked, "In a typical day about how much time do you spend on the following web pages?" Visual representation of the responses is illustrated in Figures 3, 4, and 5.

FIGURE 3
TIME SPENT ON FACEBOOK



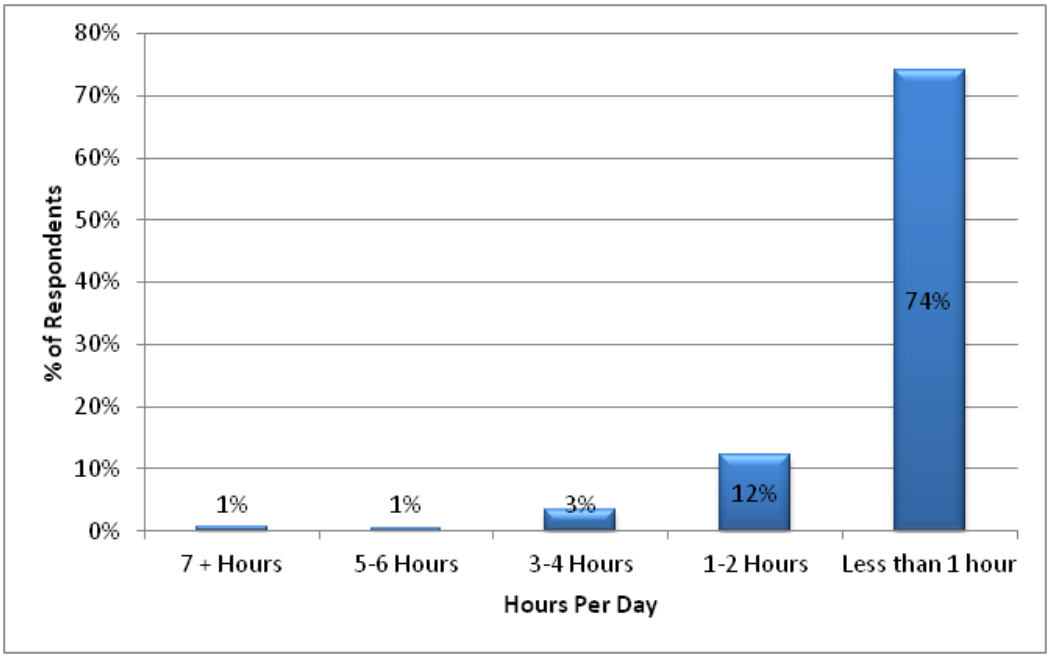
94% of respondents stated they had a Facebook account. Of those respondents, who use Facebook spend 4 hours or less on this social networking webpage per day.

FIGURE 4
TIME SPENT ON TWITTER



56% of respondents stated they had a Twitter account. 91% of respondents who use Twitter spend 4 hours or less on this social networking site per day.

FIGURE 5
TIME SPENT ON YOU TUBE



91% of respondents stated that they accessed YouTube daily. 97% of respondents who access YouTube spend 4 or less hours on this website per day. Based on the findings it can be concluded that the majority of respondents spend less than one hour of their time on each of the social networking sites daily.

During the time spent on Facebook, Twitter, and YouTube, consumers are exposed to many advertisements. In order to gauge consumer's perception of advertising on the web, respondents were asked to what degree they agreed with the statement, "I am annoyed by online advertisements" (see Figure 6).

FIGURE 6
LEVEL OF ANNOYANCE

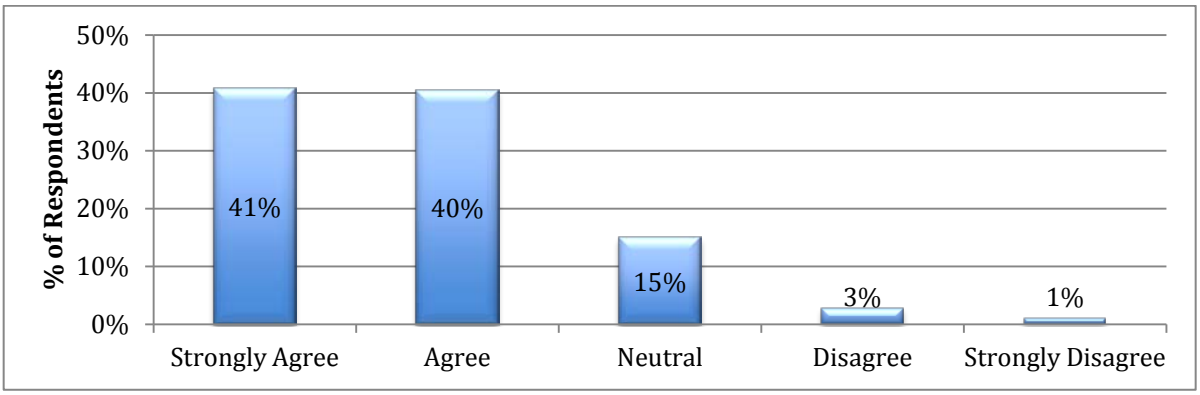
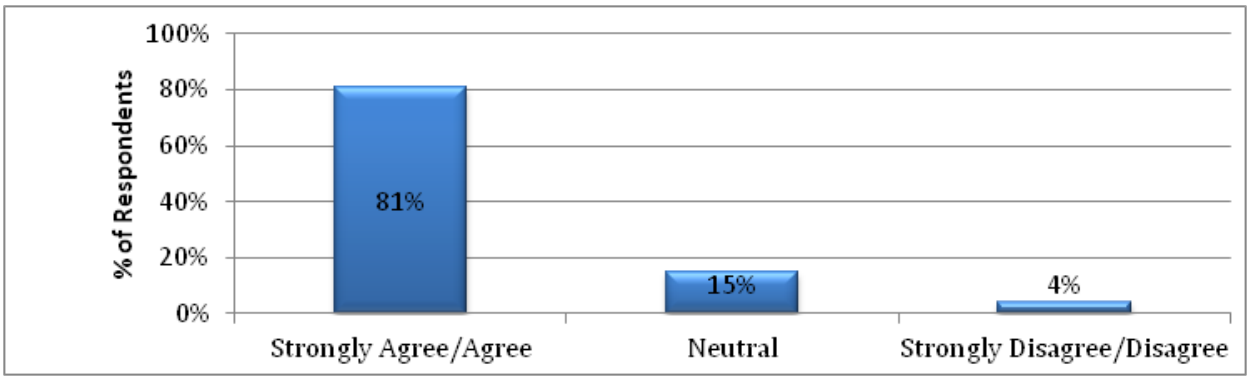


FIGURE 7
LEVEL OF ANNOYANCE
(This table is the accumulated version of FIGURE 6)



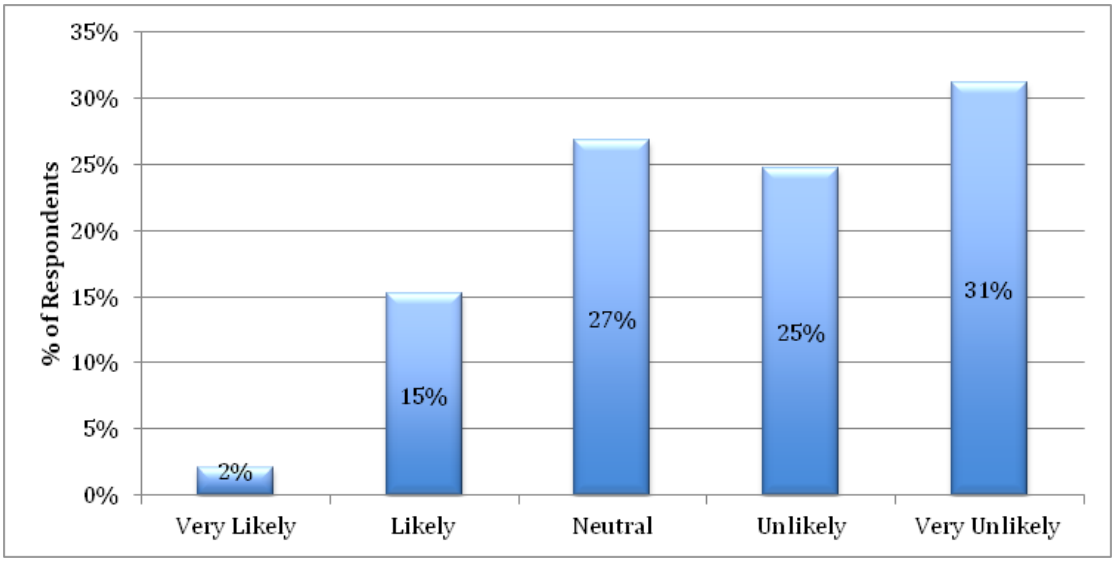
Of the respondents surveyed, 81% agree or strongly agree that they are annoyed by online advertisements. It can be concluded at a 99% confidence level that consumers agree they are annoyed by online advertisements. The mean level of annoyance among all respondents was 4.17 out of a 5-point scale (1=strongly disagree through 5=strongly agree).

There is not a significant relationship between gender and mean level of annoyance. On a 5-point scale (1=strongly disagree through 5=strongly agree) women's mean level of annoyance was 4.16 where men's mean level of annoyance is 4.18. This suggests that men and women are equally annoyed by online advertisements. Just because consumers are annoyed by online advertising does not mean that these

marketing techniques are not effective. For this reason, additional questions were asked to test consumer's receptiveness to online advertising techniques used on Facebook, YouTube and Twitter.

To test the effectiveness of Facebook's Suggested Pages, respondents were asked to respond to the question, "How likely are you to "like" suggested pages on Facebook?" (See FIGURE 8). Suggested pages are arguably the most intrusive advertisement on Facebook. These ads allow marketers to post promotions and other advertisements in the News Feed section of Facebook. Traditionally, a news feed is made up of a user's friend's posts and shared pages. Because a user has the ability to choose who their friends are on Facebook, the user has partial control of the information on their news feed. However, Suggested Pages allow advertisers to promote on a non-fan's news feeds without giving consumers a choice in the matter.

FIGURE 8
HOW LIKELY ARE YOU TO "LIKE" SUGGESTED PAGES ON FACEBOOK?



31% of the survey respondents stated they are very unlikely to "like" a suggested page on Facebook. The mean likelihood of "liking" a suggested page on Facebook is 2.32 out of 5 point scale (1=Very Unlikely through 5=Very likely). With 99% confidence, it can be determined that respondents are unlikely or very unlikely to "like" suggested pages on Facebook. These results propose that consumers are not likely to respond to suggested pages.

To test the effectiveness of Facebook's Standard Ads, respondents were asked to identify their likelihood of overlooking these different techniques (see Figures 9 and 10). Facebook's standard advertisements are usually found along the right-hand side of the page. By clicking on one of these advertisements a consumer would most likely be redirected to webpage offsite. Similar to suggested pages, consumers are involuntarily exposed to the standard advertisements on Facebook.

FIGURE 9
HOW LIKELY ARE YOU TO OVERLOOK ADVERTISEMENTS ON FACEBOOK?

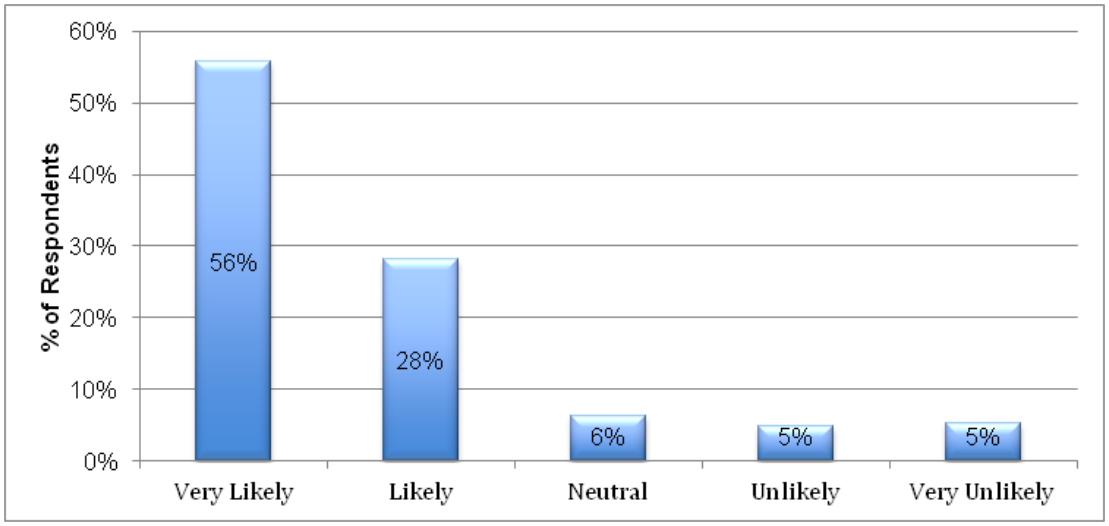
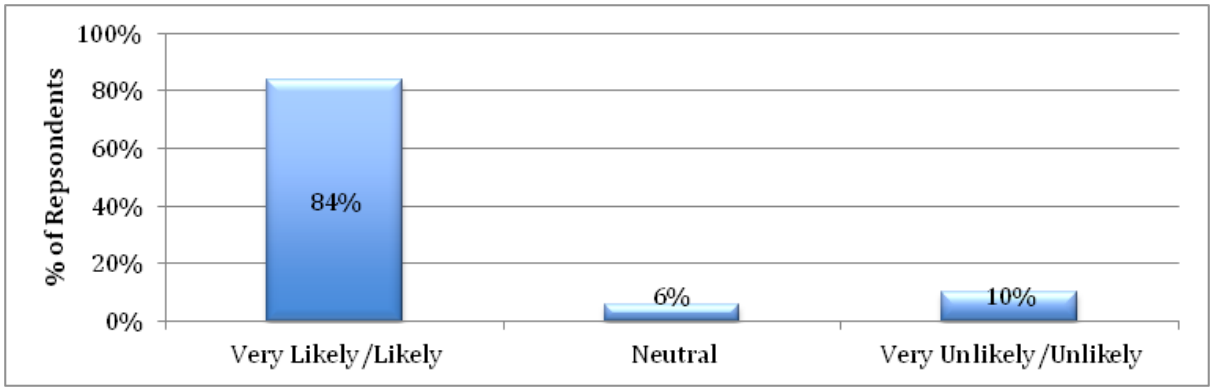


