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Detection of Multiple Beta Shifts in Monthly Returns Data

Thomas S. Howe and Ralph A. Pope

Introduction

For over three decades, studies have used the single index market model (Sharpe 1963) to analyze risk or performance of stocks, often in response to an information-containing event. The market model is

$$R_{it} = a_i + b_i R_{mt} + u_{it} \quad (1)$$

where R denotes return, i and t denote the asset and time period, respectively, m denotes the market, b is the beta, that is, the sensitivity of the asset returns to the market returns, a is the intercept, and u is an error term.

Early research into the consistency of the beta of common stocks over time indicates that the betas of individual assets are nonstationary (Levy 1971). Recent studies which acknowledge this nonstationarity include Graddy, Kyle, Strickland, and Bass (2004) and Kaplanski (2004). One parameter stability model is the shifting regimes model (Mehta and Beranek 1982; Bey 1983; McDonald 1983; Hays and Upton 1986), in which the return-generating process is assumed to follow a stationary regime for n_1 periods, then shift to another stationary regime for n_2 periods, and so on. The shifts are considered to be infrequent; that is, for any given k, n_k is large enough for reliable estimation of the parameters.

Major difficulties in applying the shifting regimes model are the detection and location of regime shifts. Possible techniques include the Chow (1960), Farley-Hinich (1970), recursive residual (RR) (Brown, Durbin, and Evans 1975), and dummy variable (Harvey 1976) tests, and variable parameter regression (Garbade 1977) for the detection of a change, and the Quandt log likelihood ratio (LR) (1958,1960) for both detection and location of the change. The RR and LR are often used in combination, the first to detect the presence of a shift and the second to estimate the location of the shift point. Garbade (1977) and Farley, Hinich, and McGuire (1975), however, raise questions about the suitability of the RR and LR techniques.

To the extent that the methodology is inadequate, the previous research is called into question. For example, Howe and Upton (1992) suggest that an individual stock's beta shift is difficult to detect reliably. This calls into question the results of studies such as Hays and Upton (1986). In addition, Howe and Pope (2005) suggest that attempts to detect multiple beta shifts in daily stock return data are fruitless.

Other than the fact that Howe and Upton use simulated returns while Hays and Upton use actual returns, there are two major differences between the studies. First, Howe and Upton use daily returns while Hays and Upton use monthly returns. Second, Howe and Upton assume only one beta shift while Hays and Upton allow for multiple beta shifts. Howe and Pope allow for multiple beta shifts using daily returns.

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For greater comparability with Hays and Upton, this study uses monthly simulated stock returns to examine the ability of techniques to detect multiple beta shifts. Techniques this study uses include partition regression (Guthery 1974; Miller and Gressis 1980) and sequential variations of the Brown-Durbin-Evans (BDE) cumulative sum of the squared recursive residuals (Brown, Durbin, and Evans 1975; Hays and Upton 1986), stabilogram (Ashley 1984), and variable parameter regression (Garbade 1977) techniques. As in Howe and Upton (1992), this study improves over previous studies by examining conditions which more realistically approximate those found in security returns. Also as in Howe and Upton, this study uses a range of conditions which depart from the nominal assumed conditions in directions indicated from empirical studies. This range of conditions allows an examination of the robustness of the techniques. A class of the Stable Paretian distribution is used to generate residuals to assess the effect of non-normality and outliers.

This study finds single beta changes of 25 percent nearly impossible to detect. It finds the cumulative sum of the squared recursive residuals procedure to be highly sensitive to extreme observations and to have no ability to detect a beta change, even when there are three 25 percent beta changes within 180 months. In addition, the partition regression procedure and the cumulative sum of the squared recursive residuals procedure have type I error rates far greater than the significance level of the tests. While the variable parameter and stabilogram tests do not show such high type I error rates, the percentage of the cases in which they detect even one beta shift is low. None of the methods shows much ability to detect any beta changes beyond the first.

Methodology

Techniques for Detection of Parameter Shifts

Variable Parameter Regression (VPR)

Variable parameter regression assumes that beta follows a random walk. If we express this as $b_t = b_{t-1} + P$, where b_t is the beta for period t and P is the drift parameter, the null hypothesis is that P=0. The maximum likelihood estimate of P is asymptotically chi-squared with one degree of freedom. A full discussion of variable parameter regression can be found in Garbade (1977).

Stabilogram (STAB)

The stabilogram procedure divides the period to be studied into a number of subperiods of approximately equal length. Dummy and interactive variables are used to obtain ordinary least squares estimates of the market model parameters for the subperiods. The stabilogram procedure considers the market model parameters to be unstable if the null hypothesis that the market model parameters for all subperiods are equal is rejected.

Cumulative Sum of the Squared Recursive Residuals (RR)

Recursive residuals are obtained by recursively computing the standardized prediction error of r_{it} when the market model parameters are estimated from the preceding t-1

observations. Under the null hypothesis of no parameter change, the errors are independent and distributed $N(0,s^2)$. A shift in either a_i, b_i, or the error variance is indicated if a residual shows significant departure from zero. BDE present tests on the cumulative sum (cusum) of the recursive residuals and on the cusum of the squared recursive residuals. This study uses the latter test because Garbade (1977) found it to be much more powerful than the former. A full discussion of the technique and can be found in Brown, Durbin, and Evans (1975).

One problem with the RR technique is that the distribution of the test statistic is known only under the null hypothesis, and will be violated in the presence of multiple shifts. Additionally, it has been suggested that the RR technique is sensitive to outliers or other departures from the assumed conditions. In response to these objections, several papers (for example, Hays and Upton (1986), Johnson (1989)) have used a sequential approach for the RR technique, in which the RR technique is applied to progressively longer periods to avoid the possibility of multiple shifts. In this approach, shift indications are accepted as valid only if consistently observed, and the analysis is restarted after a shift has been detected. A full discussion of this approach can be found in Hays and Upton (1986).

Howe and Upton (1992) suggest that the VPR technique does not show this outlier sensitivity. Also, one can infer from their Chow test results that the STAB technique would likely be insensitive to outliers. However, the VPR and STAB techniques, as originally presented, test for general instability rather than multiple shifts. To attempt to detect multiple beta shifts, this study modifies these techniques by using a sequential approach.

Garbade (1997) compared the ability of RR and VPR to detect instability in the coefficients of a linear regression model, and found that the VPR dominated. In addition to comparing a larger number of techniques, this study differs from Garbade in using conditions which are more realistic for event-study applications, and by including a number of conditions not investigated by Garbade. Additionally, Garbade used only totally simulated data, while the proposed studies use simulations based on observed market data to include the possible effects of instabilities in the market process.

Partition Regression (PR)

The partition regression approach presented by Guthery (1974) and applied by Miller and Gressis (1980) differs from the RR, VPR, and STAB approaches in that it was originally designed to attempt to identify multiple parameter shifts rather than a single shift. Partition regression employs the following algorithm.

1. Divide the period into subperiods (initially two) so as to minimize the error sum of squares.
2. Use Chow (1960) tests to test the null hypothesis that the market model parameters of every two neighboring subperiods are equal.
3. If the null hypothesis is rejected for all neighboring subperiods, increase the number of subperiods by one and go to step 1.
4. If any of the Chow tests on neighboring subperiods are not rejected, stop the procedure. The number of parameter shifts is considered to be two less than the number of subperiods most recently examined.

Technique for Shift Point Locations

The log likelihood ratio (LR) can be calculated as follows:

$$LR = \ln \left[\frac{\text{likelihood of the observations under } H_0 \text{ (no parameter change)}}{\text{likelihood of the observations under } H_1} \right]$$

It can be used to detect the presence of a shift by examining the size of the minimum value over the period of interest. The distribution of the ratio has not yet been specified, however, and application of the technique to the detection of a shift itself is judgmental in nature. Because of the qualitative nature of the technique, it is sometimes used in conjunction with other techniques (such as RR) as a method of locating the shift point. That is, given that a shift has been detected within a series of observations, the likely location of the shift is at the minimum of the ratio.

Return Simulations

Market-based simulated daily security return series are generated using the following form of the single index model:

$$r_{it} = r_{ft} + b_{1it}(r_{mt} - r_{ft}) + u_{it}\,, \tag{2}$$

where:

b_{1it} = the beta coefficient for "security" i in period t
u_{it} = error term
r_{mt} = observed monthly returns to the S&P 500
r_{ft} = observed monthly rate on 90 day T-bills.

For comparability with Hays and Upton (1986), each series contains 180 monthly returns. These simulated returns are based on the S&P 500 and T-bill returns over the period from January 1962 through July 1995.

Two hundred simulated return series (corresponding to 200 "securities") are created, each using a beta drawn from a normal distribution with a mean of 1 and a variance of 0.16. Examination of a cross-sectional distribution of betas suggests that such a distribution is realistic. In order to provide a variety of conditions under which the techniques can be tested, the parameters in (2) are varied as follows:

b_{1it}: Eight conditions of change: (a) constant beta (no change), (b) a 25% increase in beta, (c) two 25% increases in beta, (d) three 25% increases in beta, (e) a 25% increase in beta, followed by a 20% decrease in beta, so the beta after the second shift is the same as the beta before the first shift, (f) a 25% increase in beta,

followed by a 20% decrease in beta, followed by a 25% increase in beta, (g) two 20% decreases in beta followed by a 25% increase in beta, and (h) two 25% increases in beta followed by a 20% decrease in beta For each simulated security, three beta change dates are selected at random from a uniform distribution consisting of days 3 through 177.

u_{it}: Two distributions of error terms: a) Normal (Stable Paretian with $\alpha = 2.0$) and b) Stable Paretian with $\alpha = 1.95$. These values are consistent with those observed by Fama (1965). The mean of the distributions is zero. The variance (scale factor in the case of the Stable Paretian 1.95 error terms) is estimated from a randomly chosen set of 200 securities.

This results in eight conditions and two error term distributions, or 16 (8×2) data sets. Each data set is composed of 180 "observations" for each of 200 "securities."

Procedure

The studies are to apply the detection techniques to the sixteen data sets at the 0.05 significance level. The RR test is performed on the first six observations. After that, we increased the interval tested six observations at a time between RR tests. In this study, for a shift indication to be considered consistent and persistent one of the following conditions has to be met:

1. three consecutive indications of significance, all with the same LR estimate of the location of the shift
2. four consecutive indications of significant, with three identical LR estimates of the location of the shift

This is consistent with the procedure used by Hays and Upton (1986).

In the STAB procedure, there is a tradeoff regarding the number of subperiods. The fewer the subperiods, the more degrees of freedom there are, but using fewer, but longer, subperiods reduces the ability of the procedure to identify relatively short regimes. This study uses six subperiods in all stabilogram runs.

As in Howe and Pope(2005), this study uses the minimum of the LR as the estimate of the beta change date in the sequential application of the VPR and STAB procedures. After obtaining this estimate, the study performs the VPR or STAB procedures on the two regimes that are immediately before and after the LR minimum.

This method of locating beta shifts has the weakness of indicating a disproportionate number of the shifts in the first few or last few observations of the return series. Many of these shift indications are likely spurious. At the same time, if one treats indications of shifts in the first few or last few observations to be spurious, one may miss actual beta shifts. As a compromise, this study constrains the beta shift indications to between approximately the $N/8^{th}$ and $7N/8^{th}$ observation, where N is the number of returns in the series being tested for beta changes.

The results from the data sets with no beta change indicate the Type I error rate. The various techniques are then compared on the basis of their ability to detect shifts in

parameters by examining the frequency of detection in data sets with one or more beta changes. The robustness of the techniques is investigated by comparing the changes in Type I error and detection frequency for the data sets with normally-distributed error terms with the Type I error and detection frequency for the data sets with Stable Paretian 1.95 error terms.

Expectations

Given the results of Ashley (1984), one would expect the VPR test to be conservative; Ashley attributes this at least partly to the fact that the test statistic is only approximately chi-squared. On the other hand, because the Chow tests involved in the stabilogram procedure are exact, one would expect the Type I error rate of the stabilogram to approximately equal the significance level, in this study 5 percent.

The partition regression procedure involves calculating the SSE for all possible parameter shift points and choosing the shift point(s) which minimize the SSE. Only after that is a Chow test run to test for parameter instability. Since this amounts to running all possible Chow tests and choosing the one which produces the highest F-statistic, the expectation is that the Type I error rate is greater than the significance level.

It is not clear *a priori* whether the sequential RR procedure employed in this study has a Type I error rate greater than or less than the significance level of the test. One would expect the requirement that the RR procedure's indication of parameter change be persistent and consistent to weaken the test. On the other hand, the fact that the RR procedure is repeated a number of times over progressively longer subsets of the return series increases the probability of finding three or more consecutive indications of significance within any given simulated security return series. Given the extreme sensitivity to outliers documented in Howe and Upton (1992), one would expect more indications of significance when the error terms have a Stable Paretian distribution than when they are normally distributed.

Results

Table I presents the first-pass rejection frequencies, that is, the frequencies with which the null hypothesis that there is no beta change is rejected. Regardless of the method used, a single 25% beta change is practically undetectable. Also, the more beta increases there are the more likely it becomes that there will be an indication of beta instability. Also, there is more likely to be an indication of a beta change in cases in which there are two consecutive beta changes in the same direction than when beta increases, then decreases, and then increases.

While studies such as Howe and Upton (1992) and Howe, Upton, and Pope (1997) find the RR procedure has a slight ability to detect beta changes using daily stock returns, this study suggests the method has no ability to detect beta changes in monthly stock returns; the method gives no more indications of a beta change in the three-beta-increase cases than in the no-beta-change cases. Also, the results from the samples with Stable Paretian error terms indicate that the procedure is highly sensitive to extreme observations. Finally, the rejection frequency of the null hypothesis of no beta change when there is in fact no beta change and the error terms are normally distributed (12.0%) is substantially greater than the 5 percent one would expect. A binomial test finds this difference to be significant at much less than the 0.01 level (p-value = 2.61×10^{-5}).

The PR procedure does appear to show some ability to detect beta changes, at least in the cases with two or more consecutive beta changes in the same direction Also, the PR procedure appears to be largely unaffected by extreme observations, such as those found in the Stable Paretian samples. However, as expected, the type I error rate of the PR procedure in the no beta change samples is significantly higher than the 5 percent one would expect (p-value = 7.66×10^{-15}). The ability to detect beta changes is comparable to what Howe and Pope (2005) report for daily returns.

Consistent with the findings of Ashley (1984), the VPR test is conservative, with type I error rates of 1 to 4 percent when the VPR test is run at the 5 percent level. In all of the samples in this study the VPR procedure detects a beta change less than half of the time, and except for the samples with three beta increases, no more than 15 percent of the time. A paired t-test on the rejection frequencies on the normally-distributed samples versus the Stable Paretian 1.95 samples suggests that the VPR test is sensitive to extreme observations (two-tailed p-value = 0.018). For the most part, the ability to detect beta changes appears to be slightly less than that reported by Howe and Pope (2005).

The stabilogram test appears to have power at least comparable to that of VPR, especially in the cases in which there is either only one beta change or a mixture of beta increases and decreases. Also, the STAB test appears to be robust to extreme observations. Similar to VPR, the ability to detect beta changes appears to be slightly less than that reported by Howe and Pope (2005).

Table II presents frequency distributions of the number of beta shifts indicated by the RR procedure. In the samples with normally distributed error terms, there were no cases in which three beta shifts were indicated, and only a few cases in which two beta shifts were indicated. There appears to be no relationship between the number of cases in which two beta changes were indicated by the procedure and the actual beta change pattern. Although the Stable Paretian error term samples showed indication of more beta changes than the normally distributed error term samples, the incidence of these indications appears to be unrelated to the actual beta change pattern. The number of beta changes detected is less than the number Howe and Pope (2005) find when using daily stock returns.

Table III presents frequency distributions of the number of shifts indicated by the partition regression procedure. In the samples with two or more beta changes, the procedure gives an indication of two or more beta changes no more than 9 percent of the time. Furthermore, there appears to be no correlation between the number of actual beta changes and the number of beta changes indicated by partition regression. This study finds fewer indications of two or more beta changes but slightly more indications of four or more beta changes than Howe and Pope (2005).

Table IV presents frequency distributions of the number of beta shifts indicated by the VPR procedure. Consistent with the results in Table I, the samples with more actual beta changes generally yield more indications of any given number of beta changes. However, in the samples with two beta changes, the second one is rarely detected, and in samples with three beta changes the third one is detected in less than 2 percent of the cases. There appear to be more indications of market model parameter changes per security in the samples with Stable Paretian error terms than in the samples with normal error terms. This suggests that when applied sequentially the VPR procedure is somewhat sensitive to extreme observations. The number of beta change indications is considerably less than when using series of 600 daily simulated stock returns (Howe and Pope 2005).

Table V presents frequency distributions of the number of beta shifts indicated by the STAB procedure. Consistent with the results in Table I, the samples with more actual beta changes generally yield more indications of any given number of beta changes. However, the procedure detects a third beta change in no more than 1.5 percent of the securities in any of the samples. Furthermore, in the samples with exactly two beta changes, the STAB procedure finds two or more beta changes less than 3 percent of the time. While it is conceivable that the sequential application of the STAB procedure is less sensitive to extreme observations than the sequential application of the VPR procedure is, it is also possible that the STAB procedure weakens considerably as the subperiods become shorter. The number of beta change indications is somewhat less than when using series of 600 daily simulated stock returns (Howe and Pope 2005).

Summary and Conclusion

This study has examined the power and type I error rate of four methods of testing for regression parameter changes when applied to detecting beta changes in monthly stock return series. The study used simulated stock return series with known betas, error variances, beta change dates, and error term distributions.

The study found a single 25% beta change to be nearly impossible to detect, regardless of the method used to attempt to detect the changes. The partition regression and sequential recursive residual procedures were found to have type I error rates far greater than the 5 percent significance level used in this study, a finding consistent with expectations. Furthermore, the recursive residuals procedure showed no ability to detect beta changes and was found to be very sensitive to extreme observations.

On the other hand, variable parameter regression and the stabilogram procedure showed some ability to detect market model parameter changes when there were two or more beta shifts of 20 or 25 percent in the same direction. Still, even in the case of three 25 percent increases in beta, which amounts to almost a doubling of beta during a 180-month period, the change in beta was detected in no more than 32 percent of the cases at the 5 percent significance level.

None of the methods showed ability to detect a second or third beta change in more than 9 percent of the cases. This could be due to the high level of residual risk in monthly stock return data or, in the case of the recursive residuals procedure and possibly the variable parameter regression procedure, the low power of the tests.

In most cases the number of beta change indications is less than those in Howe and Pope (2005). This suggests that the lower level of residual variance in monthly stock returns compared to daily stock returns is more than offset by smaller number of observations.

In summary, it appears to be nearly impossible to detect or find the location of small or moderate beta changes in monthly stock return series. This suggests that the market model parameter changes reported by Hays and Upton (1986) are most likely not beta changes. However, they find of market model nonstationarity in almost all of the stocks in their sample—far more than this study finds. This suggests that if non-normality of stock returns accounts for the results obtained by Hays and Upton, the Stable Paretian 1.95 distribution does not adequately explain monthly stock returns.

There are certainly other tests that could be employed, such as central Chow tests, Farley-Hinich tests, and dummy variable tests specifically aimed at detecting beta changes

rather than market model parameter changes in general. However, the ability of these tests to detect multiple beta shifts will still be limited by the poor performance of methods used to locate the beta changes. Thus, even though failure to account for beta changes could bias risk-adjusted return measurement and the results of abnormal returns tests, the techniques examined in this study appear to be of almost no help in correcting for beta changes.

Table I. First Pass Rejection Frequencies of Null Hypothesis of No Market Model Parameter Change (N=200)

Beta Change Pattern*	RR**	PR	VPR	STAB
		Normal Error Terms		
OOO	12.0%	43.5%	1.5%	6.0%
UOO	10.0%	47.5%	4.5%	8.0%
UUO	10.5%	67.0%	14.0%	17.0%
UUU	11.5%	84.0%	32.0%	33.0%
UDO	10.5%	49.5%	3.0%	8.5%
UDU	11.0%	48.0%	3.0%	8.0%
DDU	11.5%	55.0%	3.5%	9.5%
UUD	11.5%	58.0%	9.0%	13.5%
		Stable Paretian 1.95 Error Terms		
OOO	33.5%	43.0%	4.0%	7.5%
UOO	33.5%	47.5%	7.0%	8.5%
UUO	32.0%	63.0%	14.5%	17.0%
UUU	33.0%	81.5%	31.5%	33.0%
UDO	32.0%	47.0%	5.5%	10.0%
UDU	33.0%	46.5%	5.0%	9.0%
DDU	34.5%	54.5%	5.5%	11.0%
UUD	32.5%	54.5%	10.5%	14.0%

* O, U, and D denote no change, an increase, and a decrease, respectively. Therefore, for example, UDO refers to a beta increase, followed by a beta decrease, followed by no beta change.

** RR, PR, VPR, and STAB refer to the recursive residuals, partition regression, variable parameter regression, and stabilogram procedures, respectively.

Table II. Cumulative Frequency Distributions of Number of Parameter Shifts Detected by the Recursive Residuals Procedure (N=200)

Beta Change Pattern*	Number of Shifts 1	2	3	4
		Normal Error Terms		
OOO	24	6		
UOO	20	4		
UUO	21	5		
UUU	23	3		
UDO	21	5		
UDU	22	6		
DDU	23	5		
UUD	23	5		
		Stable Paretian 1.95 Error Terms		
OOO	67	30	8	
UOO	67	33	6	
UUO	64	33	6	
UUU	66	35	8	1
UDO	64	31	5	
UDU	66	32	10	
DDU	69	33	6	
UUD	65	36	6	1

* O, U, and D denote no change, an increase, and a decrease, respectively. Therefore, for example, UDO refers to a beta increase, followed by a beta decrease, followed by no beta change.

Table III. Cumulative Frequency Distributions of Number of Parameter Shifts Detected by Partition Regression (N=200)

Beta Change Pattern*	Number of Shifts 1	2	3	4+
		Normal Error Terms		
OOO	87	16	7	5
UOO	95	11	5	3
UUO	134	15	7	6
UUU	168	14	7	6
UDO	99	16	11	6
UDU	96	10	6	5
DDU	110	17	8	6
UUD	116	14	6	4
		Stable Paretian 1.95 Error Terms		
OOO	86	13	7	6
UOO	95	12	5	5
UUO	126	15	6	0
UUU	163	14	6	6
UDO	94	18	10	6
UDU	93	13	7	6
DDU	109	17	7	5
UUD	109	14	5	4

* O, U, and D denote no change, an increase, and a decrease, respectively. Therefore, for example, UDO refers to a beta increase, followed by a beta decrease, followed by no beta change.

Table IV. Cumulative Frequency Distributions of Number of Parameter Shifts Detected by Variable Parameter Regression (N=200)

	Number of Shifts			
Beta Change Pattern	1	2	3	4
		Normal Error Terms		
OOO	3	1	1	1
UOO	9			
UUO	28	1		
UUU	64	5		
UDO	6	2		
UDU	6	1	1	1
DDU	7	2	2	1
UUD	18	3		
		Stable Paretian 1.95 Error Terms		
OOO	8	4	2	1
UOO	14	5	3	
UUO	29	4	2	
UUU	61	8	3	
UDO	11	6	3	
UDU	10	4	2	1
DDU	11	3	2	2
UUD	21	7	2	

* O, U, and D denote no change, an increase, and a decrease, respectively. Therefore, for example, UDO refers to a beta increase, followed by a beta decrease, followed by no beta change.

Table V. Cumulative Frequency Distributions of Number of Parameter Shifts Detected by the Stabilogram Procedure (N=200)

Beta Change Pattern	Number of Shifts 1	2	3	4
		Normal Error Terms		
OOO	12	3	1	
UOO	16	3	1	
UUO	34	5	1	
UUU	72	8		
UDO	17	5	1	
UDU	16	4	2	
DDU	19	5	2	
UUD	27	3	0	
		Stable Paretian 1.95 Error Terms		
OOO	15	4	3	
UOO	17	4	2	
UUO	34	4	2	1
UUU	66	11	2	2
UDO	20	5	2	
UDU	18	5	3	
DDU	22	5	1	
UUD	28	3	1	

* O, U, and D denote no change, an increase, and a decrease, respectively. Therefore, for example, UDO refers to a beta increase, followed by a beta decrease, followed by no beta change.