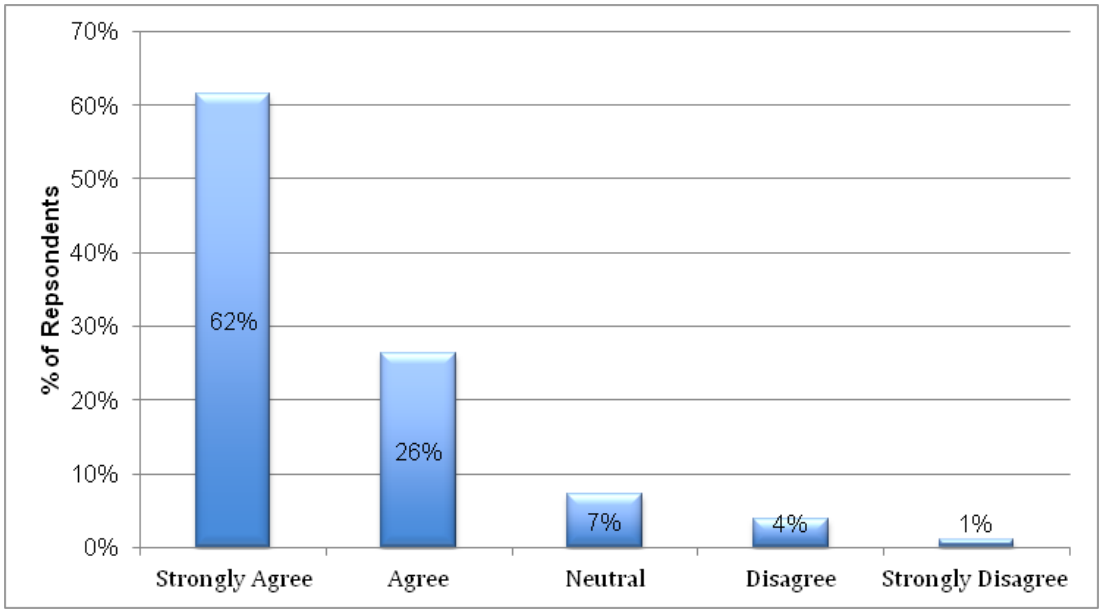
FIGURE 10
HOW LIKELY ARE YOU TO OVERLOOK ADVERTISEMENTS ON FACEBOOK?
(This table is the accumulated version of Figure 9)



84% of all respondents stated they were very likely or likely to overlook advertisements on Facebook. Respondent's mean probability of overlooking advertisements on Facebook is 4.24 out of a 5-point scale (1=very unlikely through 5=very likely).It can be determined that respondents are likely/very likely to ignore advertisements on Facebook. This statistic suggests that consumers are not receptive to this online advertising method.

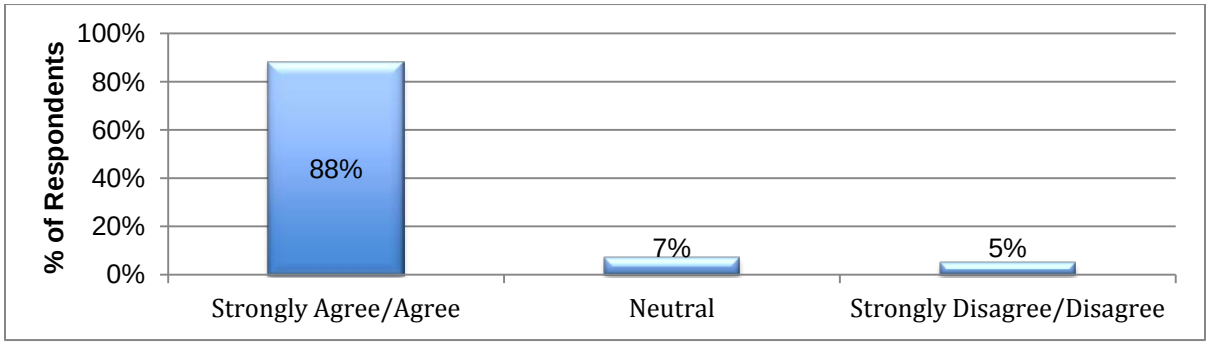
Consumers are involuntarily exposed to YouTube's video advertisements as well. Before being able to view the video on YouTube, users are sometimes obligated to preview an online ad YouTube users cannot control whether they view these advertisements or not. If an advertisement does pop up, users are obligated to watch a portion of the video before having the option to skip the ad To determine how consumers feel about this form of advertising, respondents were asked to what degree they agreed with the statement "I always skip the YouTube Commercials" (see Figures 11 and 12).

FIGURE 11
I ALWAYS SKIP THE YOUTUBE COMMERCIALS



Only 5% of all respondents who use YouTube stated that they sometimes watch the YouTube commercials.

FIGURE 12
I ALWAYS SKIP THE YOUTUBE COMMERCIALS
(This table is the accumulated version of Figure 11)



88% of respondents always skip the YouTube commercials. The mean among for respondents was 4.44 out of a 5-point scale (1=strongly disagree through 5=strongly agree). It can be concluded that when given the opportunity, users will skip the video commercials on YouTube.

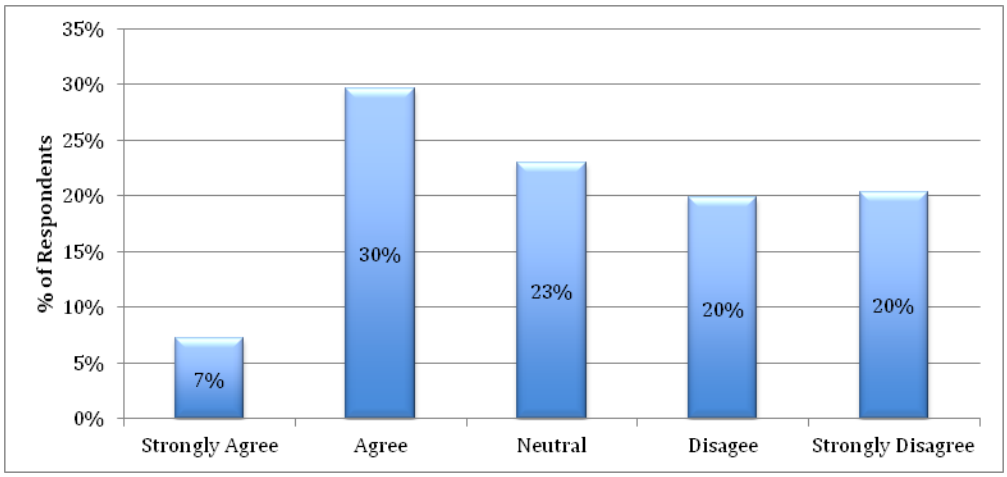
To test the theories of Permission Marketing on social media sites, respondents were asked about marketing strategies that give them the authority to choose whether or not they would like to be exposed to information, marketing and other online advertising techniques.

On Facebook users have the option to "like" business' profile page and on Twitter, users can opt in to "follow" companies. By choosing either of these options, consumers would voluntarily be exposed to information shared by these companies. Facebook's Like Ads are similar to their Standard Ads, but are

designed to drive traffic to a Facebook Page. If a consumer "likes" a company on Facebook, the consumer also gives the company permission to share information that will be seen in a user's news feed. Similar to Facebook, if a user follows a company on Twitter, that company's tweets will be seen in the Twitter feed.

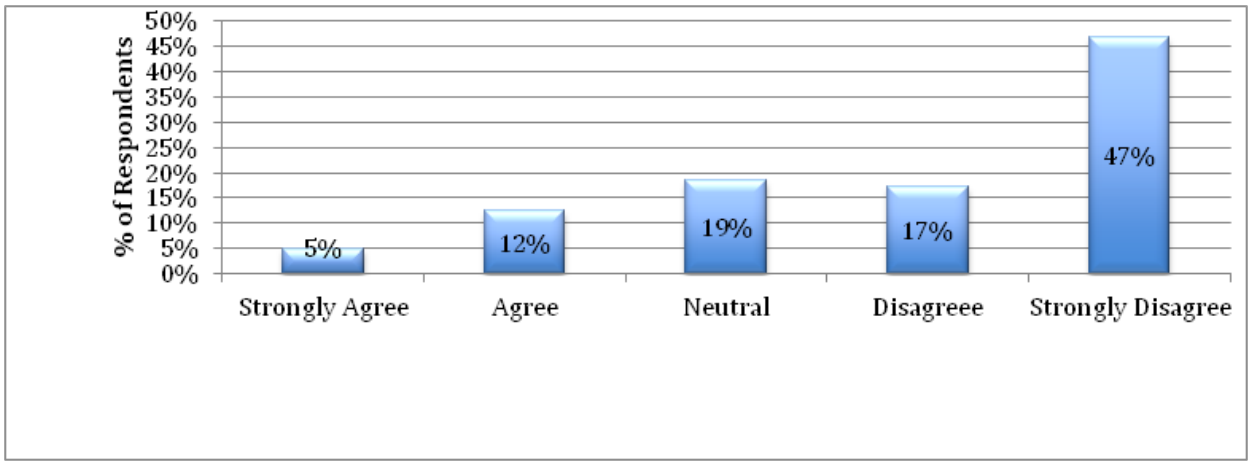
In the survey respondents were asked to what degree they agreed with the statements, "I "like" companies on Facebook" (see Figure 13) and "I "follow" companies on Twitter" (see Figure 14).

FIGURE 13
I "LIKE" COMPANIES ON FACEBOOK



Out of a 5-point scale, the mean response among all respondents was 2.83 (1=strongly disagree through 5=strongly agree). It can be concluded that respondents are more likely to choose not to "like" companies of Facebook. Only 37% of all respondents agreed that they "like" companies of Facebook.

FIGURE 14
I "FOLLOW" COMPANIES ON TWITTER



The mean response among all respondents was 2.11 out of a 5-point scale (1=strongly disagree through 5=strongly agree).It can be concluded that respondents are more likely to choose not to "follow" companies on Twitter. Only 17% of all respondents agreed that they did "follow" companies. These

results suggest that even when given the option to be exposed to online advertisements on social networking sites, consumers will most likely op out.

CONCLUSION

Today, consumers of all ages and demographics are spending a significant amount of their time on the Internet. Due to this trend, businesses have expanded their marketing campaigns to reach consumers through online platforms. As Facebook, Twitter and YouTube have become more popular, businesses are paying to advertise on these popular social networking sites. While most agree that a business should have a social media presence, the effectiveness of these advertising methods is debated.

Facebook, Twitter and YouTube have been identified as the most popular social media sites of today. Millions of Americans access these sites daily. It is assumed that if a business' online advertising strategy is formulated correctly, marketers can effectively target this large segment of the population. In order to develop an effective marketing strategy consumer's opinions and desires need to be considered and acted upon.

After conducting a randomized survey to test consumer's perception of online advertisements, the results were telling. The majority of respondents are not receptive to advertising on their favorite social networking sites. In fact, most are annoyed by online advertisements in general.

After testing the notions of Permission Marketing, it seems that giving consumers the choice to view online ads has little impact on the effectiveness of the advertisements in general. The majority of respondents stated they are not likely to voluntarily be exposed to information shared by businesses.

Overall, respondents are not likely to want to be exposed to information, marketing and other online advertising techniques while on Facebook, YouTube and Twitter. If a company is trying to build a relationship with their consumer, it does not seem as though marketing on Facebook, Twitter and YouTube are not effective advertising techniques.

RECOMMENDATIONS

While this research revealed some interesting findings regarding online advertising strategies, more research needs to be done to determine businesses' place on Facebook, YouTube and Twitter. Since Facebook, Twitter and YouTube are inherently social webpages, it may be beneficial for businesses to try to become a part of the conversation rather than force potential customers to view their ads. It is very important for a business to do their due diligence before implementing their digital strategy on a social networking website. Prior to entering the world of social networking, businesses need to identify who their target market is, understand their market's need and then decide what their strategy will be.

Lastly, businesses must keep in mind that the online world is constantly evolving. Thus, advertising strategies need to constantly be analyzed and updated to suit the market's needs.

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Strategies for Customizing Financial Services Using Clients' Birth Order

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Birth order provides unique insight into individuals' personalities, risk tolerances, and investment needs. Use of this information will allow financial service firms to create a more customized experience for clients. This should increase customer satisfaction and retention, and with appropriate promotion, attract new investors. The practical implementation of birth order segmentation is discussed in a framework that includes the relationship with the financial advisor, investment advice, access to financial services, receptiveness to new products, packaging of services, and promotion of benefits from considering birth order.

INTRODUCTION

The order an individual is born within the family has a profound and long-lasting influence upon the formation of his/her personality and behavior.[1] In the words of one researcher, "birth order is the single most obvious factor that makes the shared family environment different for each sibling" (Sulloway, 1995, p.76). Birth order is a composite variable that incorporates siblings' differences in terms of age, power, and privilege (Sulloway, 1996). It is also antecedent to many bases for segmenting consumer markets (Rink, 1972; Claxton, 1995; Saad, et.al., 2005). Thus, birth order represents a comprehensive and realistic means to better understand individuals.

Use of birth order information has the potential to assist financial service firms in developing and offering more effective market segmentation schemes. This, in turn, will permit them to formulate financial services better attuned to the unique personalities, risk tolerances, and investment needs of their customers. According to one researcher, "neglect of birth order as a targetable demographic factor may be remiss at best, and unprofitable at worse" (Claxton, 1995, p.37).

Financial service companies traditionally use surveys to assess clients' investment needs and attitudes toward risk. However, these questionnaires usually fall short in revealing investors' personalities and financial goals. Several studies have found little or no relationship between individuals' risk preferences derived from surveys and their actual financial decision-making (Lopes, 1994; Warneryd, 1996; Zaleskiewicz, 2001). One weakness of traditional questionnaires is they use hypothetical gains and losses that are often confusing and result in an incomplete picture of customers' true attitudes about risk.

Numerous studies have investigated birth order and its effect upon the development of a person's personality and behavior patterns. Of particular interest are those findings that support a theoretical connection between birth order and consumer behavior (Kirchner, 1969; Rink, 1972; Claxton, 1995; Zemanek, et.al., 2000; Saad, et.al., 2005; Rink, 2010). However, very little exists in the literature conceptually linking birth order and the financial services industry. To help fill this gap, Rink, Roden, and Cox (2013) summarized research findings on birth order-related personality traits that have potential impact on the financial services industry. They discussed the relevant literature in a framework that considers birth order differences in terms of risk tolerance, patience, financial goals, and conformity.

The application of clients' birth order information provides financial service firms the opportunity to develop custom-designed services that will better appeal to customers' personalities, investment needs, and risk tolerances. This paper offers specific strategies for using birth order information to develop and provide a more customized experience for investors. This should increase their satisfaction and retention, which will maximize their lifetime value to the company, and with appropriate promotion, attract new clients. These practical suggestions are discussed in a framework that considers the relationship with the financial advisor, investment advice, access to financial services, receptiveness to new products, packaging of services, and promotion of benefits from using birth order as one of many dimensions in an investor's profile.

SPECIFIC STRATEGIES FOR CUSTOMIZING FINANCIAL SERVICES

Relationship with Financial Advisor

In general, first-born are more dependent, risk-averse, anxious, fearful, cautious, and worrisome than later-born.[2] Financial advisors should expect to spend significantly more time and effort with these customers in investment planning and decision-making as well as in the purchasing and post-purchasing processes. For example, first-born clients are likely to request advisors search a wide variety of different information sources for feasible low-risk investment alternatives and engage in an extensive evaluation of these (McClelland and Winter, 1969; Rink 2010).

After purchasing an investment, first-born clients are likely to experience dissonance or anxiety, because they have lower self-esteem than their younger siblings.[3] This will trigger their affiliation needs. It is crucial first-born find positive confirmation for their purchase. If a first-born client's investment struggles, this will produce stress and anxiety. Because first-born lack a reference point for evaluating their emotional state, they will want or need to affiliate with others, especially those who are, or appear to be, older than them (Schachter, 1959; Warren, 1966; Joubert, 1990; Sulloway, 1996; Salmon and Daly, 1998). Hence, financial advisors must be capable of handling the affiliation needs of first-born investors under such stress-producing situations. Financial advisors and customer service representatives should be trained in techniques for effectively handling assertive behavior that first-born investors are more likely to exhibit when they are anxious and they do not receive prompt and personal attention (Sulloway, 1996; Jefferson, et.al., 1998; Paulhus, et.al., 1999; Rohde, et.al., 2003; Beck, et.al., 2006; Rink, 2010).

First-born are susceptible to interpersonal influences because they are more dependent and possess lower self-esteem (Kirchner, 1969; Sulloway, 1995, 1996, and 2001; Saad, et.al., 2005). Understanding this susceptibility will allow financial advisors to satisfy these needs and maintain a successful relationship. Since first-born also tend to be serious, responsible, punctual, organized, structured, conservative, and traditional (Sulloway, 1996; Jefferson, et.al., 1998; Paulhus, et.al., 1999; Rohde, et.al., 2003; Healey and Ellis, 2007), advisors should mirror these characteristics in their clothing, appearance, mannerisms, speech, demeanor, and punctuality.

On the other hand, later-born possess higher self-esteem and are more independent. As a result, these clients will likely conduct their own evaluation of information regarding companies' financial products/services. They prefer a minimum of suggestion and assistance in decision-making. In addition to researching firms' websites, later-born investors might contact knowledgeable friends. Because later-born are more self-reliant and secure as well as less anxious, fearful, and worrisome than their oldest siblings, they are unlikely to experience post-purchase dissonance and will require little, if any, confirmation of

their purchase. If later-born ask for acceptance from others concerning a purchase, it will be from a few close peers. However, this affirmation will not be critical for dissonance reduction (Rink, 2010).

Financial advisors and investment companies, therefore, should not proactively contact later-born clients, especially to chat, provide general information, and solicit business. If these investors want something, they will contact their advisors.

Investment Advice

First-born usually are patient (Chabris, et.al., 2008; Lampi and Nordblom, 2009; Morgan, 2009; Gilliam and Chaterjee, 2011), risk-averse, anxious, cautious, disciplined, and conservative. Morgan (2009) found first-born have personal discount rates lower than their youngest counterparts. They were willing to wait to receive a higher payout. First-born customers, therefore, are likely to prefer portfolios with conservative asset allocations, such as money market funds, bonds, and blue-chip stocks. They are also more likely to favor passive investment strategies that feature "buy-and-hold" philosophies with long-term perspectives. Such investments would minimize their anxiety, worry, fear, and post-purchase dissonance.

On the other hand, later-born are likely to prefer active investment strategies that include higher-risk securities, such as specific stocks and derivatives, in an attempt to earn abnormally high short-term returns. These riskier strategies are consistent with the inclinations of later-born investors with higher personal discount rates.

Gathering client's demographic information, including birth order, should not change fundamental investment advice, such as diversification and appropriate asset allocation. However, birth order can be an additional tool to help financial advisors better understand a customer's risk tolerance and find the combination of securities with the optimum balance of risk and return. The work for the financial advisor is finding the balance between the easier task of enabling portfolios that match investors' inherent risk inclinations versus the more difficult task of advocating portfolios with appropriate levels of risk that will allow investors to reach their financial goals. In the case of first-born clients, the financial advisor may need to push these investors beyond their comfort level into more aggressive (but still prudent) investment mixes. In contrast, the advisor may need to caution later-born against taking too much risk while still being sensitive to their clients' risk preferences.

The challenge is how to maintain satisfied customers when the investment advice is potentially contrary to the client's instincts. The path of least resistance is to simply follow clients' investment inclinations. However, the inherent conservative investment strategies of first-born may not allow them to reach their retirement goals. Using the insight from birth order, a financial advisor may be able to gently guide first-born customers to a more effective strategy. Similarly, by understanding the source of risk-taking behavior by later-born, financial advisors may be able to moderate the investment strategy by suggesting hedging strategies that work in combination with risky investments.

Assisted Versus Self-Directed Research

In general, first-born are organized, responsible, serious, and prefer structured and controlled lives.[4] If a first-born customer has not used the company's online investment research and analytical tools, they could be offered individual training on the software during a promotional trial period. The training could take place on an iPad or other tablet that the customer gets to keep if they elect to extend their service beyond the trial period. First-born customers who can conveniently track their investment activities on a professional and proprietary website will associate the financial services firm with the characteristics of being organized, responsible, and serious. This will strengthen the relationship between firms and their customers. In addition, this would make first-born investors feel they are in control of their financial future. The ability to check their portfolios and individual investments frequently and conveniently should decrease their anxiety and worry.

Later-born are typically independent, self-reliant, and heavy users of technology. They desire a minimum of suggestion and assistance in decision-making. Such customers, therefore, would prefer exposure to innovative products/services through social media or on the websites of financial services

firms, instead of sending out unsolicited postal mailings or e-mail blasts. In order to appeal to these individuals, the websites and social media should be creative, warm, friendly, fun, colorful, vivacious, and somewhat extravagant (Eisenman, 1987; Moore and Cox, 1990; Bohmer and Sitton, 1993; Sulloway, 1996).

Receptiveness to New Products

First-born tend to be more cautious, insecure, anxious, fearful, worrisome, and dependent than later-born. They are also likely to be conservative, conforming, and traditional as well as prefer the status quo.[5] Thus, first-born are less willing to adopt innovations or try new things (Sulloway, 1995 and 1996; Jefferson, et.al., 1998; Healey and Ellis, 2007).

In a laboratory experiment, Morgan (2009) found first-born required more compensation if they were going to assume more risk. One way first-born customers could be motivated to try new investment services would be through sampling or trial usage. The service, such as online research and analytical tools, could be offered to investors free of charge on a trial basis. This would reduce first-borns' anxiety and perceived risk. Other possible incentives include free software upgrades and price discounts for bundling investment services.

In contrast to first-born, later-born had older siblings to compete with for parental attention (Sulloway, 1995 and 1996; Wang, et.al., 2009). As a result, later-born tend to be more risk-oriented, rebellious, and non-conservative. They are not motivated by tradition and status quo. Thus, later-born clients are more likely to be receptive to new investment products/services. As strong potential first-adopters, they should be the first clients who are offered new services (Rink, 2010).

Packaging of Services

First-born generally are achievement- and success-oriented as well as status conscious.[6] Packaging of promotional materials and reports of investment performance to such customers should project these personality traits. For example, hard copy should look professional and be presented in elegant binders. Website reports should be similarly professional with attention paid to the layout, colors, and fonts. Later-born clients will be less impressed by elegant and expensive packaging than their older siblings. Instead, later-born clients will be attracted to more creative, lively, and colorful packaging.

Use of Technology and Social Media

Later-born tend to be out-going, trusting, sociable, generous, cooperative, and peer-oriented.[7] In a laboratory experiment involving an anonymous investment game, Courtiol, et.al. (2009) found later-born participants displayed significantly more cooperation, trust, and generosity in exchanging monetary rewards than their first-born colleagues. As a result, firms' websites and social media should include chat rooms and forums for later-born customers to share information. Some companies have discovered word-of-mouth communications in online communities increased their sales (Chevalier and Mayzlin, 2006; Dwyer, 2010). Also, such communications could provide firms with "useful, hard-to-get customer information and insights." In order to be successful with later-born, online communities should "create individual and group activities that help form bonds among community members" (Kotler and Keller, 2012, p.547).

On the other hand, first-born typically are not as peer-oriented, sociable, trusting, generous, out-going, and cooperative as their later-born siblings. First-born investors will be more likely to use financial firms' online resources for fact-gathering and to privately track their investments. They will be less likely to utilize online communities.

PROMOTION OF BENEFITS FROM CONSIDERING BIRTH ORDER

Birth order should not be used in isolation. It can, however, represent an additional variable that assists financial service companies to better understand customers' personalities, risk tolerances, and investment needs. When used in conjunction with other variables, consideration of birth order can provide

additional insight resulting in appropriately modified financial advice and customized service. In this section, we first examine how traditional advertising is perceived differently depending on an individual's birth order. Then, we suggest how financial service firms can attract new clients through promotion of customized services based on a better understanding of their customers.