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Analysis of *Investment Advisor* Strategists' Predictions

Brian Hornberg and Thomas M. Krueger

Introduction

The very process of investing implies forecasting the future. Security buyers expect investment yields to at least equal the required rate of return. Furthermore, those investing in the stock market are assuming that they can earn a higher rate of return than would have been received in the bond market. When buying stocks or bonds, investors are predicting that their rate of return will exceed the inflation rate. Future economic conditions will dictate whether the investor in stocks, bonds, or cash come out ahead. Consequently, investment success will hinge on how accurately economic conditions are forecast.

Forecast accuracy can be empirically tested. The difficult part of the analysis is identifying a sufficiently long series of forecasts from a single prognosticator so that it covers multiple market conditions. In this report, we will examine the forecasting ability of the financial gurus picked by *Investment Advisor*, the popular journal whose subtitle is "The Advisor to Advisors." In December 2005, Investment Advisor celebrated its 25th year of publication. During most of this time period, the serial has included a monthly column titled "Asset Allocation." Approximately ten varying experts in the brokerage, portfolio management, and banking industries have provided economic and financial market forecasts. In this study we will examine the accuracy of those forecasts.

This report is split into six sections. The next section provides a brief literature review of market modeling and forecasting. The third section discusses the economic and financial market forecasts provided by *Investment Advisor*. The fourth section covers the empirical model used to test forecast accuracy, while the fifth section includes the results of our study. Finally, a short summary is presented.

Literature Review

Thousands of empirical economic exercises are run daily in an attempt to predict changes in economic variables. Diebold (1997) examines over one hundred articles on this subject. Obviously, this literature review cannot do justice to the multitude of research

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contributions made over the years. For instance, much effort has been put forth in an attempt to identify underlying trends in economic indicators. Near the time that *Investment Advisor* first started publishing its forecasts, Kyland and Prescott (1990) described the correlation of real GNP with lags of itself. More recently, Croushore and Stark (2003) reported that GNP numbers are stable across time. Although there is only a limited amount of information about future inflation in maturities up to a year, Mishkin (1991) found that going beyond a year increases the prediction of yield curves in Germany and the United States. In the same nations, Estrella, Rodrigues, and Schich (2003) report that models predicting national productivity and recessions are more stable than those that predict inflation. However, Shields, Olekalns, Henry, and Brooks (2005) found that shocks to the economy can result in changes in inflation and industrial production that can last for up to three years and the impacts vary with positive and negative shocks to the economic landscape.

The Livingston Survey

Perhaps the best comparison to the *Investment Advisor* forecasts is the Livingston Survey, which was started in 1946 by the late columnist Joseph A. Livingston, a business journalist for the *Philadelphia Inquirer*. It is the oldest continuous survey of economic expectations in the United States and summarizes the forecasts of fifty economists from industry, government, banking, and academia. The Federal Reserve Bank of Philadelphia took responsibility for the survey in 1990.

The Philadelphia Federal Reserve's release of the Livingston Survey includes the actual release, documentation, mean and median data of all of the respondents, as well as individual responses from each economist. Participants are asked to forecast a set of key macroeconomic variables, including real and nominal GDP, inflation based on both the producer price index and consumer price index, the unemployment rate, interest rates on three-month Treasury-bills and 30-year Treasury bonds, and the stock market including the Dow Jones Industrial Average and Standard & Poor's 500.

With such a treasure trove of economic forecast information, it is not surprising that a multitude of analysts have studied the accuracy of the Livingston Survey. Keen (1981) analyzed forecasts from 1971 – 1978 in an effort to tell which forecasters were best: those from academia, banking, or business? No consistent differences were found in the forecasts of nominal GNP, real GNP, consumer prices, and unemployment when considering size of error and turning points. Another relevant analysis conducted by Keen was whether the Livingston forecasters were better than the "no-change" model for 6 and 12-month-ahead forecasts. They were generally more accurate, with the exception of forecasts for the industrial stock price index.

Ahlers and Lakonishok (1983) examined the Livingston survey from the first survey up to 1978 and three sub-periods. Forecast accuracy was examined for ten macroeconomic variables and for two forecast horizons. Their findings included

a. economists underestimate changes
b. economics are too optimistic
c. economists do better than a "no-change" model,
d. economists do better than a simple trend extrapolation, and
e. economists do not appear able to predict turning points.

One relevant conclusion of Ahlers and Lakonishok was that the economists' forecasts improved over time, but this conclusion was based on only three time periods, the last of which was almost thirty years ago. Additional information can be found in a report written in conjunction with the 50th anniversary of the Livingston survey, where Croushore (1997) provides a compendium of over twenty research articles examining the Livingston data.

Data

Investment Advisor

Based in Shrewsbury, New Jersey, and owned by Wicks Business Information, *Investment Advisor* is the nation's leading source of news, information, research, and practical help for independent financial planners. Long the distinguished monthly magazine serving advisors and planners, the magazine is at the forefront of publications tracking what is going on in financial planning and investments. In an attempt to reach every qualified financial intermediary currently active, Wicks Business Information offers free subscriptions to *Investment Advisor* magazine and *Investment Advisor's* e-newsletter to qualified recipients, including finance professors, in the United States. Other parties pay an annual fee of $89.00 in the United States and Canada, or $109.00 elsewhere.

Investment Advisor attracts experienced and successful investment professionals from Main Street to Wall Street, constituting one of the largest and highest quality audited circulations of fee/commission financial professionals of any trade magazine. According to the Investment Advisor Group website (www.investmentadvisor.com), *Investment Advisor's* 77,000 readers manage or advise on some $1 trillion in client assets. By comparison, the web site of *Financial Advisor,* a leading competitor, reports a 2006 circulation of 70,000. On average, its subscribers have been in the financial industry for more than 10 years, and have an average of 203 clients, each with an average account size of nearly $775,000. Recent articles in *Investment Advisor* included information on such wealth-management areas as hedge funds, separately managed accounts, and tax advice for high-income clients.

Since March 1991, *Investment Advisor* has included recommended asset allocations of *Investment Advisor's* panel of distinguished economists and money managers. The February 2006 edition included nine experts, including Gary Schilling (A Gary Shilling & Co.), Gail Dudack (SunGuard Institutional Brokerage), Save Stoval (Standard & Poor's), and Richard Bernstein (Merrill Lynch). One expert provides a 100-word synopsis explaining their stocks/bonds/cash distribution. These experts also forecast the values of five economic and financial market indicators in six moths. The February 2006 edition, for instance, forecasts economic conditions through August 2006.

Research Hypothesis

Investment Advisor has an ongoing "Asset Allocation" column where strategists predict the level of the several macroeconomic measures of a financial nature six moths later. Nine to thirteen experts have attempted to predict the level of the following stock market, bond market, economic growth, inflation, and short-term interest rate measures.

- Stock Market — Dow Jones Industrial Average
- Bond Market — Rate on 30-day Treasury Bonds or 10-year Treasury Notes
- Economic Growth — Annual Growth of Real GDP in GNP

- Inflation — Annual Increase in the Consumer Price Index
- Short-term Rates — Annualized yield on the Three-month Treasury Bills

The Asset Allocation column has been published by Investment Advisor for fifteen years, resulting in a mountain of information on which to base an analysis of strategist forecasting ability. In making statistical decisions, null and alternative hypotheses need to be created. The null hypothesis, which is assumed to be true, is that there is no bias in the forecasting of economic data. The alternative to this hypothesis is that there is a bias, and that the forecast is either too high or too low. (Spiegel et al, 2001)

Forecast accuracy, will be determined through the calculation of the average difference between the forecast and the actual figures. If analysts are able to accurately predict future economic conditions, the average difference between the forecast and the actual figure should be zero.

Data Collection

All data was taken from the "Asset Allocation" section of the *Investment Advisor*. The strategists' predictions were compared to actual values for the market indicators given in later issues of the *Investment Advisor*. Strategists' predictions were assumed to indicate the level of the data at the end of the month indicated. For example, the December 2003 edition says that the predictions are "Through May 2004." Therefore, the data to be used should reflect the activity at the end of the month of May. In this example, the data that was compared to the strategists' predictions from the July 2004 edition. The levels indicated on the footnote to Current Level states that the values are as of 05/28/04, the end of May. The same procedure was used for the rest of the comparisons. However, sometimes the Current Level given was as of the beginning of the month. For example, the November 2004 levels were given as of 10/01/04, the beginning of October. This data was considered to be "Through September" and was compared against the April 2004 prediction.

Some problems arose, though, when the values from earlier years' predictions were compared against the actual values. Many times the values for the CPI and GDP were given as quarterly values. In this case, the quarter that the month fell into was used. For example, the June 1992 predictions were through November 1992. November falls in the fourth quarter and the economic growth numbers for the fourth quarter appeared in the March 1993 edition.

Statistical Analysis

All data was entered into Microsoft's Excel spreadsheet. After the data was entered, the difference between the predicted value and the actual value was calculated, which is the error for the entry. A negative value means that the prediction underestimated the actual number, while a positive value means that the prediction was an overestimation. With these values known, the next step was to calculate the mean and the standard deviation of the errors for each of the financial statistics. These were done through functions built into Excel. Table 1 exhibits the average forecast error, standard deviation, and z-score for the five economic measures in the same order in which they are presented in *Investment Advisor*.

Table 1: Average Forecast Errors and Standard Deviations

Stock Market		Inflation	
Average Forecast Error	-292	Average Forecast Error	-0.031
Standard Deviation	1013	Standard Deviation	0.804
z-score	-3.80	z-score	-0.50
Bond Market		Short-Term Rates	
Average Forecast Error	-0.027	Average Forecast Error	0.242
Standard Deviation	0.715	Standard Deviation	0.840
z-score	-0.48	z-score	3.76
Economic Growth		Confidence Interval:	Range:
Average Forecast Error	-0.545	68.3%	σ
Standard Deviation	1.912	95.4%	2σ
z-score	-3.72	99.7%	3σ

Normal Distribution

A visual representation of the distribution of the errors can be constructed with the averages and the standard deviations known. A normal distribution, also know as a bell-shaped curve or Gaussian curve, is a convenient model as many distributions form a normal curve. (Normal Distribution, 2006) It is possible to construct the Gaussian Curve of the errors of the predictions with the probability distribution function. There was one curve created for each of the economic variables. The distributions of curves for the economic data are exhibited in Appendix A.

Prediction Accuracy for Entire Sample Period

Stock Market (Dow Jones Industrial Average)

The prediction for the stock market seems to have a tendency to under predict the Dow Jones Industrial Average (DJIA), as the average prediction is nearly 300 points below the actual value, as shown in the first row of Table 1. Also, the curve is very flat; the standard deviation is very large as a confidence interval covering 95% confidence interval would cover 2,027 points on the DJIA on each side of the average. Much of this variation is caused from the under prediction of the DJIA in the late 1990s. A z-score test was used to see if the bias was statistically significant. On a two-sided test, an alpha value of 0.05 would give critical regions of above 1.96 and below -1.96. Since the z-score, -3.8, is less than -1.96 we can reject the null hypothesis and conclude that there is a bias in the strategies forecasting accuracy. There is a bias is towards underestimation of the value of the Dow Jones Industrial Average.

Bond Market (Long-term Interest Rates)

There is only a slight under predication of long-term interest rates; an error of about 3 basis points. The standard deviation of long-term interest rates was a much higher 71 basis points. Consequently, a 95% confidence interval would have a range of 2.8 percentage points. The z-score is -0.48. Since the z-score is between -1.96 and 1.96 we do reject the null hypothesis

of a bias in long-term interest rate forecasts. The strategists appear to be able to forecast this estimate of economic activity.

Economic Growth (GNP/GDP Growth)

Economic growth was the third macroeconomic measure where the average prediction was slightly negative. Although the economic growth forecast error was 55 basis points, the standard deviation was higher, at 190 basis points, creating a flatter normal curve. Economic growth's z-score was -3.72. Since the z-score is less than -1.96 we reject the null hypothesis of no forecasting bias. The strategists significantly underestimated economic growth.

Inflation (Consumer Price Index)

The inflation prediction was slightly less than the actual inflation rate, as measured by the change in the consumer price index, with a difference between actual and predicted of less than four basis points. Across, the 170 observations, inflation's standard deviation was about eighty basis points, resulting in a z-score of -0.503. Since the z-score is between -1.96 and 1.96, we can conclude that *Investment Advisors'* strategist did a very good job forecasting the change in the consumer price index.