Role of Traditional Advertising

Advertisements should not directly target first-born or later-born investors, because a message that appeals to one group would likely alienate the other. In addition, the traits that are associated with birth order are generalizations, which may be altered by life experiences and other demographic characteristics. It is important, however, to consider how first-born and later-born customers respond to traditional advertising, because many advertisements effectively target one group or the other without mentioning birth order.

First-born are usually patient, responsible, conservative, and risk-averse. Advertisements promoting safe and steady investment returns will resonate with first-born clients, who value safety, patience, responsibility, and discipline.

Compared to later-born, first-born are more susceptible to personal (or normative) influences, which pertain to their need to meet others' expectations. Furthermore, they tend to be suggestible and prefer assistance in decision-making. Hence, potential first-born customers would be more receptive to advertisements featuring spokespersons, expert endorsements, or testimonials by satisfied clients.

First-born identify with parents and are more sensitive to their expectations than younger siblings. They are also likely to adopt parent's attitudes toward risk as well as the same-gender parent's personality traits and behavior patterns.[8] Advertisements showing clients discussing investment strategies with their parents would appeal to first-born customers.

Because first-born are achievement- and success-oriented as well as status-conscious, they would be attracted to communications indicating the company has won industry awards for excellence. These recognitions would further reduce some of the anxiety, worry, and fear of first-born investors. Similarly, individual financial advisors who have won firm or industry achievement awards, received advanced investment training, or earned MBA degrees would appeal to first-born, who are more likely to attain higher levels of social and intellectual success than their younger siblings.[9]

On the other hand, later-born are rebellious, independent, peer-oriented, and easy-going. They are self-confident, extravagant, fearless, energetic, and non-conforming. Relative to first-born, later-born are less status-conscious or achievement- and success-oriented. Later-born clients, however, might be receptive to advertisements featuring spokespersons, experts, or satisfied customers, who reflect the same personality traits as themselves.

Later-born also tend to be creative, fun, unconventional, vivacious, innovative in their thinking, and somewhat undisciplined (Eisenman, 1987; Moore and Cox, 1990; Bohmer and Sitton, 1993; Sulloway, 1996). Hence, they are apt to respond to humorous, lively, and non-traditional advertisements, which may be better suited to promoting innovative and aggressive investment strategies. Such advertisements are likely to appeal to the risk-taking nature of later-born, who are willing to gamble for higher payoffs.

Promotion of Better Understanding of Clients

In advertising improved financial services, the use of birth order should not be directly promoted. It could easily be copied; and it does not stand well by itself. Instead, a differentiation strategy similar to the one employed by eHarmony should be adopted. eHarmony claims to truly understand customers by "identifying key dimensions of personality that make long-term relationships successful." Since eHarmony uses multiple dimensions to create a powerful portrait of who individuals are at the deepest level, they maintain they are unlike traditional online dating services. eHarmony is successful, in part, because they use an online personality profile tool to learn more about their clients, which allows them to better serve their customers.

The same can occur in the financial services industry. By using investors' birth order to customize financial services, an investment firm would be able to offer and promote exceptional levels of customer

service based on a more complete understanding of clients' personalities, risk tolerances, and financial needs. This, in turn, should increase the satisfaction of existing customers and improve investor retention, which will maximize their lifetime value to the company.[10] A highly satisfied customer typically stays loyal longer, purchases more as the company introduces new and upgraded products, talks favorably to others about the firm and its products, pays less attention to competitors, is less price sensitive, and costs less to serve than new customers (Homburg, et.al., 2005). In addition, opportunities would exist to attract new investors, who are lured to a financial service firm that better understands clients, because it uses multiple dimensions of personality to custom-design services.

CONCLUSION

Birth order provides unique insight into an individual's personality, risk tolerance, and investment needs. Based upon the major distinguishing characteristics between first- and later-born that have potential impact upon the financial services industry, specific strategies to take advantage of birth-order information are suggested. Use of this information, in conjunction with demographic data, will allow financial service firms to create and offer a more customized experience for their clientele.

First-born tend to be cautious, anxious, insecure, and fearful. Further, they desire assistance in decision-making and are suggestible. When first-born become anxious, they want to affiliate with others. In every step of the investment planning and decision-making process, financial advisors should be personally involved with first-born customers. Advisors should expect to spend significantly more time with these individuals, especially in the post-purchase stage.

In addition, first-born clients are likely to favor conservative investments. The corresponding low expected returns are more acceptable to them, because they are patient and willing to wait for a future payout. The challenge comes when this conservative investment strategy will not allow them to reach their retirement goals. With an understanding of birth order, a financial advisor may be able to convince first-born customers to adopt a more effective investment strategy.

While typically cautious, slow to adopt new products, and less likely to use technology, first-born should be encouraged to utilize online services, which allows convenient tracking of their investment activities on a professional website. The ability of first-born clients to check their portfolios and individual investments frequently and conveniently should decrease their anxiety and worry.

Because first-born tend to be achievement- and success-oriented as well as status conscious, packaging of promotional materials and reports of investment performance should project these personality traits. For example, hard copy should look professional and be presented in elegant binders. Website reports should be similarly professional with attention paid to the layout, colors, and fonts.

On the other hand, later-born are generally more risk-oriented, independent, unconventional, creative, peer-oriented, self-reliant, out-going, and cooperative. They are likely to conduct their own evaluation of information regarding companies' financial products/services. Later-born prefer a minimum of suggestion and assistance in decision-making. Also, they are unlikely to experience post-purchase dissonance and will require little, if any, confirmation of their purchase. Financial advisors and investment companies, therefore, should not proactively contact later-born clients, especially to chat, provide general information, and solicit business.

Later-born are likely to be attracted to riskier investment strategies that might include active investing with short-term time horizons. By better understanding the source of this risk-taking behavior, financial advisors may be able to moderate the investment strategy of later-born. For instance, advisors can suggest hedging strategies that work in combination with risky investments.

Typically, later-born are independent, self-reliant, and heavy users of technology. They desire a minimum of suggestion and assistance in decision-making. Because later-born tend to be out-going, trusting, sociable, generous, cooperative, and peer-oriented, firms' websites and social media should include chat rooms and forums for investors to share information. It is less effective to try to impress later-born with elegant and expensive packaging.

When used in conjunction with other variables, clients' birth order can provide additional insight into their personalities, risk tolerances, and investment needs. This will result in appropriately modified financial advice and customized service. Offering improved financial services to investors through consideration of birth order should increase their level of satisfaction and improve customer retention, thereby maximizing their lifetime value to the company. In addition, opportunities exist to attract new clients, who are lured to a financial services firm that better understands customers as a result of using multiple dimensions of personality to customize service.

ENDNOTES

1. For example, see Sampson, 1965; Ernst and Angst, 1983; Daniels and Plomin, 1985; Eisenman and Sirgo, l991; Eisenman, 1992; Lester, et.al., 1992; Sulloway, 1995 and 1996; Steelman, et.al., 2002; Courtiol, et.al., 2009; and Sulloway and Zweigenhaft, 2010.

2. For example, see Schachter, 1959; Sampson, 1965; Warren, 1966; Ernst and Angst, 1983; Burden and Perkins, 1987; Eisenman, 1987; Moore and Cox, 1990; Phillips, et.al., 1990; Bromiley and Curley, 1992; Rowe, et. al., 1992; Sulloway, 1995 and 1996; Davis, 1997; Zajonc and Mullally, 1997; Jefferson, et.al., 1998; Mock and Parker, 1997; Paulhus, et.al., 1999; Eckstein, 2000; Zweigenhaft and Von Ammon, 2000; Sulloway, 2001; Steelman, et.al., 2002; Rohde, et.al., 2003; Stewart, 2004; Saad, et.al., 2005; Healey and Ellis, 2007; Hertwig, et.al., 2007; Dixon, et.al., 2008; Simonton, 2008; Courtiol, et.al., 2009; Wang, et.al., 2009; Sulloway and Zweigenhaft, 2010; and Gilliam and Chatterjee, 2011.

3. For example, see Ernst and Angst, 1983; Burden and Perkins, 1987; Rowe, et.al., 1992; Sulloway, 1996; Mock and Parker, 1998; Paulhus, et.al., 1999; Rohde, et.al., 2003; Courtiol, et.al., 2009; and Sulloway and Zweigenhaft, 2010.

4. For example, see Sampson, 1965; Moore and Cox, 1990; Harris and Morrow, 1992; Sulloway, 1995 and 1996; Jefferson, et.al., 1998; Salmon and Daly, 1998; Paulhus, et.al., 1999; Hertwig, et.al., 2002; Rohde, et.al., 2003; Stewart, 2004; and Healey and Ellis, 2007.

5. For example, see Sampson, 1965; Eckstein, 1983; Ernst and Angst, 1983; Burden and Perkins, 1987; Stewart and Stewart, 1995; Sulloway, 1996; and Zajonc and Mullally, 1997.

6. For example, see Sampson, 1965; Marjoribanks, 1989; Terry, 1989; Cherian, 1990; Wilson, et.al., 1990; Retherford and Sewell, 1991; Sulloway, 1995 and 1996; Davis, 1997; Paulhus, et.al., 1999; Rohde, et.al., 2003; Hertwig, et.al., 2007; and Simonton, 2008.

7. For example, see Schachter, 1959; Sampson, 1965; Warren, 1966; Eckstein and Driscoll, 1983; Steelman and Powell, 1985; Fullerton, et.al., 1989; Moore and Cox, 1990; Sulloway, 1995 and 1996; Salmon and Daly, 1998; Paulhus, et.al., 1999; Steelman, et.al., 2002; Rohde, et.al., 2003; Healey and Ellis, 2007; and Courtiol, et.al., 2009.

8. For example, see Sampson, 1965; Toman, 1976; Harris and Morrow, 1992; Sulloway, 1996; Salmon and Daly, 1998; Paulhus, et.al., 1999; Rohde, et.al., 2003; Dohmen, et.al., 2006; Healey and Ellis, 2007; and Hertwig, et.al., 2007.

9. For example, see Marjoribanks, 1989; Terry, 1989; Cherian, 1990; Wilson, et.al., 1990; Retherford and Sewell, 1991; Sulloway, 1995; Davis, 1997; Paulhus, et.al., 1999; and Simonton, 2008.

10. Customer lifetime value (CLV) describes the net present value of the stream of future profits expected over the customer's lifetime purchases (Kotler and Keller, 2012). For more information, refer to Gupta, et.al., 2004; Ho, et.al., 2006; Kumar, 2006; and Kumar, et.al., 2008.

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Comparing Financial Contagion and Volatility Spill over and Structural Break Within Major Asian Economies Pre and Post Global Recession to that of Asian Crisis

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The significance and the originality of this paper lies in comparing, crisis effected Asian markets during the Asian Financial Crisis 2007, success of macroeconomic policy adjustments and implementation of tightening strategies to that of the impact of Financial crisis 2007 on the same markets. It is vital to introduce the roles of sample markets such as South Korea, China, Singapore, Malaysia, India, Japan, and Taiwan during the Asian crisis. Although the crisis initiated in Thailand, shocks propelled into South Korea, a first degree (where shocks generate) crisis prone market and spilled the crisis over to second degree markets (highly effected by shocks in first degree markets) of the Philippines, Malaysia, China and Singapore, those mark significant co-movement. This paper canvasses evidence for financial contagion and shock propagation that spread into specific Asian markets, generating from US equity markets. While many papers examined the contagion effect applying long term association methods, in a linear model; this paper concentrates on the conditional mean and variance framework in non-linear structure.

INTRODUCTION

Increased capital market integration has escalated the real linkage and subsequently pure financial linkage between emerging economies in the last decade. An appropriate degree of financial linkage as a tool of macroeconomic stabilization (Maneschiold, 2006) raises debate on crucial elements such as financial deepening through asset market integration (Gultekin et al., 1989; Taylor & Tonks, 1989; Mittoo, 1992). Financial deepening indicates the edging up of capital flows within financial institutions of any given host country. Investors and market makers are motivated by the negative co-movement of the asset market driven by *portfolio rebalancing* and ignore the significance of market integration in absence of the desired co-variance movement (Fleming, Kirby & Ostdiek, 1998). The action of strategic traders in fear of idiosyncratic shocks and in presence of information heterogeneity leads to contagion transmission and volatility spillover. The recurring market crisis in the last few decades resulting from irrational behavior of market makers brings about the discussion on the importance of regime shifting in spillover and in contagion studies. Such discussion is introduced by Kin and Wadhwany (1990) in the concept of *correlated information channel.*

The effect of risk preference of strategic traders and risk averse investors has been highly studied in empirical literature. A substantial function for time varying risk aversion in asset and equity markets is elaborated by Engstrom and Zing (2006); Graendier, Engstrom, Bekart (2006).The time varying volatility risk flowing from derivatives to equities are examined by Bollerslev, Gibson and Zhou (2004). It can be said that, the discussion of risks associated with market factors such as volatility, liquidity risk, credit

default risk and risks that are idiosyncratic in nature (country risk) fuels the transmission of shocks through non-contingent channels into countries of different peripheries with little or no financial linkages. Such transmission is better explained by contagion risk (Dungey et al., 2010). It is alarming to find that through correlated risk factors, overall risk is compounded during crisis periods. For instance, an international investor responds to the fear of credit risk by offloading liquid assets in presence of low default risk, resulting in a liquidity crisis in any given market (Greenspan, 1999). Such literature has spiked argument on the degree and direction of contagion risk correlation to other risk components during a crisis period.

A crisis under any given circumstances is simply the increased level of volatility and uncertainty in both macro and micro level. The market response to such sudden crisis indicates systematic risk; and in most cases institutional intervention results in intensification of such volatility. Dungey and Martin, in 2007 measured the effect of contagion by evaluating the transmission mechanism comparing crisis condition to non-crisis condition and suggested that regulatory actions and institutional interventions are often justified to the investors as preventive measure for both systematic and contagion risk. In the post 1997, East Asian crisis leading to the devaluation of Thai Baht, Malaysia's reversal to capital control, the announcement to defer Russian Bond payment has all been good examples of institutional intervention that resulted in increased systematic risk (Dungey et al., 2012).

There has been a plethora of studies conducted in finding the impact of contagion risk in the post Asian crisis period. Masson (1999) suggests contagion is short run phenomenon that disintegrates over time and simply defined as shock transmission from one market to another during a crisis period. Contagion in sociology, philosophy and medicine is defined as "Transmission by direct or indirect contact; the spread of a behavior pattern, attitude, or emotion from person to person or group to group through suggestion, propaganda, rumor or imitation; the tendency to spread, as of doctrine, influence or emotional"(Islam, 2013). On the other hand, contagion risk is argued to be induced if wider market integration causes reversal of the capital movement (Collins & Biekpe; 2003). The recent global market crisis which is to some extent is contributed by increased integration of financial assets and financial markets, fueled the dispute over contagion risk in the empirical literature. As proposed by Mason (1999), the propagation of shocks may become substantial through contingent and non-contingent channel crisis. The spillover of equity market crisis among countries having similar macroeconomic structure may properly be redefined as contingent channel crisis or "monsoonal effect crisis". Contingent channel propagation of shocks can be categorized as *shift contagion* and *pure contagion.* "Shift contagion illustrates the propagation of shock beyond normal level"(Masson, 1999); in presence of a crisis period. On the contrary "Pure contagion is the transmission of contagion purely due to unexplained fundamentals generally identified in post-crisis period" (Dungey & Tambakis, 2005; Percolli & Sbracia, 2003; Flavin & Panopoulou, 2010); and such propagation marks reversal in market confidence (Charumilind et al. 2006). However, in the discussion of financial linkage the significance of real linkage is undeniable; which has important implications in defining idiosyncratic shocks.

This can be better explained with an example. Let us assume the role of a strategic trader investing in international equity market in Korea. Now the trader receives private information, suggesting that South Korean government is expected to announce an important change in the monetary policy which may cause reversal in the current equity market and a bear market will follow. The private information has the probability of being asymmetric in nature and any reaction to such information may only be irrational. To avoid any such happenstance, the trader's portfolio rebalancing should have a stabilizing effect. So, in fear of a portfolio loss the trader would sell off a Korean stock and buy a Hong Kong stock which has a negative co-movement. The trader will also sell off Singapore stocks. It must be noted that the Singapore market have little or no direct integration to that of Korean market. Nevertheless, a pool of such actions in the occurrence of Korean market crash will also trigger a fall in the Singapore market causing a pure contagion of crisis.

Dungey, Milunovich and Thorp (2010) separated crisis period linkages into news impact on markets of different peripheries. The phenomenon of hypersensitivity to information from distant host country to domestic economy impairs the stability of the market environment in home economy. While, News

impact suggests the degree of impact of a troubled economy to a potentially non-crisis economy, Dungey (2010) delved into finding the effect of hypersensitivity to information phenomenon, and found news impact to be insignificant in crisis generation. Conversely, evidences are suggestive to the fact that, crisis countries have weak incentives in curbing the speed of spread. In contrast, countries in close proximity both economically and financially, must take proactive roles to circumvent the speed of crisis spreading from host market, otherwise spillover is eminent. Initiatives can be taken in the form of strengthening of domestic policy or increasing coordination between different markets (Dungey et al., 2010).

It should be appropriate to put some lights on the most substantial financial crisis since that of the great depression, the global crisis of 2007-2008. Originating from the US mortgage market, in its second phase, the crisis becomes a truly global phenomenon. The importance of extensively studied Asian Crisis 1997 has fallen by the wayside, calling for contagion studies to cover the pre and post global crisis period and the shift in the existing market integration with structural break. Of the many available discussions, the one portrayed by Cabellaro (2013) is appealing. Relentless flow of capital in the US mortgage market causes asset scarcity and results in the formation of stochastic bubble. In the aftermath of simultaneous burst in bubble, the crisis intensifies as through contingent and non-contingent channels, scarcity is triggered in commodities and alternative investment vehicles. However, the increased oil prices turn financial assets seeking petrodollar in US, eventually reducing destabilization and reverse the tightening of commodity prices. Consequently, the process of dissipating this vicious cycle initiates. Such becomes a global phenomenon, enveloping both emerging and emerged markets likewise in the post 2008 period. It is suggestive to put emphasis on recent studies of contagion risk to identify the recent global financial crisis, even to understand the Asian contagion, as majority of the studies of contagion is concentrated in Asian crisis 2007.

In the investigation of contagion and crisis spilling into markets of less significance, or explosiveness of shock in the equity market, it is crucial to focus on equity and debt markets association, in connection to the housing market. In the study of Dungey, Milunovich and Thorp (2012), interesting association among US bond market returns, stock return and returns of Real Estate Investment Trusts (REIT) is found with direction of spillover, which may have serious consequences in the US Mortgage Backed Securities (MBS) bubble, leading to a global crisis. In the pre-crisis period, the spillover of shock from stock market returns to Treasury bond index has a negative direction. In contrast, the bullish market trend of equity leads to buoyant REIT market returns, that explains the bubble formation in MBS, and had direct impact on consumers reliant on leveraging housing equity (Mian and Sufi, 2010). The second phase of crisis marked significant change in the direction of association. The sign of spillover from debt to equity market marked a positive co-movement and eventually the link was broken, resulting in the plunge of bond and REIT returns linkage. The post crisis period marks a reversal. So, in accordance to conventional views, if shocks in MBS returns and property market meltdown triggered the latest global financial crisis, than information hypersensitivity linkage played an important role for crisis to transmit from REIT to stock returns, exacerbating the effect of financial crisis 2007. Due to regime switch, strong linkage between REIT and equity returns remain (Dungey et al., 2012). The asset market linkage suggests the importance of equity shocks in explaining global crisis, ignoring alternative investment vehicles in theoretical literature.

In contrast to previous studies, Yuan (2005) explained financial contagion using Rational Expectation Equilibrium (REE), a commonly studied theory in financial literature. Yuan suggested crisis is eminent, if investors borrowing constraints is significant. In presence of information asymmetry, contagion is triggered in the form of small shocks causing negative movements of large assets. In contradiction to popular belief, contagion is proved to be a function of investors borrowing constraints, rather than common shocks. Such constraints propagate shocks through a specific group of borrowers across national borders. Contagion spillover is non-linear and asymmetric by condition and assets are relatively more skewed (Connolly and Wang, 2003). Bank of International Settlement (BIS) (1998) proposed an all-encompassing framework defining contagion;“ i. Strong fundamentals imply immunity to contagion; ii. Trade and financial linkages between countries are associated with contagion transmission; iii. Regional proximity is important for contagion transmission; iv. Developing markets experience greater contagion

than developed markets; v. Developed markets operate as a conduit for contagion effects between regions; vi. Contagion effects differ by financial markets, contagion occurs across both asset markets and country borders." While majority of literature suggests contagion falls in the line of the framework, some contradicts to the suggestion, in post global crisis period.

Many important empirical literatures investigated contagion in East Asian equity markets during the Asian crisis of 1997-1998. Some crucial literature studied contagion concentrating on Hong Kong equity market turmoil 1997 (Baig and Goldfajn, 1999; Forbes and Rigobon, 2002; Baur and Schulz, 2005; Baur and Fry, 2005; Bond, Dungey and Fry, 2005; Dungey, Fry, Hermosillo and Martin, 2005b). Bond, Dungey and Fry (2005), Baur and Schulz (2005) identified Hong Kong as the *ground zero market* for contagion shocks. Japanese and Singapore markets have been important conduits in the transmission of crisis from Hong Kong to other East Asian economies. Thailand has been the *ground zero* for shocks propagating into the equity markets of Asia (Baur and Schulze, 2005; Kleimeier, Lehnert and Verschoor, 2003). Nonetheless, Forbes (2002), and Kleimeier et al., (2003) found little significance of contagion propagating from Thailand. Applying conditional correlation analysis, contagion is significantly found in major Asian economies during the Asian crisis (Caporale Cipollini and Spagnolo), while transmission from Hong Kong to Philippines and Singapore (Corsetti, Pericoli and Sbracia, 2001) and from Hong Kong to important Asian economies during eight percent of days over Asian Crisis was notable(Baur and Fry, 2005).

In spite of the availability of many articles regarding contagion crisis in Asia, majority covers the Asian crisis 1997-1998 period, and there is little concentration regarding contagion in Asia during global crisis of 2007. In this regard, the study of Islam (2013) advocates the phenomenon of spillover effect from US market to developed and emerging markets. In the multivariate GARCH framework, the authors found the transmission significance of 15 markets across two regions, and US market acted as the conduit of crisis. The findings implied, while own volatility spillover is profound in Asian markets during the second phase of the global crisis, such condition is reminiscent only in UK, Germany and France in Europe. In Europe, the intensity of cross volatility spillover results in extreme homogeneity and drives away investors seeking *portfolio rebalancing*. On the other hand, Asian markets are found to be significantly heterogeneous, with shocks propagating through pure contagion. The markets are more determined by their own past shocks rather than conditional shocks from neighboring countries. However, Japan and Singapore were important conduits for the spread of idiosyncratic shocks across Asian borders (Islam, 2013). Despite of such findings, it is important to check for the spillover, and structural break for significant Asian markets, comparing the inclusion and the exclusion of ground zero US market as the conduit. It is also important to re-examine the popular theory outlined in the BIS (1998) framework, that developing markets are more prone to contagion compared to developed markets.

The contradiction of contagion studies are irrefutable, explaining crisis propagation mostly through real linkage and idiosyncratic shocks (Helpman and Razin, 1978; Cole and Obstfeld, 1991; Backus, Kehoe and Kydland, 1992; Baxter and Crucini, 1993; Case and Pavlova, 2004). While most of the findings intend to rationalize contagion with insignificant degree of correlations of fundamental elements, such studies fail to examine the spread of shocks throughout Latin America, Eastern Europe, East Asia. Kaminsky and Reinhart (2000) illustrated the failure of such studies to explain the lack of spillover, in presence of crisis, within countries of close proximity.

Preponderance of studies recognized some fundamental causes for contagion transmission. Primarily, variation in commodity prices caused by economic shifts may end up triggering large capital flights into emerging economies. The studies of Corsetti, Pesenti and Roubini 1998; Radelet and Sachs 1998a, 1998b, identified the gain of U.S. dollar against yen in 1995-96 to contribute in the in East Asian export slump, leading East Asian economies towards financial hurdles in years to come. A crisis induced economy may affect its trading partners with currency depreciation, and upshot is that trading partner encounters subdued asset prices and subsequently become a target of speculative attack. Corsetti (1999) specified, excessive competitive devaluation may consequently induce stark currency depreciation, and blamed non-cooperative nature in the game. Such would, in effect, inspire a large outflow of securities, curtail in lending and a nosedive in short-term loans offered to international markets. Amid Asian Financial Crisis,

the steadfast economies to speculative attack; Singapore, Taiwan and China, could not resist propagation of exchange rate depreciation, earning some credence to this theory.

Tightly integrated economies and highly liquid financial markets are more susceptible to crisis spillover largely due to cross-market hedging of macroeconomic risks, and due to prevailing comovement of partially integrate economies even during tranquil periods (Kaminsky and Reinhart, 1998b). An overall adverse impact can be experienced as commercial banks attempt to maximize profit by selling off high risk assets on the back of a crisis (Schinasi and Smith, 2000). Calvo and Mendoza specified that information asymmetries, and investors attitude to evade additional costs related to collection of country specific information, lends to **herd** behavior of even rational investors. Increased herding hinges on escalation of economic and financial growth, inducing higher degrees of portfolio diversification, but causing larger capital outflows eventually (Scharfstein and Stein, 1990; Wermers 1995). Contagion propagation might not be limited to issues related to financial markets integration only, as suggested by Diamond and Dybvig's (1983). Competitive devaluation, plummeting asset prices, capital outflow and sovereign debt defaults consequently shifts market expectations and economy as a whole immerses into bad equilibrium. Fear gripped investors would collectively withdraw funds from foreign exchange reserve, leading the economy towards debt crisis, mimicking a bank run on.