Short-Term Rates (Three-month Treasury Bills)

The last macroeconomic variable predicted by *Investment Advisor's* strategists, the 3-month Treasury-bill's interest rate, is the only one that has an average error that is positive. Predicted Treasury-bill rates exceeded actual Treasury-bill rates by 24 basis points, as exhibited in Table 1. Meanwhile, the standard deviation of short-term rates around the mean was 84 basis points. As one might expect, the standard deviation of short-term rates is very close to that of inflation. The z-score was 3.76. Since the z-score is greater than 1.96 we reject the null hypothesis that there is no bias in the forecasting of short-term interest rates. Financial analysts consistently over estimated short-term rates

Prediction Accuracy Changes Across Time

The sample period was also split in half to determine whether strategist forecasting ability has improved over time, perhaps as a consequence of improved technology. The first period runs from approximately 1991-1997, while the other runs from 1998 to 2005. Table 2 summarizes the results.

Table 2: Analysis of Strategist Performance Across Time

Macroeconomic Variable	1991-1997 Average Error	1991-1997 z-score	1998-2005 Average Error	1998-2005 z-score
Stock Market	-633	-9.63	32	0.25
Bond Market	0.025	0.30	-0.81	-1.10
Economic Growth	-0.386	-2.14	-0.698	-3.05
Inflation	0.307	5.67	-0.353	-3.63
Short-term Rates	0.145	1.91	0.336	3.29

Analysis of *Investment Advisor* strategist predictions across time leads to some interesting insights. For instance, although stock market forecasting was poor in the first half of the sample period, it improved remarkably in the 1998-2005 period. As shown in the first row of Table 2, the average forecast for the Standard & Poor's 500 rose from being 633 points below the future level, to being 32 points above it. With it, the z-score dropped from -9.63 to 0.25.

Long-term bond market yield predications were insignificant in both periods, as exhibited in the second row of Table 2, as suggested by the z-values being under 1.96 (-1.96). However, strategist slightly overestimated future long-term interest rates during the first half of the sample period, and then underestimated rates during the second half of the period. As a consequence, the average error, as on Table 1, was less than three basis points.

Investment Advisor strategists appear to consistently underestimate the economic growth, as shown in the third line of Table 2. Furthermore, there seems to be a bias that is significant in both periods. These findings are consistent with those for the entire period, as shown in Table 1.

Inflation forecasts experienced a dramatic shift over the past fifteen years. In the early period, there is a significant tendency to overestimate the changes in the consumer price index. During the latter period, there is a significant bias towards over estimating inflation. This tradeoff resulted in an apparent consistent lack of bias in the forecasting of inflation, which was reported in Table 1.

Short-term interest rate forecasts appear to have gotten worse over time. The z-score for the 1991-1997 is close to the 1.96 level necessary to indicate a bias in Treasury-bill rate prediction at the 0.05 level. The average z-score, as well as the error itself, is much greater in the latter period. The reason that this finding runs counter to that exhibited in Table 1 may be the smaller sample size on which the results in Table 2 are based.

Conclusion

Correct financial decisions require accurate forecasts of future economic conditions. The literature review covered many instances where macroeconomic data was used to test models of economic activity, analyze economic events, and forecast conditions. Accurate predication of future economic conditions help investors, financial organizations, government bodies,

regulators, and business concerns effectively management their funds. Consequently, many economists and financial publications attempt to accurately predict the values of chosen macroeconomic metrics. In this study, we examined the ability of the strategist chosen by *Investment Advisor*, the leading trade magazine dedicated to financial planning, and quoted monthly in its "Asset Allocation" column. Data was obtained for the entire fifteen years that this information has been published.

Two of five economic forecasts statistically showed a great deal of accuracy over the 15-year span. The forecasts for the bond market and the inflation rate statistically have no bias over the years. However, when both early data and more recent data are looked at individually, the accuracy of *Investment Advisor* strategists' inflation rate forecast seems to be time sensitive. Segmenting of the data does not affect the bond market hypothesis results.

Less accuracy was observed for the prediction of the other three economic measures, the stock market, economic growth, and short-term rates. However, over shorter periods, some of the predictions appear to have less bias. For instance, when the stock market data is split, the hypothesis of prediction accuracy was rejected for the fist half of the sample period but accepted for the second half. By contrast, short-term interest rate forecasts were statistically accurate during the first sub-period, but not the second sup-period. Predications of changes in gross domestic product were not accurate whether one used the data from 1991-1997, from 1998-2005, or the entire period.

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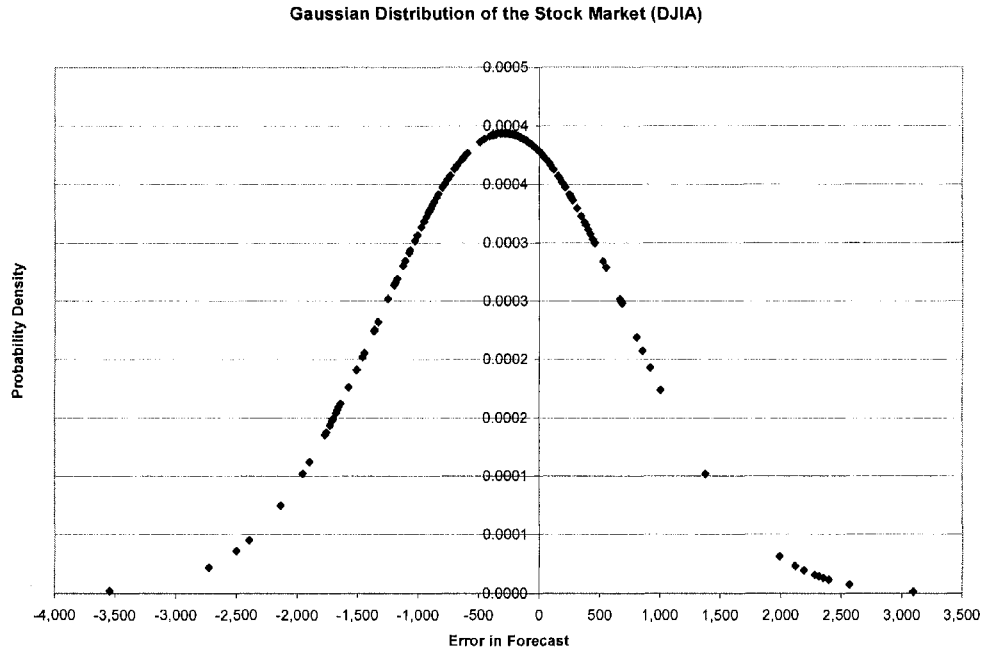
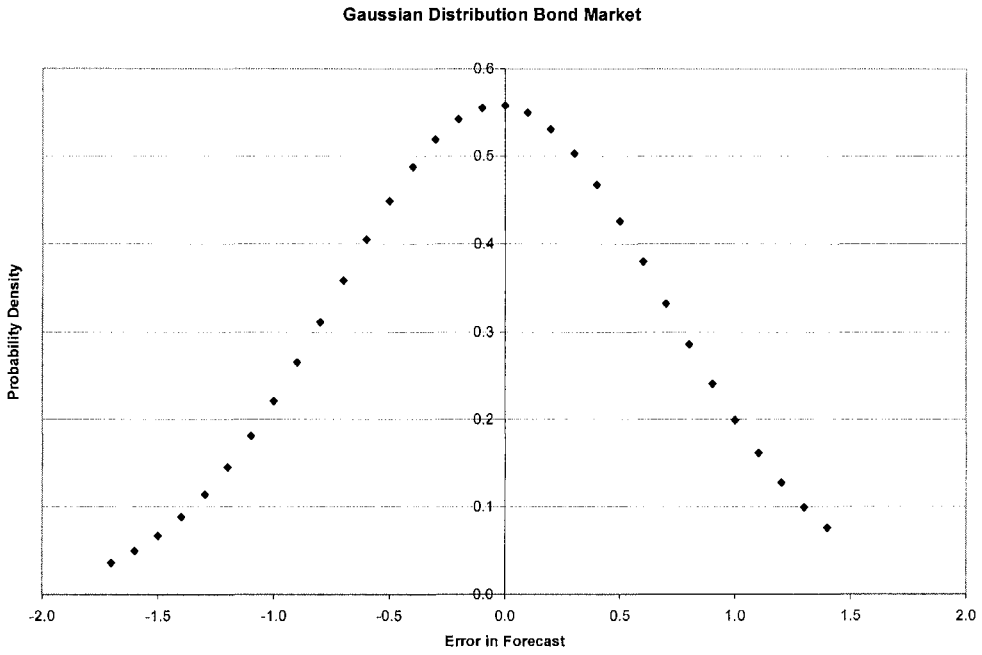
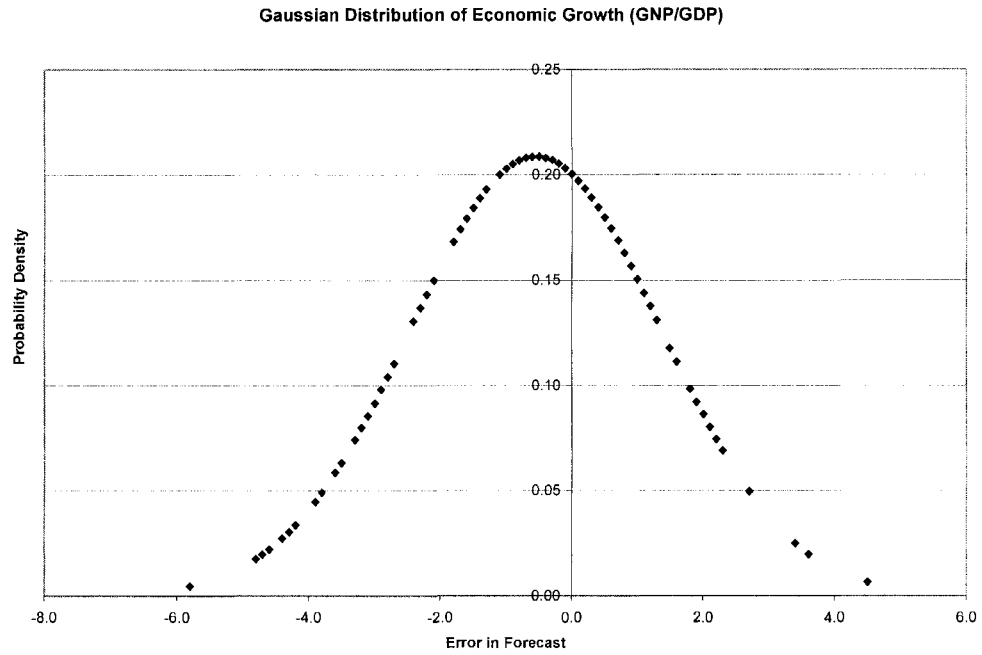
Appendix A:




Gaussian Distribution Bond Market
Probability Density
0.6
0.5
0.4
0.3
0.2
0.1
0.0
-2.0
-1.5
-1.0
-0.5
0.0
0.5
1.0
1.5
2.0
Error in Forecast