The significance and the originality of this paper lies in comparing, crisis effected Asian markets during Asian Financial Crisis 2007, success of macroeconomic policy adjustments and implementation of tightening strategies to that of the impact of Financial crisis 2007 on the same markets. It is vital to introduce the roles of sample markets such as South Korea, China, Singapore, Malaysia, India, Japan, and Taiwan during the Asian crisis. Though crisis initiated in Thailand, shocks propelled into South Korea, a first degree (where shocks generate) crisis prone market and spilled crisis over to second degree markets (highly effected by shocks in first degree markets) of Philippines, Malaysia, China and Singapore, those mark significant comovement. According to BIS (1998), Japanese market (data derived from Tokyo stock exchange) played pivotal role as conduit for crisis transmission. Inclusion of India is crucial for academic purpose. In response to exacerbation of capital outflows, by doubling currency devaluation, South Korea subsequently tripled its per capital GDP. In oppose to Malaysia's profound restrictions on capital account convertibility, China and Singapore uplifted capital flow restrictions and quickly healed due to their improved total factor productivity (Daly, 2003). Considering successful Asian market response to Asian crisis, it is imperative to identify the reincarnation of Asian crisis in the back of 2007 financial crisis, kindled by the shock of US mortgage backed securities. This study examines own volatility spillover, cross volatility spillover, interdependence of markets and conduit effects, which rejuvenates in Asian markets 10 years after the learnings and implementations from the Asian crisis. It is also vital to see if an accord can be drafted to respond to crisis.

This paper canvasses evidence for financial contagion and shock propagation that spread into specific Asian markets, generating from US equity market. While many papers examined the contagion effect applying long term association methods, in a linear model; this paper concentrates on the conditional mean and variance framework in non-linear structure. The conditionality of concerned series demands non-linearity and asymmetric distribution as majority crisis contagion markets are skewed in nature and time varying. The time varying conditional mean and conditional variance models also envelope "volatility clustering" and "leverage effect" with more success. Important Asian markets are selected to explain contagion transmission within themselves and in presence and absence of US equity market shock, as global proxy. The selected Asian countries are India, Japan, Malaysia, South Korea, Singapore, Taiwan and China. The purpose of including these markets are properly portrayed in the literatures reviewed in this paper. In Asian crisis, Japan and Singapore were important conduits, while contagion was significant from Korea and Hong Kong to other economies. It is imperative to re-examine the time varying conditional transmission. The markets are tested for mean spillover of and cross spillover in a multivariate GARCH diagonal VECH framework, up to five lags. Partial asymmetric EGARCH addresses non-negativity constraints of clustered volatility of the previous model, but captures post crisis linkage structure with 'structural break' model. Contagion, spillover and regime switch addresses pre and post crisis period, combining the non-linear conditional models.

In the first section, concept of contagion is embedded in introduction and previous researches are highlighted. In the second section, empirical framework is illustrated, and in the succeeding section, results of analysis are elaborated. Finally, respond to the objective of the study and some remarks on policy reforms are outlined.

EMPIRICAL FRAMEWORK

To examine excess return instability and crisis spillovers, the weekly stock prices of eight major stock markets (India, Japan, China, South Korea, Taiwan, Malaysia, Singapore and Srilanka) from the Asian region are considered. The countries under study have well-structured stock indices and elevated amount of international effect in contrast to other countries of this region. It has been highly examined in the primary section of this study is that these particular countries had exhibited significant roles in the contagion transmission during the pre and post Asian Crisis of 1997, notably resulting in regime shifting. As a blend of emerging and developed economies, the conduit effect proposed by BIS (1998) will be examined in the pre and post global crisis, in addition to the impact of global proxy. These indices are also somewhat closely linked, so the indication of hypersensitivity to information effect might be found.

Using of weekly data tender some recompense over the use of daily stock indices data. Firstly, it removes the interferences associated with the utilization of analogous data as the particular trading day in any given market may ignore a community holiday in a different country. Secondly, it also outwits the difference in trading time. We assemble the data over the episode 01/01/1999 to 04/02/2013 for a total number of 728 observations. The periods under analysis, attempts to circumvent the profound impact of the Asian crisis, but begin from the post crisis period market transformation of the Asian contagion. The purpose is to canvass the interaction among the markets post regime shift caused by the extensively debated Asian Crisis, which would mark the pre-regime shift period interaction. The structural break analysis should successfully portray the shifting integration in the post global financial crisis of 2007.

For investigating the transmission of global financial shock, US market shock is considered as exogenous shock and also the ground zero to crisis. Weekly proceeds of the stock indices are transformed into logarithmic expressions where the string of experiential returns rehabilitated into squared proceeds. In fact, it gives the intrinsic volatility approximation for each point in time (t). The impact of non-linearity is adjusted with the log transformation of the ratio of the highest experiential price to the lowest observed price for each weekly proceeds at time (t). $\sigma_t^2 = \log\left(\frac{High_t}{Low_t}\right)$

Linear structure models fail to indicate some crucial nature of equity market returns. The expected indication of 'leverage effect' and 'volatility clustering' is not properly assessed with linear models, which is a profound error in many of the previous studies focusing on long term market association. In order to explain, time varying contagion transmission, dynamic conditional mean and variance must be assessed with proper tests for non-linearity and heterogeneity for the series under consideration. It must be noted, while contagion is captured with GARCH models, due to the possible linearity in mean (own spillover) and non-linearity (cross spillover) in variance, structural break is studied with threshold GARCH, which satisfies the need of the study, signifying non-linearity in both mean and variance.

For this particular study, we analyze the joint procedure of existing stock market indices for Asian region using the Multivariate GARCH-Diagonal VECH model. The restricted variance-covariance equations for the boundless VECH model contain 21 parameters. The VECH model's restricted variance-covariance matrix is rebounded to the form developed by, Bollerslev, Engle and Wooldridge (1988), where, A and B are assumed to be diagonal. The model is characterized by,

$$h_{ij,t} = \omega_{ij} + \alpha_{ij} u_{i,t-1} u_{j,t-1} + \beta_{ij} h_{ij,t-1} \quad \text{for } i, j = 1, 2 \tag{1}$$

At equation (1), ω_{ij}, α_{ij} and β_{ij}, are the restrictions. The diagonal VECH multivariate GARCH model could also be shown as an unbound order multivariate ARCH model, where the covariance corresponds to

as a geometrically decaying weighted average of existing cross products of unforeseen returns, with recent observations carrying greater weights.

Due to the sample of seven stock indices, the restricted variance-covariance matrix (H_t) has seven dimensions with the diagonal and non-diagonal matrix erected for the variance and the covariance conditions, correspondingly. H_t can be articulated as the matrix form,

$$H_t = \begin{pmatrix} h_{11t} & h_{12t} & \cdots & \cdots & h_{18t} \\ h_{21t} & . & \cdots & \cdots & h_{28t} \\ \vdots & . & . & . & \vdots \\ \vdots & . & . & . & \vdots \\ h_{81t} & h_{82t} & \cdots & \cdots & h_{88t} \end{pmatrix} \quad (2)$$

In this Matrix model for the stock proceeds of country *I* , h_{ijt} is a restricted variance at the point of time *t* and refers to the restricted covariance connecting the stock indices of country *i* and country *j* ($i \neq j$) at time *t*.

To explain the variance and covariance matrix, this paper applies the diagonal VECH model (Bollerslev et al., 1988), and this model is sufficient when more than two variables are considered (Scherrer and Ribarits, 2007). The diagonal VECH expression is based on the theory that the restricted variance is determined by squared lagged residuals and the restricted covariance is contingent on the cross-lagged residuals and lagged covariance of other series (Harris and Sollis, 2003). The specification of diagonal VECH model is as follows,

$$VECH\ (H_t) = C + AVECH\ (\varepsilon_{t-1}\varepsilon'_{t-1}) + BVECH\ (H_{t-1}).\ \ e_t|\psi_{t-1} \sim N\ (0, H_t) \quad (3)$$

Here, *A* and *B* are 1/2 *N* (*N* +1) × 1/2 *N* (*N* +1) parameter matrices and *C* is a 1/2 *N* (*N* +1) ×1 vector of constants.

The impact from preceding squared innovations on the present volatile nature is explained by the diagonal elements of matrix *A* (a_{11}, a_{22}, ⋯ a_{77}), which depicts own volatility shocks. On the other hand, non-diagonal fundamentals signifies the cross product consequences of the lagged transformation representing the cross-volatility shocks. In the same manner, the diagonal components of matrix *B* (b_{11}, b_{22}, ⋯ b_{77}) present the influences from past squared volatilities on the present volatility which can be expressed as own volatility spillovers and non-diagonal essentials inspects the cross product property of the lagged cross-volatilities on the cross-volatility spillovers.

The diagonal VECH model is not without its limits. This model is without success in capturing 'leverage effect', which suggests, a negative shock following a positive shock is stronger in shape and duration, in contrast to the other direction (Brooks, 2002). Due to explained non-negativity constraint property of Generalized ARCH model, which limits the models capacity to capture the direction of shock, and the impact of the global proxy, EGARCH (1,1) is applied in two phases to explore *structural break* as an indicator of regime switch (Islam et al., 2013).

This study uses the partial asymmetric GARCH model, popularly the EGARCH formulated by Nelson (1991) to identify the volatility and leverage effect within the elected stock indices. The model dimensions is provided below,

$$\mathrm{Ln}\sigma^2_{j,t} = \omega_j + \beta_j \ln(\sigma^2_{j,t-1}) + \gamma \frac{\varepsilon_{t-1}}{\sqrt{\sigma^2_{t-1}}} + \alpha \left[\frac{|\varepsilon_{t-1}|}{\sqrt{\sigma^2_{t-1}}} - \sqrt{\frac{2}{\pi}} \right] \quad (4)$$

Here, $\sigma^2_{j,t}$ is one step onward approximation of variance also known as provisional variance, and $\omega,\beta,\gamma,\alpha$ are the parameters to be estimated. An important advantage of EGARCH (1,1) model is, σ^2_t will always be positive even if the parameters are depressing. In equation (4) parameter α illustrates the symmetric effect of the model, β represents volatility persistence and γ denotes the leverage effects (Alexander, 2009).

EMPIRICAL RESULTS

Table 1, represents the descriptive statistics for all the stock indices, encompassing the global market proxy U.S. For all the stock indices mean returns render to be positive, ranging from a least amount 0.0125 (Malaysia) to an utmost 0.0219 (South Korea). As illustrated by the standard deviations, while Chinese stock indices is found to be least volatile with a standard deviation of 0.0086, South Korean stock indices is observed to be the most volatile series with a standard deviation of 0.0137. All indices are tilted to right, as can be seen from the projected skewness. This finding is supporting the conditions of short term dynamic model. As anticipated for highly regularized capital market indices series, such larger than three for Japan and U.S., mimicking a classic leptokurtic distribution, whereby the series are spikier around the mean with thick tails compared to the normal distribution. In addition, conclusion of the J-B test illustrate that the null hypothesis of normal distribution is rejected for all stock indices.

TABLE 1
DESCRIPTIVE STATISTICS OF THE STOCK INDICES

	Mean	Median	Std. Dev.	Skewness	Kurtosis	Jarque-Bera
China	0.0131	0.0107	0.0086	1.5882	6.3267	641.7516***
India	0.0211	0.0182	0.0127	2.2283	10.8789	2485.4500***
Japan	0.0178	0.0159	0.0105	4.0168	32.6605	28643.2500***
Malaysia	0.0125	0.0100	0.0094	2.9817	17.4706	7430.4710***
South Korea	0.0219	0.0185	0.0137	2.2583	11.9355	3040.6950***
Singapore	0.0157	0.0134	0.0104	2.8830	17.2101	7133.5670***
Srilanka	0.0150	0.0116	0.0123	2.7253	14.4202	4857.3220***
Taiwan	0.0194	0.0169	0.0110	1.7337	7.6651	1024.8410***
USA	0.0138	0.0108	0.0108	3.6350	25.3936	16814.5700***

Table 2 shows the cross-correlation between Asian stock indices with U.S. stock indices. The correlation coefficients of Asian region and U.S. market emerge as moderately correlated which is around 60%. In this region, the superior correlation is with Singapore (0.583) and the lowest is with Srilanka (0.061). Srilanka also has negative correlation with most of investigative indices.