Gaussian Distribution of Economic Growth (GNP/GDP)
Probability Density
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0.20
0.15
0.10
0.05
0.00
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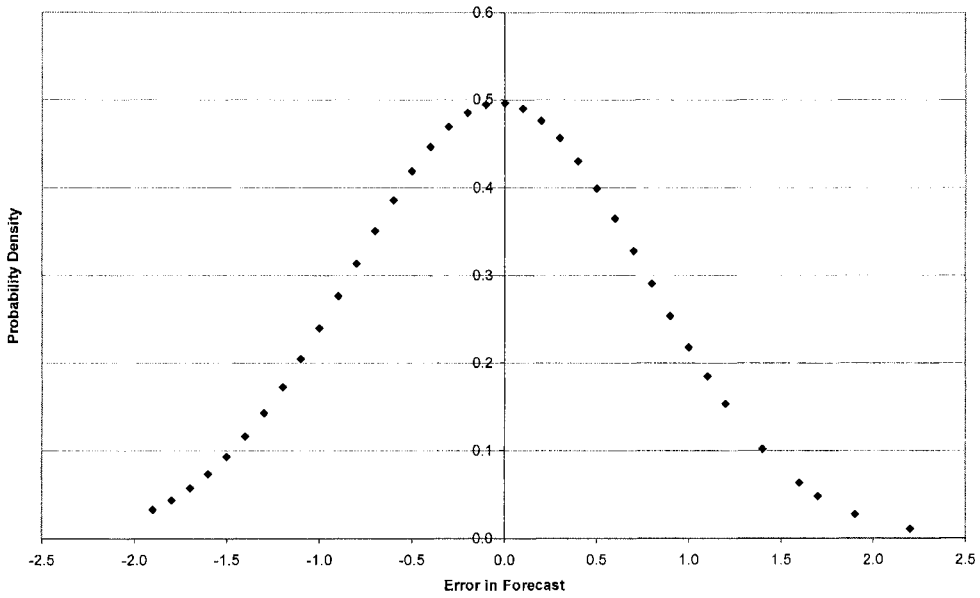
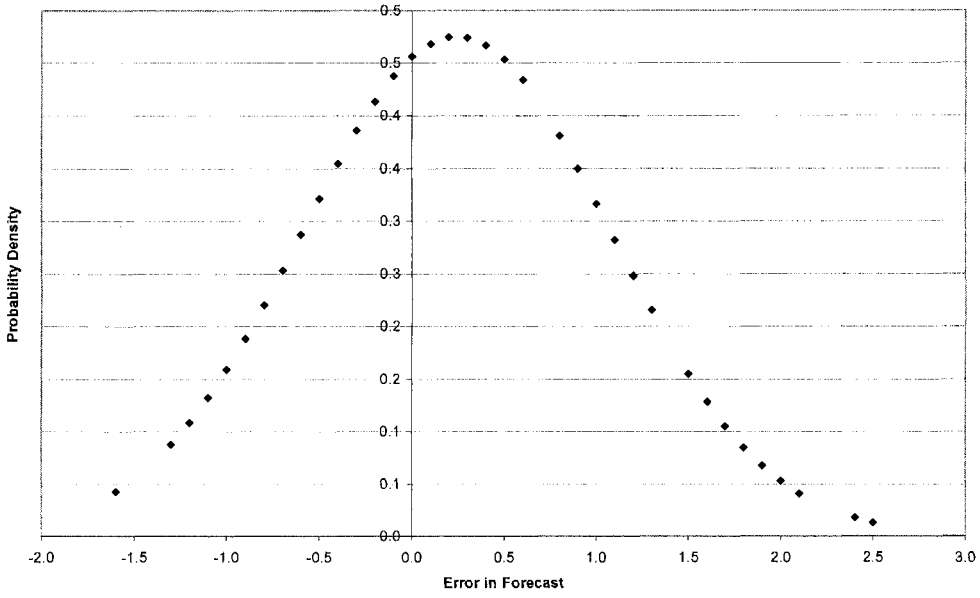
-4.0
-2.0
0.0
2.0
4.0
6.0
Error in Forecast

Gaussian Distribution of Inflation (CPI)



Gaussian Distribution of Short-Term Interest Rates (3 mo.)



Impact of NASCAR Sponsorship Announcements on Shareholder Wealth: A Replication

Robert J. Balik and Jamshid Mehran

Introduction

Pruitt, Cornwell, and Clark (2004, page 281) state that NASCAR sponsorship announcements were accompanied by the largest increases in shareholder wealth ever recorded in the marketing literature in response to a voluntary marketing program – represents a striking and unambiguous stock market endorsement of the sponsorships. Indeed, the 24 sponsors analyzed in this study experienced mean increases in shareholder wealth of over $300 million dollars, net of all of the costs associated with the sponsorships.

Purpose

This research replicates the Pruitt, Cornwell, and Clark event study. They found statistically significant positive daily abnormal rates of return for the two-day period, one day before the announcement date and the announcement date. We try to recreate their results. Then we alter some of their research procedures. For instance, their event study method has an estimation period that is after the test period. We duplicate the study with an estimation period that is before the test period. Our results are significantly different.

NASCAR Sponsorship

One possible reason why a firm would want to be a NASCAR sponsor is the belief that this investment has a positive net present value. That is, the present value of the incremental revenue is greater than the cost. This would imply a positive abnormal rate of return when a firm announces a sponsorship.

An alternative hypothesis is that NASCAR sponsorship is an executive perk. That is, the top executives get to participate in NASCAR weekends. This perk has a cost and no expected benefits and consequently should have a negative impact on the stock price when sponsorship is announced.

Pruitt, Cornwell, and Clark Event Study Methodology

The features of their event study are:

- Studied 24 firm announcements. The firm names, sponsor's name, driver, car number, and announcement are in Exhibit I (all Exhibits are at the end of the paper). This Exhibit is in Table 1 of Pruitt, Cornwell, and Clark (2004, page 287).

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- Used daily data. The daily rates of return are from CRSP.
- Used the Scholes and Williams standardized cross-sectional market model to estimate the parameters of the market model. See Cowan and Sergeant (1996) and Scholes and Williams (1977).
- Market model estimation period is t = +101 to +200 relative to day t = 0. Day t = 0 is the first day of trading following the NASCAR sponsorship announcement date.
- Test period is from 25 trading days prior to day t = 0 to 100 trading days following the announcement.
- Market proxy is CRSP value weighted index.
- Measure of the impact of the announcement is the abnormal rate of return. This is the actual rate of return for a stock on a specified day minus the expected rate of return for this stock on the same day. The expected daily rate of return is calculated using the Scholes and Williams market model. This model accounts for the problems associated with non-synchronous trading which can occur in event studies that have firms with exceptionally low trading volume.

Exhibit II, which is Table II in Pruitt, Cornwell, and Clark (page 288), contains their key results. The mean daily abnormal rate of return for event days -1 and 0 is 0.0129 and is the only statistically significant result at the five percent level. This one statistically significant result is the primary result that justifies their statement of the impact of a NASCAR sponsorship announcement on shareholders wealth.

Critique

Three important issues that Pruitt, Cornwell and Clark did not discuss are

- Whether or not any other information (confounding event) was announced on the sponsorship announcement date. For instance, is the NASCAR sponsorship announcement date on the same day as a positive earnings announcement?
- Most event studies use an estimation period prior to the event date. Their estimation period is from 101 to 200 trading days after the event date. They do not state why they selected a post event day time period for the estimation period.
- Most event studies include both the daily and cumulative abnormal rates of return. They provide mean daily abnormal rates of return for 16 out of the 126 event days. There are no cumulative returns for the mean daily abnormal rates of return. After event day 1 six of the eight mean daily abnormal rates of return are negative (Exhibit II). While none are statistically significant this is a signal that something significant could be happening after the event day. And this could be checked by looking at the cumulative returns.

Abnormal Rate of Return Model

The daily abnormal rate of return is the difference between the daily actual rate of return and the daily expected rate of return. The use of any model to estimate the expected daily rates of return requires two time series of return data for each security for each event. They are an estimation period for estimating the model parameters and an event period for calculating

abnormal rates of return. Usually, in order to avoid biasing the parameter estimates, the estimation period and event period do not overlap.

The single factor market model is used to estimate the expected daily rates of return. The alphas and betas of the market model are estimated by ordinary least squares and the method of Scholes and Williams (1977).

The daily abnormal rate of return $AR_{j,t}$ for the common stock of the j^{th} firm on day t during the test period is

$$AR_{j,t} = R_{j,t} - (a_j + b_j * R_{m,t})$$

where the coefficients a_j and b_j are ordinary least squares estimates (estimated using daily data from the estimation period), $R_{j,t}$ is the daily observed rate of return on stock j on day t during the test period, and $R_{m,t}$ is the daily observed rate of return on the market m on day t during the test period.

The Scholes and Williams method is also used to estimate those coefficients. The beta estimator is

$$b_{j^*} = \frac{b_{j-} + b_j + b_{j+}}{1 + 2\rho_m}$$

where b_{j-} is the ordinary least squares slope estimate form the simple regression of $R_{j,t}$ on $R_{m,t-1}$, b_j is the ordinary least squares slope estimate from the simple regression of $R_{j,t}$ on $R_{m,t}$, b_{j+} is the ordinary least squares slope estimate from the simple regression of $R_{j,t}$ on $R_{m,t+1}$, and ρ_m is the estimated first order correlation of the daily rate of return on the market, R_m. The intercept estimator a_{j^*} is

$$a_{j^*} = \bar{R}_j - b_{j^*} * \bar{R}_m$$

where $\bar{R}_j$ is the mean return for stock j during the estimation period and $\bar{R}_m$ is the mean market return during the estimation period.

The average abnormal daily rate of return, AAR_t on date t is

$$AAR_t = \frac{\sum_{j=1}^{N} AR_{j,t}}{N}$$

where t is the number of trading days relative to the announcement date (for instance t = -10 means 10 trading days before the event and N is the number of common stocks studied.

The cumulative average daily abnormal rate of return, $CARR_{T1,T2}$ beginning with trading day *T1* and ending with trading day *T2* is

$$CAAR_{T1,T2} = \frac{1}{N}\sum_{j=1}^{N}\sum_{t=T1}^{T2} AR_{j,t}$$

where all of the terms are as defined above.

The Features of Our Study

The features of our study are

- Study the same firms as Pruitt, Cornwell, and Clark.
- Study a sample which deleted two firms that had confounding information.
- Use the CRSP value and equal weighed index as a proxy for the market rate of return.
- Study two estimation periods:
    - The same future time as Pruitt, Cornwell, and Clark (2004).
    - An estimation period from 16 days before the even to 75 days before the event.
- Use the Market model to estimated expected rate of return.
- Use two methods to estimate the market model parameters:
    - Standard ordinary least squares regression method.
    - Scholes and Williams method to estimate beta.

Our Results

Exhibits III through VII contain our results. The replication of the Pruitt, Cornwell, and Clark results indicate that the daily abnormal rates of return are significantly different. For instance, as shown in Exhibit III Pruitt, Cornwell, and Clark have an abnormal rate of return of +0.0129 for the two days t = -1 and t = 0. Our replication of their study for these same two days resulted in a two-day abnormal rate of return of +0.0063 which is less than half of their value. When the estimation period is before the test period this two day abnormal rate of return is +0.0023. While these two results are positive they are significantly less than the result obtained by Pruitt, Cornwell and Clark and are not statistically significant (at the five percent level).

Exhibits IV through VII show the charts of cumulative abnormal rates of return for the entire test period. Exhibit IV shows the cumulative abnormal rate of return when the estimation period is after the test period and the Scholes and Williams method is used to estimate the parameters of the market model. The cumulative abnormal rate of return at the end of the test period is -2.09%. Exhibit V shows the cumulative abnormal rate of return when the estimation period is after the test period and the standard market model is used. The cumulative abnormal rate of return at the end of the test period is -1.53%. Exhibit VI shows the cumulative abnormal rate of return when the estimation period is before the test period and the Scholes and Williams method is used to estimate the parameters of the market model. The cumulative abnormal rate of return at the end of the test period is -17.92%.

Exhibit VII shows the cumulative abnormal rate of return when the estimation period is before the test period and the standard market model is used. The cumulative abnormal rate of

return at the end of the test period is -18.79%. These results change significantly when the estimation period is changed from after the test period to before the test period.

While not reported here we obtained similar results for daily abnormal rates of return around the announcement date and cumulative abnormal rates of return during the test period when the equal weighted CRSP index is used and when the sample with two firms with confounding information is omitted.

The calculation procedure was checked using the sample data in O'Hara (2006). O'Hara provides announcement dates and sample firms for an event study and then gives the results. We replicated her study and get the same abnormal rates of return. This replication, which is not included here, was done using the same calculation procedure used to replicate the NASCAR study.

Summary

This study replicates the event study of the announcement of NASCAR sponsorship studied by Pruitt, Cornwell, and Clark. Our results are significantly different. We do not get any statistically positive abnormal rates or return around the announcement date. We also use an estimation period before the test period. In this case the cumulative abnormal rates of return for the test period are negative. We verified the accuracy of our calculation procedure using another data set that contained event dates, sample firms, and estimated abnormal rates of return.

Exhibit I: NASCAR Sponsorship Sample (Table 1 in Pruitt, Cornwell, and Clark, 2004)

Obs.	Company Name	Sponsorship Name	Driver/Car	Date
1	Ashland Oil	Valvoline	Jimmy Benson/10	8/19/00
2	Conseco	Conseco	Larry Foyt/14	9/3/99
3	Daimler Chrysler	Dodge	Everham Racing/2 cars	1/11/00
4	Delphi Automotive	Delphi Automotive	Jerry Nadeau/25	10/31/00
5	Fleetwood	Fleetwood RVs	Dale Jarrett/88	12/3/97
6	Ford Motor Co.	Motorcraft	Elliot Sadler/21	11/14/97
7	Ford Motor Co.	Quality Car Service	Dale Jarrett/88	11/11/95
8	General Mills	Cheerios	Johnny Benson/26	1/13/98
9	Georgia Pacific	Georgia Pacific	Roy Jones/44Rusty Wallace/2	9/21/00
10	Harley Davidson	Harley Davidson	Rusty Wallace/2	6/2/99
11	Home Depot	The Home Depot	Tony Steward/20	9/2/99
12	Kroger	Ralph's Supermarkets	Brett Bodine/11	11/13/99
13	Mattel	Hot Wheels	Kyle Petty/44	10/19/96
14	Mobil Oil	Mobil	Penske Racing/12	2/4/98
15	Nations Rent	Nations Rent	Michael Waltrip/7	11/13/99
16	Newell Rubbermaid	Sharpie	Kurt Busch/97	4/4/01
17	Oakwood Homes	Oakwood Homes	Ken Schrader/33	7/3/99
18	Paychex	Paychex	Brett Bodine/11	1/8/98
19	Phillip Morris	Miller Lite Beer	Rusty Wallace/2	6/2/99
20	Phillips Petroleum	Phillips 66	Elliot Sadler/29	4/2/97
21	Pfizer, Inc.	Viagra	Mark Martin/6	6/30/00
22	Sara Lee	Jimmy Dean	Derrick Cope/30	1/12/99
23	Sprint	Sprint	Adam Petty/45	11/15/99
24	United Parcel Service	UPS	Dale Jarrett	11/17/00

Exhibit II: Mean Shareholder Wealth Effects Associated with a NASCAR Sponsorship Announcement for the Full Sample of 24 Announcements
(Table 2 in Pruitt, Cornwell, and Clark, 2004)

Event Day	Mean Abnormal Return	t-statistic	Median Abnormal Return	Sample Size	N+	Z-Statistic
-25	-0.0051	-0.97	-0.0059	24	10	-0.58
-10	-0.0014	-0.70	-0.0061	24	10	-0.58
-5	+0.0056	+0.93	-0.0013	24	11	-0.17
-4	+0.0032	+1.20	+0.0038	24	15	+1.06
-3	-0.0001	-0.05	-0.0029	24	10	-0.58
-2	-0.0079	-1.25	-0.0118	24	9	-0.99
-1/0	+0.0129	+2.08*	+0.0148	24	16	+1.88
1	+0.0001	+0.44	+0.0021	24	13	+0.65
2	-0.0021	-0.44	-0.0016	24	11	-0.17
3	+0.0009	-0.03	+0.0014	24	13	+0.65
4	-0.0074	-1.30	-0.0088	24	8	-1.39
5	-0.0044	-0.62	-0.0017	24	12	0.00
10	-0.0141	-1.21	-0.0042	24	9	-0.99
25	-0.0069	-1.51	-0.0019	24	12	0.00
50	-0.0035	-1.34	-0.0048	24	10	-0.58
100	+0.0002	-0.55	-0.0026	24	10	-0.58

Significant at the 5 percent level, two tailed test.
N+ is the number of positive mean abnormal daily rates of return on the event day.

Exhibit III: Mean Daily Abnormal Rates of Return for Sample of 24 Announcements from Pruitt, Cornwell, and Clark (2004) and Our Replications

Event Day	Mean Daily Abnormal Rate of Return Pruitt, Cornwell, and Clark	Mean Daily Abnormal Rate ofReturn Replication Test period After	Mean Daily Abnormal Rate of Return Replication Test period Before
-25	-0.0051	-0.0053	-0.0040
-10	-0.0014	-0.0035	-0.0052
-5	+0.0056	+0.0048	+0.0034
-4	+0.0032	-0.0014	-0.0032
-3	-0.0001	+0.0018	+0.0000
-2	-0.0079	-0.0046	-0.0062
-1/0	+0.0129	+0.0063	+0.0023
1	+0.0001	+0.0002	-0.0013
2	-0.0021	-0.0011	-0.0019
3	+0.0009	-0.0007	-0.0009
4	-0.0074	-0.0055	-0.0056
5	-0.0044	-0.0053	-0.0059
10	-0.0141	-0.0151	-0.0163
25	-0.0069	-0.0053	-0.0063
50	-0.0035	+0.0008	+0.0005
100	+0.0002	-0.0013	+0.0005

Exhibit IV: Plot of Cumulative Daily Abnormal Rates of Return, estimation period is after announcement, value weighted market index, Scholes and Williams method.

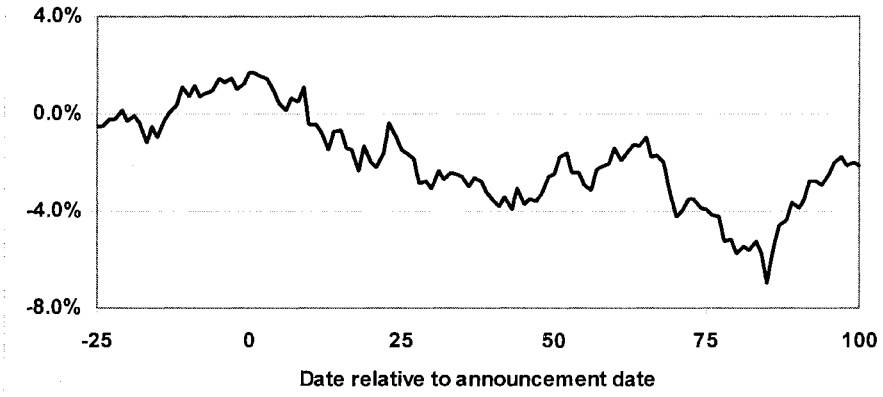


Exhibit V: Plot of Cumulative Daily Abnormal Rates of Return, estimation period is after announcement, value weighted market index, standard market model.

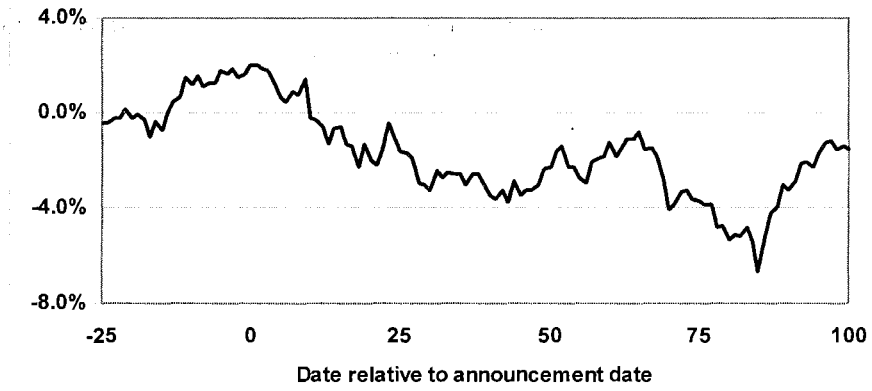


Exhibit VI: Plot of Cumulative Daily Abnormal Rates of Return, estimation period is before announcement, value weighted market index, Scholes and Williams method.

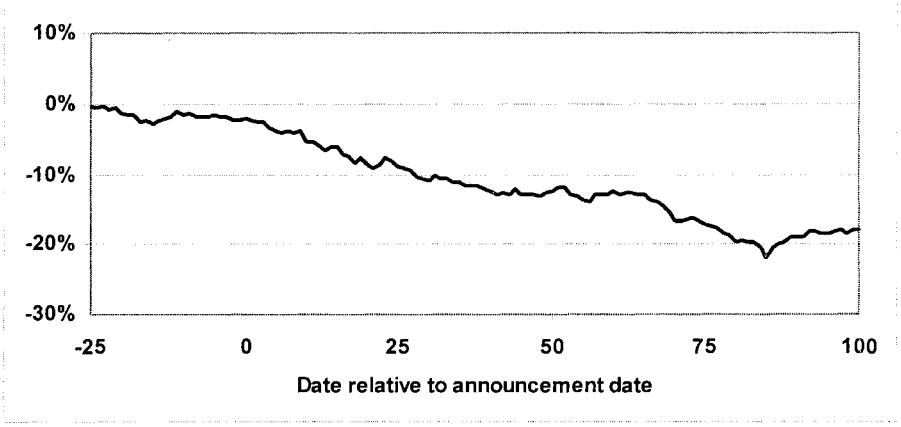
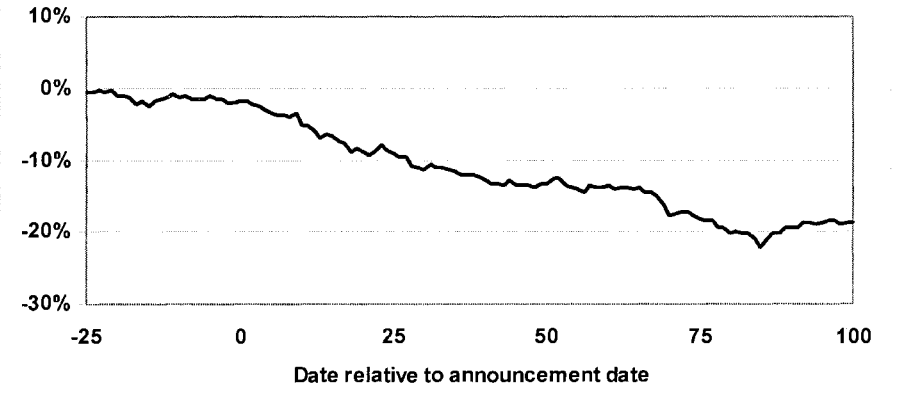


Exhibit VII: Plot of Cumulative Daily Abnormal Rates of Return, estimation period is before announcement, value weighted market index, standard market model.



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Developing an Asset Allocation Strategy Using Morningstar Tools: A Project for the Beginning Personal Financial Planning Course

Susan Crain, James Pettijohn, and Kent Ragan

In this paper we discuss the importance of Internet-based resources for use by students in completing assignments. We explore the possibility of incorporating Morningstar.com into the personal financial planning course as the basis of a portfolio allocation project using an extensive case scenario that we have developed. We illustrate the use of a scoring guide to facilitate grading of the project, thus providing ready-made case analysis for use in the personal financial planning course.

Introduction

Although Internet-based business ventures have experienced dramatic ups and downs over the first half of this decade, free, fee-for-service, and/or subscription-based online investment analysis and portfolio management resources have been widely utilized as an increasing number of investors have access to the World Wide Web. A number of surveys and reports demonstrate that both individuals and financial professionals use, and are quite satisfied with, such sites. Examples include the following:

- A Securities Industry Association [SIA] survey found that eleven percent of *all* U.S. equity trading volume takes place on the Internet [SIA, 2002].
- CyberAtlas [2002] reported that thirty-five percent of high-income professionals queried use the Internet for financial planning assistance. Other findings reported in this study indicate eighty-one percent of those who perform financial tasks on the Internet use it to research specific investments; fifty-four percent use it for portfolio tracking; and forty-six percent trade securities online.
- _ The Association for Finance Professionals [AFP] reported that eighty percent of finance professionals obtain information related to financial services from Internet-based resources [AFP, 2002].
- One 2003 study showed that online brokerage was among the top five sectors of the economy in terms of customer satisfaction, loyalty, and (potential for) future economic growth [Cox, 2003].
- Laise and Mauldin (2005) open their report on finding an online broker with the statement, "Online traders have never had it so good. Commissions are dirt cheap, and the sites are flooded with new features."

When the broad use of online investment analysis and portfolio management resources by individual and professional investors is coupled with the fact that college students are extremely comfortable with the use of technology (particularly the Internet), the need for instructors of personal financial planning courses to incorporate the use of web-based information, data, and applications in their courses and assignments becomes quite apparent.

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Since the assortment of online resources is so broad, however, the problem is not one of locating resources; instead, it is one of developing efficient and effective ways to use a particular resource or set of resources to enhance student learning. In this paper, we demonstrate how selected tools offered by one well respected and highly popular website, *Morningstar.com*, might be incorporated into an asset allocation project suitable for use in a junior-level personal financial planning course.