TABLE 2
CORRELATION COEFFICIENTS OF THE STOCK INDICES

	China	India	Japan	Malaysia	South Korea	Singapore	Srilanka	Taiwan	USA
China	1.000	0.198	0.132	0.109	0.186	0.224	-0.060	0.074	0.226
India	0.198	1.000	0.369	0.375	0.513	0.543	-0.001	0.276	0.472
Japan	0.132	0.369	1.000	0.248	0.404	0.540	0.104	0.371	0.445
Malaysia	0.109	0.375	0.248	1.000	0.382	0.424	-0.074	0.267	0.214
South Korea	0.186	0.513	0.404	0.382	1.000	0.540	0.002	0.357	0.419
Singapore	0.224	0.543	0.540	0.424	0.540	1.000	0.065	0.342	0.583
Srilanka	-0.060	-0.001	0.104	-0.074	0.002	0.065	1.000	-0.053	0.061
Taiwan	0.074	0.276	0.371	0.267	0.357	0.342	-0.053	1.000	0.217
USA	0.226	0.472	0.445	0.214	0.419	0.583	0.061	0.217	1.000

*** 1%, ** 5%,* 10% level of significance.

Table 3 stipulated the essential non-linearity condition for 8 Asian countries. Autoregressive Conditionally Heteroskedasticity (1,1) tests were conducted, in order to estimate the suitability of the model and the results were fitting that satisfies the essential non-linearity of the indices. The result of the ARCH test (up to 5 lags) is indicative of the non-linearity of observations.

TABLE 3
ARCH (1,1) RESULTS FOR THE STOCK INDICES

	China	**India**	**Japan**	**Malaysia**	**South Korea**	**Singapore**	**Srilanka**	**Taiwan**
F-statistic	2.8283**	14.8286***	7.05265***	10.4671***	14.9412***	11.7194***	0.43694	2.7684**
Obs*R^2 (χ^2)	13.9841**	67.7488***	33.8896***	49.1795***	68.2147***	54.6181***	2.19633	13.6934**
$\mathbf{u_{t-1}}$	0.1055***	0.26964***	0.06124*	0.06071*	0.1665***	0.1684***	0.05203	0.01312***
$\mathbf{u_{t-2}}$	0.03213	0.01340	0.06228*	-0.00227	0.1856***	0.1350***	-0.00967	-0.0187
$\mathbf{u_{t-3}}$	0.03913	0.09190**	0.18963***	-0.02133	0.08859**	0.07611**	0.00828	0.0180
$\mathbf{u_{t-4}}$	0.02540	0.02062	-0.00671	0.25594***	-0.00332	-0.02327	0.00971	0.0288
$\mathbf{u_{t-5}}$	0.04392	0.00691	-0.01381	-0.03433	-0.03810	0.05386	-0.01214	0.0190

*** 1%, ** 5%,* 10% level of significance.

Table 4 presents the outcome of the WALD test. It is important to estimate the non-linear restrictions of the dynamic model. WALD test is an important hypothesis testing procedure based on maximum likelihood principal. Joint WALD tests were carried out to scrutinize the null hypotheses. Null hypothesis

is suggestively ignoring any volatility spillover among the Asian markets. The study gains more strength as the hypothesis of no volatility spillovers among the investigative stock indices; in every case the null hypotheses has been rejected at 1% level of significance. The significance also outlines important of non-linear restrictions applied on the specific indices.

TABLE 4
WALD TEST RESULTS FOR THE STOCK INDICES

H_0: No volatility spillovers within the stock indices							
	China	India	Japan	Malaysia	South Korea	Singapore	Taiwan
Restrictions							
$-1 + \alpha_2 + \alpha_3 + \alpha_4 + \alpha_5 + \alpha_6 + \alpha_7$	-0.9084***						
$-1 + \alpha_1 + \alpha_3 + \alpha_4 + \alpha_5 + \alpha_6 + \alpha_7$		-0.9149***					
$-1 + \alpha_1 + \alpha_2 + \alpha_4 + \alpha_5 + \alpha_6 + \alpha_7$			-0.9134***				
$-1 + \alpha_1 + \alpha_2 + \alpha_3 + \alpha_5 + \alpha_6 + \alpha_7$				-0.9074***			
$-1 + \alpha_1 + \alpha_2 + \alpha_3 + \alpha_4 + \alpha_6 + \alpha_7$					-0.9139***		
$-1 + \alpha_1 + \alpha_2 + \alpha_3 + \alpha_4 + \alpha_5 + \alpha_7$						-0.9103***	
$-1 + \alpha_1 + \alpha_2 + \alpha_3 + \alpha_4 + \alpha_5 + \alpha_6$							-0.9142***

χ^2 is significant for all the three countries at 1% level of significance

The values of own mean spillovers of Asian (μ_{ii} for all i= 1... 7) that are significant at 1%, confirms a sway of the most recent returns of each stock indices from their first lag proceeds (r_{iit-1}), as is produced in Table 5. The own-mean spillovers spread from a minimum of 0.00596 (Singapore) to a maximum of 0.00894 (Taiwan). Optimistic cross mean spillover prevails for the markets under examination. The shocks cross mean spillover in this region is significant in both directions, ruling out the possibility of a higher degree of non-idiosyncratic shocks.

TABLE 5
PARAMETER ESTIMATION FOR THE MEAN EQUATION
FROM DIAGONAL VECH (1,1) EQUATION

Parameter		μ_{0i}	μ_{i1}	μ_{i2}	μ_{i3}	μ_{i4}	μ_{i5}	μ_{i6}	μ_{i7}
China	**Coef.**	0.01129***	0.00838	0.01054	0.01096	0.01183	0.01063	0.00994	0.01172
	S.E.	0.00049	0.0005	0.0006	0.0006	0.0005	0.0006	0.0006	0.0007
India	**Coef.**	0.01781***	0.01722	0.00804	0.01404	0.01654	0.01294	0.01249	0.01480
	S.E.	0.00057	0.0008	0.0007	0.0009	0.0007	0.0008	0.0007	0.0009
Japan	**Coef.**	0.01635***	0.01527	0.00975	0.00884	0.01446	0.00957	0.00852	0.01176
	S.E.	0.00051	0.0007	0.0007	0.0006	0.0006	0.0006	0.0005	0.0007
Malaysia	**Coef.**	0.01030***	0.01056	0.00732	0.00969	0.00758	0.00742	0.00781	0.00864
	S.E.	0.00055	0.0006	0.0006	0.0007	0.0053	0.0006	0.0005	0.0007
South Korea	**Coef.**	0.01684***	0.01966	0.01150	0.01369	0.01556	0.00822	0.01208	0.01307
	S.E.	0.00051	0.0009	0.0008	0.0009	0.0008	0.0007	0.0008	0.0009
Singapore	**Coef.**	0.01320***	0.01172	0.00687	0.00802	0.01112	0.00769	0.00596	0.00955
	S.E.	0.00046	0.0007	0.0006	0.0007	0.0006	0.0006	0.0005	0.0007
Taiwan	**Coef.**	0.01708***	0.01786	0.01454	0.01315	0.01573	0.01192	0.01253	0.00895
	S.E.	0.00057	0.0007	0.0008	0.0008	0.0006	0.0007	0.0006	0.0007

Notes: (1) i = 1 for China, i = 2 for India, i = 3 for Japan, i = 4 for Malaysia, i = 5 for South Korea, i = 6 for Singapore, i = 7 for Taiwan. (2) *** 1%, ** 5%,* 10% level of significance. (3) From μi1 – μi7 all coefficients are statistically significant at 1% level of significance.

Table 6 suggests, the own-volatility distress for all seven indices (a11, a22 . . . a77) are significantly varying from 0.3820 (Malaysia) to 0.2267 (China), representing substantial ARCH effects. This implies that the pattern of distress occurring in the Malaysian market will have the strongest influence on its own future market volatility, contrasting to the shocks generated from other indices. The magnitude of the projected cross-volatility coefficients, aij($i \neq j$) , advocates that innovation in all of the seven stock market indices is reigned by the volatility of other indices, but the own-volatility shocks, aij($i = j$), are in general larger than the cross-volatility shocks. This suggests that preceding shocks in particular markets have a superior influence on their own future impulsiveness than preceding distress shocks stirring from other stock market indices. The largest value for cross-volatility shocks was found in between India and Malaysia (0.3482) and smallest was 0.2038 between China and Taiwan. Consequently, sit is noticeable that the lagged country-specific influence (ARCH effect), adds to the stock market distress for any given indices in a recursive way.

The estimated coefficients for the variance-covariance matrix (equation 3) suggests significance of all the indices imply the existence of elevated volatility persistence, where bij ($i \neq j$) represents one -lag conditional variance for the indices under investigation. The highest value for the own volatility influence

elongs to China (0.6192) and the smallest belongs to Japan (0.1890). These outcomes stress that the indices have the greater influence on their future volatility from their own past distress.

TABLE 6
PARAMETER ESTIMATION FOR THE VARIANCE EQUATION
FROM DIAGONAL VECH (1,1) EQUATION

Parameter		C_{i1}	C_{i2}	C_{i3}	C_{i4}	C_{i5}	C_{i6}	C_{i7}
China	**Coef.**	0.0000145***	0.00000208	-0.0000004	0.0000004	0.0000032**	0.00000003	0.0000017
	S.E.	0.0000029	0.0000015	0.0000018	0.0000016	0.0000014	0.0000011	0.0000020
India	**Coef.**		0.0000324***	0.0000048	0.00001***	0.00000136***	0.0000084***	0.0000069***
	S.E.		0.0000041	0.0000027	0.0000022	0.0000022	0.0000177	0.0000023
Japan	**Coef.**			0.0000446***	0.0000074***	0.0000058*	0.000011***	0.0000112***
	S.E.			0.0000067	0.0000026	0.0000033	0.0000026	0.0000032
Malaysia	**Coef.**				0.0000298***	0.0000096***	0.0000085***	0.0000072**
	S.E.				0.0000022	0.0000021	0.0000016	0.000003
South Korea	**Coef.**					0.000023***	0.0000073***	0.0000087*
	S.E.					0.0000035	0.0000017	0.0000036
Singapore	**Coef.**						0.0000161***	0.0000049**
	S.E.						0.0000024	0.0000021
Taiwan	**Coef.**							0.0000389***
	S.E.							0.0000058
Parameter		a_{i1}	a_{i2}	a_{i3}	a_{i4}	a_{i5}	a_{i6}	a_{i7}
China	**Coef.**	0.2267***	0.2409***	0.2397***	0.2388***	0.2223***	0.2115***	0.2038***
	S.E.	0.0395	0.0515	0.0728	0.0608	0.0510	0.0421	0.0557
India	**Coef.**		0.3519***	0.3422***	0.3482***	0.3327***	0.3081***	0.2789***
	S.E.		0.0526	0.0620	0.0618	0.0454	0.0398	0.0588
Japan	**Coef.**			0.3329***	0.3344***	0.3250***	0.2973***	0.2703***
	S.E.			0.0876	0.0795	0.0702	0.0603	0.0549

Malaysia	**Coef.**				0.3820***	0.3302***	0.2990***	0.2747***
	S.E.				0.0659	0.0553	0.0554	0.0546
South Korea	**Coef.**					0.3439***	0.2896***	0.2536***
	S.E.					0.0470	0.0394	0.0409
Singapore	**Coef.**						0.2624***	0.2525***
	S.E.						0.0468	0.0455
Taiwan	**Coef.**							0.2576***
	S.E.							0.0369
Parameter		b_{i1}	b_{i2}	b_{i3}	b_{i4}	b_{i5}	b_{i6}	b_{i7}
China	**Coef.**	0.6192***	0.5204***	0.3345**	0.4921***	0.5256***	0.5803***	0.4999***
	S.E.	0.0589	0.0855	0.1595	0.1570	0.0840	0.0721	0.1480
India	**Coef.**		0.4486***	0.2895***	0.4254***	0.4598***	0.5007***	0.4272***
	S.E.		0.0437	0.0829	0.0613	0.0458	0.0405	0.0604
Japan	**Coef.**			0.1890*	0.2797**	0.3018***	0.3289***	0.2918***
	S.E.			0.1067	0.1348	0.1153	0.1076	0.0985
Malaysia	**Coef.**				0.4122***	0.4450***	0.4683***	0.4098***
	S.E.				0.0316	0.0623	0.0730	0.0986
South Korea	**Coef.**					0.5274***	0.5207***	0.4493***
	S.E.					0.0392	0.0480	0.0913
Singapore	**Coef.**						0.5652***	0.4880***
	S.E.						0.0487	0.0788
Taiwan	**Coef.**							0.4224***
	S.E.							0.0618

Notes: (1) i = 1 for China, i = 2 for India, i = 3 for Japan, i = 4 for Malaysia, i = 5 for South Korea, i = 6 for Singapore, i = 7 for Taiwan. (2) *** 1%, ** 5%,* 10% level of significance.

The echelon of inconsistency within the stock market indices is represented in table 7. This table also presents the unevenness of these stock market indices earlier than and after/within the financial calamity of 2007. The EGARCH (1,1) model was applied in estimating the parameters. The first part of the table presents the inconsistency of the overall investigation period and the remaining portion presents the earlier/without (i.e. 1st January, 1999 to 25th December, 2006) and after/within (i.e., 3rd January, 2007 to 4th February, 2013) financial crisis.