Purposes of the Project

As will become evident to the reader, the project discussed in this paper has several purposes. One of these purposes is to give students the opportunity to put into action some of the asset allocation concepts they have encountered in their personal financial planning textbook. To achieve this objective, we assign each student a particular "investor scenario" (or profile) and then ask each student to develop a well thought out asset allocation plan for the individual or family described in the scenario. Examples of two of these scenarios are included later in this paper.

Since mutual funds are the investments of choice for a substantial proportion individual investors, particularly in 401(k) plans, yet another purpose of this project is to expose students to the world of mutual fund investing. To help accomplish this objective, we limit long-term investments in the project to mutual funds.

Because students are required to select from the mutual fund universe for long-term investments, and because Morningstar is a (or perhaps "the") leading information resource for mutual fund investors, a third purpose of the project is to help students become more familiar with Morningstar's resources. We strive to accomplish this purpose, and to achieve another purpose as well – acquainting students with some of the types of investor resources that are available on the Internet – by directing them to specific tools and information that are available on the Morningstar website, *Morningstar.com*. As we designed this project, we realized that *Morningstar.com* became the project's driving force, or focal point, because through it the other purposes are achieved. Consequently, the primary focus of this paper is to demonstrate how we use Morningstar.com to achieve the aforementioned purposes.

An Overview of Selected *Morningstar.com* Mutual Fund Selection Tools

Morningstar.com includes two online mutual fund selection tools that are incorporated into this project: the "Basic Fund Screener" and the "Interactive Mutual Fund Scorer." Each of these tools is described in the following paragraphs.

The "Basic Fund Screener"

Screeners are employed in the investment world to narrow down a universe of possible investments to a small group of alternative investments that meet a set of criteria established by the investor. *Morningstar.com's* "Basic Fund Screener" allows the user to establish screening rules in each of the following categories and sub-categories:

1) Fund Type
   a) Fund Group – All, Domestic Stock, International Stock, Taxable Bond, Municipal Bond
   b) Morningstar Fund Category – All, Large Value, Large Blend, Large Growth, Mid-cap Value, Mid-cap Blend, Mid-cap Growth, Small-cap Value, Small-cap Blend, Small-cap Growth, plus an extensive variety of sector and international categories.

c) Manager tenure greater than or equal to – Any, Category Average, 1 Year, 3 Years, 5 Years, 10 Years.

2) Cost and Purchase
   a) Minimum initial purchase less than or equal to – Any, $10,000, $3,000, $2,000, $1000, $500.
   b) Loan Funds – All, No-load Funds Only
   c) Expense ratio less than or equal to – Any, Category Average, 2.0%, 1.5%, 1.0%, 0.50%.
3) Ratings and Risk
   a) Check all the ratings you would like to include - *, **, ***, ****, *****, and/or New, unrated funds.
   b) Morningstar risk better than or equal to – Any, Low, Below Average, Average, Above Average, High.
4) Returns
   a) Year to date return greater than or equal to – Any, Category Average, S&P 500, or specify a percentage.
   b) 1-year return greater than or equal to – Any, Category Average, S&P 500, or specify a percentage.
   c) 3-year return greater than or equal to – Any, Category Average, S&P 500, or specify a percentage.
   d) 5-year return greater than or equal to – Any, Category Average, S&P 500, or specify a percentage.
   e) 10-year return greater than or equal to – Any, Category Average, S&P 500, or specify a percentage.
5) Portfolio
   a) For Stock Funds
      i) Turnover less than or equal to – Any, Category Average, 150%, 100%, 75%, 25%.
      ii) Total assets less than or equal to – Any, $200 mil., $500 mil., $1 bil., $5 bil.

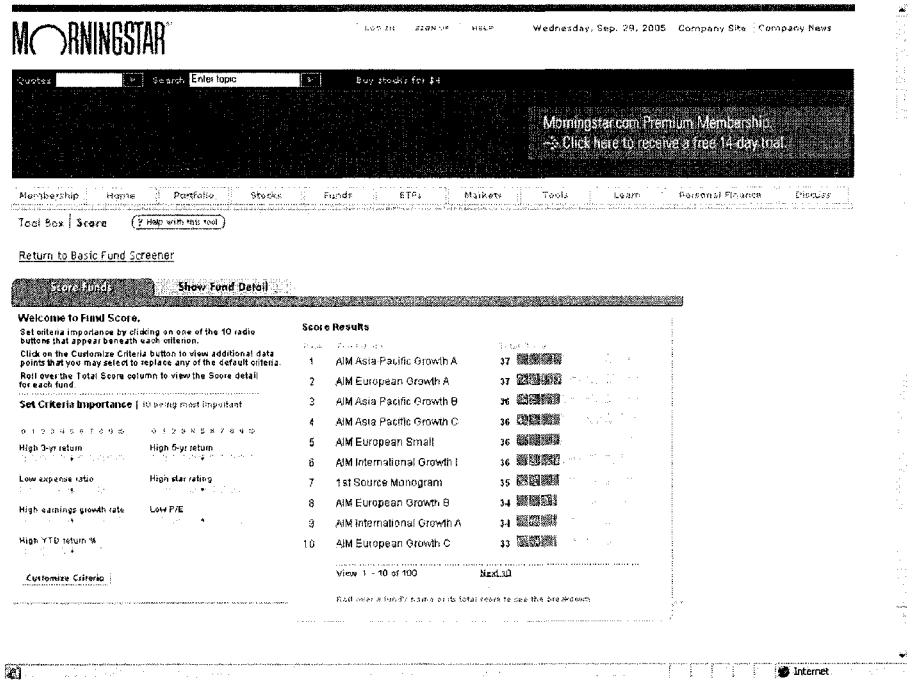
   Average market capitalization – Any, less than or equal to $250 mil., less than or equal to $1 bil., less than or equal to $10 bil., greater than or equal to $250 mil., greater less than or equal to $1 bil., greater than or equal to $10 bil.
   b) For Bond Funds
      i) Average credit quality – Any, AAA or higher, AA or higher, A or higher, BBB or higher, Below BBB.
      ii) Duration – Any, Less than or equal to 3 years, Less than or equal to 5 years, Less than or equal to 10 years, Greater than or equal to 10 years,

One final point that should be mentioned is that *Morningstar.com* also includes a "Premium Mutual Fund Screener" that allows the user to be much more detailed in the specification of the screening criteria. This tool is not employed in the project because it only is available for a fee.

The "Mutual Fund Scorer"

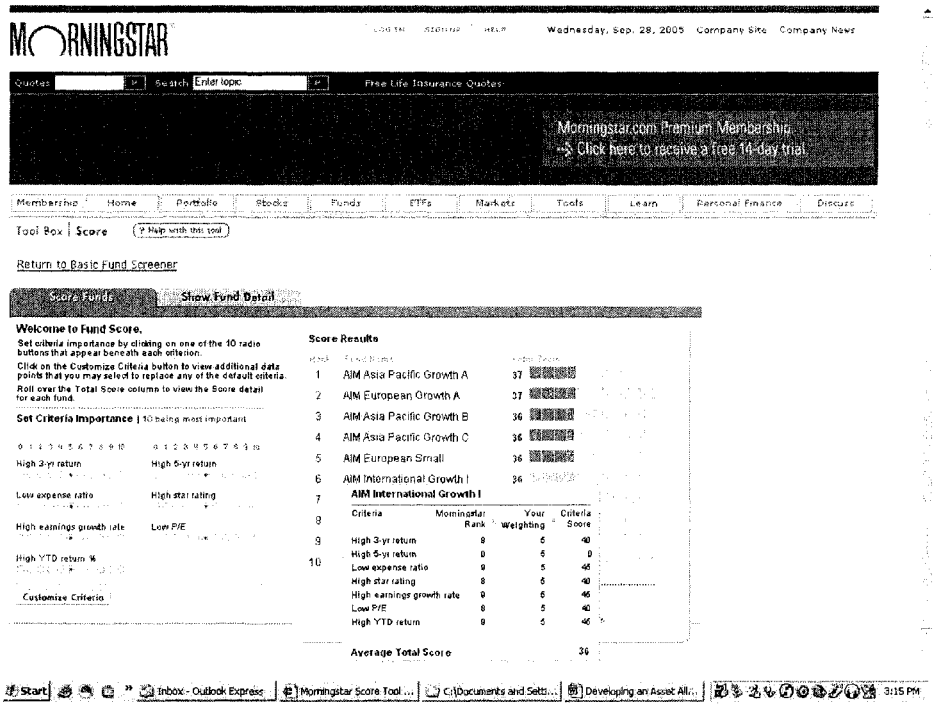
Morningstar.com's "Mutual Fund Scorer" is an interactive tool that scores and ranks and set of mutual funds based on a set of criteria established by the user. A total score is obtained by computing the weighted total score for a fund based on it's Morningstar ranking for a particular criterion and the weight (0 through 10) given that criterion by the user. Figure 1 provides an example of the "Fund Scorer."

Figure 1: The "Mutual Fund Scorer"



The scorer is interactive in that the user can change the importance (i.e., weight) of a criterion by clicking a radio button under that criterion (0 through 10), and immediately see how that change in weighting affects the scores and their rankings in the list to the right of the criteria. The user can "mouse over" one of the stocks in the list of scores to see how that fund's score was computed. Figure 2 shows the result of a sample "mouse-over."

Figure 2: The "Mutual Fund Scorer" with Sample Score Calculation Shown



The "Mutual Fund Scorer" allows to user to select as many as 8 criteria from a total of forty organized into the following categories: Performance, Risk and Other Statistics, Portfolio Statistics, and Management and Operations.

The Project Itself

The following outline depicts the asset allocation project as we have conceived it. Naturally, the individual instructor can edit it as he/she sees fit to suit his/her particular interests and needs.

1) Introduction
2) Rules of the Game
   a) Report Format
      i) Spiral Bound
      ii) Table of Contents
      iii) Each section identified with a tab
      iv) 12 point, Times New Roman Font
      v) Double-spaced
      vi) One-inch margins all around the page

(1) A pop-up window will tell you that Morningstar's Analysts have prepared some "starter screens" for you. Those screens are listed on the left-hand side of the pop-up window.
(2) Click on one of the five starter screens, and then click the "Show Screen Results."
   (a) Carefully review the results of the starter screen you've selected, making sure you review each of the views that are available in the drop down "View" list.
   (b) Click on each column heading in the screen results list, noting how clicking on each heading re-arranges the list.
   (c) After this extensive review, prepare (in your own words) a one-page summary/explanation of the different Fund Screener Results views and how they might benefit the investor.
   (d) Include your summary as Section Two of your report.
(3) Click on the "Score These Results" link at the top of the Fund Screener Results window. (When a dialog box saying, "You have not selected any funds. As a result, the tool will score the first 100 funds in your results screen" is displayed, click "OK."
   (a) Carefully review the resulting "Fund Score" results, making sure you do the following:
      (i) "Mouse-over" the bar chart on the right side of the page.
      (ii) Click on a few of the radio buttons on the left side of the page.
      (iii)Click on the "Customize Criteria" link.
   (b) After this extensive review, prepare (in your own words) a one-page summary/explanation of the different Fund Screener Results views and how they might benefit the investor.
   (c)Include your summary as Section Three of your report.

3) Developing an Asset Allocation Strategy
   a) In the context of the "Stage of Life and Financial Condition" scenario provided by your instructor, develop an asset allocation plan for the individual(s) described in that scenario.
   b) For purposes of this project, assume the following:
      i) "Cash" will be stored in a money market mutual fund.
      ii) "Savings" will be placed in FDIC insured CDs of the appropriate maturity.
      iii) "Long-term investments" will be comprised of mutual funds.
   c) Using what you have learned in this course about asset allocation and mutual funds, and using the Morningstar mutual fund selection tools that were the object of part "c" of this project, develop an asset allocation plan for the long-term investments of the individuals described in your scenario. To do this, you must consider a variety of factors, including (but perhaps not limited to) the following:
      i) age of the investor(s)
      ii) life cycle stage of the investor(s)
      iii) level of income
      iv) income stability
      v) present net worth
      vi) investor's risk tolerance
      vii) tax considerations

vii) investment time frame
viii) investment objectives (What do I want this portfolio to accomplish?)

d) Provide a written summary (5- to 10-pages in length of the asset allocation plan for the individual(s) described in the scenario you were given. At a minimum, your summary should address the following topics:
   i) The scenario itself as provided by your instructor.
   ii) Your analysis of the scenario.
   iii) Savings/investments objectives.
   iv) Your recommendations for:
      (1) Cash
      (2) Savings
      (3) Long-term investments
      (4) Your mutual fund choices for long-term investments.
      (5) How you used Morningstar Tools to select the funds.
      (6) What other information (Morningstar or otherwise) you used to make your selections and why it helped.
   v) Given your responses to "c" and "d," why you think/hope the funds you chose will meet the investment objectives of the individuals in your scenario. (If you were a financial planner, this would be one of the things you would want to tell your clients.)