The parameter of EGARCH (1,1) 'α' symbolize the symmetric influence of the model. The value of 'α' before the financial crisis was significant for all the indices except for Malaysia, turning significant

during the crisis period. Also during the crisis period the value of the parameter gets larger except for India and Singapore indicating that these two indices were the most sensitive during the crisis period. The significance of 'α', indicates the influence of financial distress. The degree of sensitivity is explains that the markets in Asian region are not well integrated.

The leverage influence (γ) was positive for all, except for Malaysia, South Korea, Singapore and Taiwan during the financial crisis period. The positive leverage effect indicates that, the impact of positive information dissuades faster than that of the negative information. The negative leverage influence implies the fact that, a positive shock produces less instability than that of negative information or distress for the indices with negative leverage effect.

The last parameter "β" depicts the persistence conditional volatility irrespective of any episodes in the market indices. During the financial crisis the β of Singapore and Taiwan were more than 1, which implies that during the crisis period the market takes much time to recover from the shocks. In every other cases of significant β, the value is less than 1, indicating the market recovers from a catastrophic period swiftly.

TABLE 7
PARAMETER ESTIMATION OF EGARCH (1,1) FOR REGIME SWITCHING

Parameters	China	India	Japan	Malaysia	South Korea	Singapore	Taiwan	Srilanka
1999-2013(Full Sample Period)								
ω	-3.7997***	-1.6587***	-1.0553**	-0.4451	-0.5610***	-0.3133*	-0.5462**	-0.3220
α	0.0642	0.5162***	0.3485***	0.1272***	0.3488***	0.2980***	0.3842***	0.2171**
γ	0.3406***	0.0754	-0.1450**	0.0911*	0.0114	-0.0487	-0.0634	0.0042
β	0.6181***	0.8669***	0.9176***	0.9639***	0.9689***	0.9907***	0.9717***	0.9804***
1999-2006(Before Financial Crisis)								
ω	-5.9288***	-1.9902***	-5.2668**	-0.0128	-0.6599***	-3.6024***	-2.2885***	-2.3077**
α	-0.1998*	0.5874***	0.3278***	-0.0263	0.2788***	0.7241***	0.4711***	0.6695***
γ	0.6598***	0.0330	-0.504	-0.0108	0.0627*	-0.1920**	0.0249	-0.1763
β	0.3950***	0.8349***	0.4977**	0.9973***	0.9531***	0.7000***	0.7921***	0.7869***
2007-2013(During/Post Financial Crisis)								
ω	-2.7809***	-2.1036***	-1.3372***	-12.7193***	-2.1573**	0.0421	-0.1143	-3.3707***
α	-0.0404	0.3645**	0.4539***	1.1341***	0.6814***	0.1022***	0.2481***	0.0425
γ	0.3059***	0.2641**	-0.2900***	-0.6224**	-0.1180	-0.1500**	-0.1362***	0.3752***
β	0.7128	0.8177***	0.8935***	-0.2150	0.8318***	1.1011***	1.0069***	0.6210***

*** 1%, ** 5%,* 10% level of significance.

In accordance to the suggestion of Bank of International Settlement (1998), that developed markets act as conduits among emerging stock markets. In addition, the investigation of Baur and Schulz (2005) during the Asian crisis advocates the idea that Japan and Singapore as developed markets within East Asia, were important conduits of contagion transmission, signifies the importance of re-examining the *conduit effects* during the global financial crisis. The post financial crisis is specifically tested, as regime shift is expected to alter market integration, as found in structural break. Table 8 and table 9, simultaneously examines the impact of spillover of Japan to other Asian economies, Singapore to other Asian economies and vice versa in the post financial crisis period. Significant spillover effect from Japan is found to all Asian markets under consideration. Japan to Taiwan has the highest interaction. On the other hand, spillover from India and China to Japan is significant with highest degree of spillover found for Japan to China, a true conduit effect.

TABLE 8
VOLATILITY SPILLOVER OF JAPANESE MARKET (CONDUIT)
TO EMERGING ASIAN MARKETS

Japan's spillover to other Asian Markets			**Spillover of other Asian Markets to Japan**		
	China	**0.7760*** **	China		0.0859
		(0.0842)			(0.1750)
	India	**0.6964*** **	India		0.0551
		(0.0854)			(0.1295)
	Malaysia	**0.7007*** **	Malaysia		0.0756
		(0.1567)			(0.1588)
Japan →	South Korea	**0.3974*** **	South Korea	Japan →	**0.6491*** **
		(0.1385)			**(0.1063)**
	Singapore	**0.5390*** **	Singapore		**0.6089*** **
		(0.0820)			**(0.1420)**
	Taiwan	**0.8140*** **	Taiwan		0.0667
		(0.0876)			(0.1427)

*** 1%, ** 5%,* 10% level of significance.

In extension, the other possible conduit, spillover effect of Singapore market to other Asian markets is laid out in Table 9. In contrast to Japan, Singapore has significant spillover effect to all of the considered Asian indices, with good degree of interaction in post crisis period. The highest spillover is found from Singapore to South Korea and South Korea to Singapore. This is an important finding, as the increased integration establishes the lingering effect of regime switch between these two markets. It is also determining that in addition to Singapore, South Korea with high degree of co movement emerges as an important Asian conduit in the aftermath of global financial crisis. It is notable, that Singapore has strong spillover impact on China and India, which is not as strong in the opposite direction.

TABLE 9
VOLATILITY SPILLOVER OF SINGAPORE MARKET (CONDUIT) TO EMERGING ASIAN MARKETS

Singapore's spillover to other Asian Markets			Spillover of other Asian Markets to Singapore		
	China	**0.9682*** (0.0132)**	China		**0.6007*** (0.0804)**
	India	**0.9196*** (0.0317)**	India		**0.6010*** (0.0852)**
Singapore →	Malaysia	**0.6916*** (0.1381)**	Malaysia	Singapore →	**0.5837*** (0.0727)**
	South Korea	**0.8834*** (0.0460)**	South Korea		**0.8626*** (0.0398)**
	Taiwan	**0.8675*** (0.0528)**	Taiwan		**0.5426*** (0.0845)**

*** 1%, ** 5%,* 10% level of significance.

CONCLUSION

The importance of this study lies in the fact that, the global financial crisis impacted many major economies around the globe, causing complete market transformations and altered the interaction between major markets. The interaction among markets in Asia is has not been significantly studied in the post global financial crisis for contagion effect, information hypersensitivity and heterogeneity, regime switch and volatility spillover relationship. Contagion definition suggests that market linkage increases in existence of a crisis. More importantly, empirical theories and literature indicates the lingering interaction the structural shift of markets in the post phase of a crisis is vital for investor's decision making process. As per the contagion framework, suggested by the Bank of International Settlement, developed countries are less impacted by contagion, while they are the major conduits of crisis spillover for developing markets. However, the later condition was outwitted by recent studies, notably that of Islam et al (2013), and it was suggested that developed European markets present strong crisis spillover in the aftermath of financial crisis. The degree of interaction rapidly propagated even the smallest of shocks quicker than before, and such information is not very inspiring for risk averse investors. Due to lack of true globalization, it was believed previously that Asian markets are, to some extent, free from such shock integration. The many indications received after the Asian crisis, it was believed that in presence of hypersensitivity to information and idiosyncratic shocks, Hong Kong, Japan and South Korean markets are more prone to be conduits to Asian crisis. Such findings lead to important shift in policies in some Asian countries. It was essential, to find the interactions among the Asian market in the pre and post global financial crisis period in presence and in absence of US market accession, which may contain important information for policy makers and investors alike. The markets considered are of China, India, Japan, Malaysia, South Korea, Singapore, and Taiwan.

The paper confirmed non-linearity and heterogeneity of the series under consideration with ARCH (1,1) effect estimation and with joint Wald test. The Wald tests also confirmed the presence of non-linear

restrictions of the dynamic model. For proper estimation of dynamic conditionality of the models, the non-linear restriction bears significance. Primarily the study examined the own and cross volatility spillover of seven major Asian markets, bearing substantial roles during Asian crisis. The study applied multivariate GARCH (1,1) estimation for mean and cross volatility spillover calculations. Most studies indicate US inclusion to be a necessary condition, for US market is the ground zero market for the global financial crisis 2007. Findings suggested Taiwan has the highest possible repeating shocks recorded, while highest volatility clustering is apparent for Malaysia. Own crisis spillover is profound for China, the post global financial crisis signifies a strong existence of cross volatility spillover generating from India and Malaysia. This is an important finding as India and Malaysia, two strong emerging markets, indicated significant economic growth in the last decade, and their stock markets became prominent, in very recent periods. In the existing literature, the role of India and Malaysia in contagion crisis spillover, carries very less significance. It can be suggested, that emerging markets in the aftermath of Asian crisis, had been important conduits during the global crisis. The real linkage for such economies might be profound, in comparison to that of financial linkage.

The paper than examines the structural break and leverage effect with threshold GARCH (1,1), comparing both the pre and the post financial crisis period. While during the crisis period Malaysia became significantly sensitive, the sensitivity to shocks lingered for Singapore and Taiwan. Such findings suggest, the increased integration purely contributed by the financial crisis 2007 for these two countries. Finally, volatility spillover tests conducted on specifically two major developed countries, Japan and Singapore is indicative to development of recent market integration. It was expected for the spillover direction from Japan to other economies, as Japan had been a conduit even during the Asian Crisis. The impact of US crisis into Japan is undeniable. However, a stronger spillover from China to Japan, for the post global crisis period must be noted, which is remarkably a recent development.

Plethora of studies offered suggestions to control contagion and curb crisis spillover. Hawkins and Turner (2000), predicted emerging markets will have difficulties complying with industrial-country standard, stressed on improved standards for supervision, surveillance for financial institutions, disclosure of real time data, and prudential controls. Tightening of financial policies stipulate that, increased monitoring of internal risk management, sanctions for poor systems, limiting maturity mismatches and the operations of hedge funds, holding excess foreign exchange assets relative to domestic currency liabilities, and capital controls on disproportionate outflows and some sort of inflows are essential in policy levels to prevent the propagation of sudden shocks. To avoid country level debt building, Supplemental Reserve Facility, Contingent Credit Lines of the IMF, guaranteed facility for the private sector by World Bank, are in place, reducing some degree of vulnerability (Dornbusch et al, 2000).

This is now time to draw the curtain off the research question and evaluate if the policy shifts adopted in the post Asian crisis period are sufficient to restrict capital flight on the back of recent global recession. In the analysis, cross market volatility spillover is found strongest between India and Malaysia, and China is robust to the spillover with minimum significance. It is a major concern, as with stringent measures taken on the speculators, a shift from floating to fixed regime, and strong capital controls, staggering Malaysian market yet cries out for pragmatic stance. It is essential to adopt coherent policy adjustment packages, close consultation with creditors and to address implicit deposit guarantees, while there is explicit lack of available fiscal resources; are advisable to Malaysian market; to control exacerbation of crisis (Summers, 2000). Indian markets reached a higher growth trajectory in the post Asian crisis period, and so the lax fiscal policies are more attractive, resulting in higher integration to other markets. Consequently, there was lack of investor and creditor confidence, implicit bailout guarantees, led to the reel of Indian market during global recession. However, strong safeguards can be placed by tightening monitory policy, maintaining of financial stability, lower interest rates can wheel off the market turbulence with better stabilization. China on the other hand remains least volatile for decades due to durable total factor productivity, and much adjustment will be less plausible.

This paper is successful in estimating strong spillover impact from Singapore to other Asian markets, which are to some extent higher than prevailing Japanese market. Japanese and US markets rode the horse in tandem from the last recession as ground zero to crisis in Asia. While as the strongest economy, it is

not surprising to find Japan playing a strong role as conduit, it must be noted that, according to analysis, shock recovery required longer period for Singapore, but Singapore successfully evaded strong impact from Asian crisis, due to timely government intervention. The recent impact of global recession in Singapore draws a stark contrast, due to lack of timely intervention that protected its markets from last recession. This was also a motivation to find the impact of idiosyncratic shocks within Asian market, and that can only be successfully assessed with a market structure of Singapore. Spillover from other markets to Singapore is not prominent, only except South Korea. South Korea has been an important conduit during Asian crisis of 1997, which gained stronger integration in the aftermath of Asian crisis. In the post financial crisis period, South Korea to Singapore and Singapore to South Korea spillover becomes strongly significant. Therefore, even without a separate estimation for South Korea, it can be concluded that South Korea remains a very strong conduit in the post global crisis period.

This study covered the Asian impact of the Global Financial Crisis of 2007-2008, and compared the situation to that of Asian Financial crisis 1997. From the analysis, some suggestions were derived to tackle eminent future shock. The Asian crisis caused some institutional intervention by policy makers, which did not prove healthy for the markets. Therefore, such dynamic conditional integration may not inspire the policymakers to follow the same path, but may draw a guideline for investor's portfolio rebalancing. It is essential to draft in an accord to tackle the next contagion in Asia, which requires extensive coherence between future researches that might lend to more pragmatic stances, not unilateral to any one market but to a pool of markets.

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