4) Include your summary as Section Four of your report. Provide a one- to two-page written summary of what you learned from this project, how you think this knowledge might be of benefit to you in the future, and how you think this project could be changed to make it an even more beneficial experience. Include your summary as Section Five of your report.

A Sample "Stage of Life and Financial Condition" Scenario

We assign each student in the class a "Stage of Life and Financial Condition" scenario from several we have developed. We have found that publications such as *Money, SmartMoney,* and *Kiplinger Personal Finance* periodically contain articles with titles such as "One Family's Finances" that can be used as a basis for developing additional scenarios to add to our collection. Generally, these articles will summarize the family's (or individual's) stage of life and financial condition, and then will report on what one or more financial "experts" advise to get the family's finances in order. The following paragraphs provide one of the scenarios we assign. **The**

Beaman Family's Finances

Jim Beaman's wife died in a car accident three years ago and Joyce Schyler's husband died of cancer two years ago. After meeting at a church gathering, the couple started dating and soon realized that they wanted to spend the rest of their lives together. Jim is 44, owns a construction company, and has two boys (ages 14 and 16) while Joyce is a 40-year-old elementary school teacher with one girl (age 11).

Their wedding is planned for next month, and the couple decided that it would be prudent to meet with a financial advisor ahead of the nuptials. Their financial objectives are to combine households, provide for a comfortable retirement for the two, and pay the majority of the college costs for their three children.

The profits of Jim's construction company have benefited from the recent real estate boom and his latest net income was $325,000. Jim paid himself a salary of $120,000 out of the $325,000 and plans to spend the remainder on some dirt moving equipment and two lots in a new housing subdivision. Jim and Joyce are both concerned, however, that there may be a bubble in the market that could burst at any time. In fact, just five years ago, Jim's net income was only $175,000. Joyce's salary is currently $35,000 per year.
Jim owns a 4-bedroom home with a market value of $350,000 that the couple will live in. The outstanding mortgage is $200,000. Joyce's 3-bedroom home is currently listed with a real estate agent for $169,900. Joyce paid off the mortgage with the proceeds of an insurance policy when her husband died. Jim drives a 2004 Ford pickup and owes $20,000 against it. Joyce drives a 1999 Ford Taurus which is paid off.

Jim is a bit of a risk taker and his current retirement account consists of an IRA with a balance of $137,000. He currently directs 100% of the funds into high growth stocks. When Jim received the proceeds of the insurance policy on his wife, he decided to earmark the money as a "college fund" and invested it in growth stocks. The last statement showed a balance of $54,000.

Joyce is much more conservative in her investment strategies and has directed her retirement account through her employer to a 50/50 split between a bond fund and stock fund. She has consistently invested $150 per month for the last 18 years and her retirement account balance now stands at $90,000. Her first husband was less inclined to look to the future and chose to "spend it now." He even balked at the idea of a life insurance policy, but Joyce insisted. After paying off the house two years ago, Joyce has been able to deposit $100 per month in a money market account and her last statement showed $2,423.
Jim's construction business currently has a net worth of $430,000. He has $4,000 in his private checking account and usually carries credit card debt of $1,500 on a consistent basis from month to month. His monthly personal bills run about $8,000 per month. Joyce has $750 in her checking account, with credit card debt of around $200. Her personal bills have been running about $1,000 per month. They estimate that their combined household goods would have a market value of approximately $20,000.

Grading and Scoring Issues

The project we describe above requires the student to perform various tasks and present them in a specific format. We believe this specificity is important, as a financial planner must be consistent in the form of the presentations that they provide to clients. To facilitate scoring, we recommend incorporation of a scoring guide. To illustrate this approach, we have developed one below that ties to the project described above

Evaluating the Financial Planning Project Scoring Guide

Project Section	Project Requirements	Points Possible	Points Earned
Sec. 0 - Professionalism of Report	Spiral Bound	1	/1
(Total Points Possible: 5)	Table of Contents	1	/1
(NOTE: All requirements for Section 0 must be met to be eligible for scoring of the remaining sections)	Sections Tabbed	1	/1
	12-Point Times New Roman Font	1	/1
	Double Spaced	1	/1
	1-Inch Margins	1	/1
Sec. 1 – Fund Screener	Description of Fund Screener Function	10	/10
(Total Points Possible = 10			
Sec. 2 – Fund Screener Result Views	Different Fund Screener Result Views and		
(Total Points Possible =10)	How They Might Benefit the Investor	10	/10
Sec. 3 – Fund Screener Result Views	Different Fund Screener Result Views and		
(Total Points Possible = 10)	How They Might Benefit the Investor	10	/10
Sec. 4 – Asset Allocation Plan	Description of Scenario	5	/5
(Total Points Possible = 55)	Your Analysis of the Scenario	10	/10
	Savings/Investments Objectives	5	/5
	Your Recommendations for:		
	Cash	5	/5
	Savings	5	/5
	Long-Term Investments	5	/5
	Mutual Fund Choices for Long-Term Investments	10	/10
	How You Used Morningstar.com to Select the Funds	5	/5
	What Other Information You Used to Make Your Selections	5	/5
Sec. 5 – Summary of Project Benefits (Total Points Possible = 10)	One to Two Page Summary of Benefits of the Project and Suggestions for Improvement in the Future	10	/10
		---	---
	Totals	**100**	**/100**

Summary and Conclusions

In this paper we discussed the Morningstar.com website. We also provided a specific case scenario that an instructor could discuss in their classroom. We showed how a project can be assigned that requires students to perform a thorough financial analysis for the family discussed in the case. Finally, we developed a scoring guide that could be used to facilitate grading of the various components of the final written financial plan. We believe that Morningstar.com is a useful tool in collecting and analyzing the necessary information to make realistic financial plans, and believe that the financial planning project described above provides a worthwhile experience for students.

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Does History (Financial) Repeat Itself? An Evaluation of Price Manipulation and Volatility in Two Emerging Markets in Asia

Inayat U. Mangla, Jamshed Y. Uppal, and Mohsin Ijaz

Introduction

It is fairly well known that many emerging markets, like China, India and Pakistan, have witnessed tremendous real economic growth varying between 6% and 11% in the last decade. Consequently, by and large, the emerging markets have been spectacular places to invest in the recent past, though their current valuations, volatility and hints of market manipulation and speculative trading pose additional risks. One particular form of systemic risk in the emerging markets arises from a lack of trust in the fairness of markets due to potential for manipulation, highlighted by recurring scandals and scams, which may exacerbates the market volatility. The regulatory agencies respond by evolving legal framework in an effort to restore the investors' confidence in the markets and institutions.

In this study we describe the interplay of regulatory adaptation and market forces in two emerging markets in South Asia, namely, India and Pakistan, which lend themselves especially for comparative analysis due to commonalities in institutional structures and traditional financial instruments and practices. The two markets share a common genesis, a common civil code, and similar cultural and regulatory environment. In recent times the two markets have had their own cycles of boom and bust, periods of superlative growth as well as of sharp decline and volatility. We draw comparisons between the regulatory response to financial scandals, speculation and volatility and its effectiveness in achieving declared objectives regarding market. We study episodes of speculative market behavior and regulatory response in India and Pakistan; two episodes in the former and one in the later. In these periods allegations of massive speculation, manipulation and scandals led to political pressures on the regulators to phase out a traditional institution common to the two countries, that is, of *"badla"* or Carry-Over-Trade (COT) financing, which is explained in the following section. In section III we provide a brief description of the speculative episodes and the regulatory response in the two countries. Section IV explains the empirical methodology we use to examine the change in the market behavior following regulatory changes. Section V presents summary and conclusions.

Institutional Background

Bombay Stock Exchange is the oldest stock exchange in Asia having been established in 1875. Over 3,500 stocks with a total market capitalization of about US $ 466 billion are traded on the exchange. The BSE is among the 5 biggest stock exchanges in the world in terms of transactions volume. Along with the National Stock Exchange (NSE), an emerging

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competitor established in 1994, the two exchanges represent more than four-fifth share in aggregate turnover of the 23 stock exchanges in the country.

Following the economic reforms of July 1991, Indian stock markets have been increasingly integrated with developed markets. Their exposure to the fluctuations in global stock markets has increased as foreign institutional investors have become influential players in the domestic markets since 1993. Over the years Indian stock markets have strived to transform themselves to meet the demands of modern finance, for example, by developing a full-fledged derivatives market for futures and options. In the last decade, Indian stock markets, particularly the BSE, have witnessed many booms and busts and weathered several crises. The Sensex, considered to be the barometer of the Indian economy, has shown relatively higher volatility during the post-reforms period. The BSE has also seen recurrence of financial irregularities; in the last decade two major and a couple of minor scams have affected the market badly.

Karachi Stock Exchange (KSE), established in 1947, is the oldest and the most active of the three stock exchanges in Pakistan, and currently lists 662 companies with a total market capitalization of about $52 billion. The KSE 100 represents major blue chips companies and is fairly good representative of the market. The current P/E ratio for KSE 100 stocks is around 18.

Exhibit A: Selected Regional Indices

Period Jan 2000 to Feb 2006	% Change In Index	Daily Return Volatility	Capitalization Ratio	Turnover Ratio
KSE 100 (Pakistan)	686.25%	1.57%	23.8	40.1
SENSEX – Mumbai (India)	92.93%	1.51%	46.6	14.1
Hang Seng – Hong Kong	-8.35%	1.31%	271.4	43.5
SET – Thailand	54.39%	1.40%	57.1	18.2
SES All – Singapore	-8.34%	1.03%	111.6	39.3
MSCI WORLD INDEX	-10,26%	0.92%	-	-
S&P 500 COMPOSITE	-12.00%	1.15%	-	-

Similar to some other emerging markets, KSE has a limited role in raising new capital; e.g., there were only five new listings in the market in 2005. Futhermore, despite the small size of the market, it experiences a high turnover and high price volatility. From the plot of the KSE 100 index price index over the five year period 2001-2005 (See Figure 1), we can see that the market experienced significant fluctuations over shorter time intervals. Finally, a skewed size distribution of stocks traded is observed for the KSE i.e., skewed in terms of size, trading patterns, volume of brokers' trading and weighted value of stocks in the index. This is particularly true for top 20 stocks accounting for 85% of the overall turnover.

Exhibit A provides salient features of BSE and KSE along with some selected indices for comparisons. The spectacular rise in the KSE index by 686% over the six year period is remarkable, though 93% appreciation of the BSE also stands in sharp contrast with the performance elsewhere in the world. We also note that the two markets are relatively more volatile as measured by standard deviation of the daily price changes. It is interesting to note the sharp contrast between Pakistan's capitalization ratio (which is low) and relatively high turnover ratio which seems to reflect the large speculative element in the market.

The Badla or Traditional Carry Forward System

Badla, meaning something in return, is a local term for a forward trading facility, and has been an old and traditional informal institution common to both India and Pakistan. A *badla* transaction is essentially a *repo* transaction carried out in a separate after-hours market where the borrower who takes the *badla* from a *badla* broker, carries forward his security exposure from the current settlement period to the next one, by sale of his position in the present period and its repurchase in the subsequent settlement period at a predetermined price differential. In the event of a purchase, the investor may want to carry forward the transaction to the next settlement cycle and for doing so, he has to compensate the seller who sold it with an intention of getting cash.

Market Crisis and Regulatory Response

The Indian Experience

In June 1991, the new Indian government accelerated the process of economic liberalization, privatization and opening up of the Indian economy, setting off expectations of an unprecedented growth and prosperity for the economy. The stock market started booming - the BSE Sensitive Index rose from around 1000 in February 1991 to a peak of 4500 in March 1992. This led to an enormous increase in the demand for margin finance required by investors while, on the other hand, there were heavy margins imposed by the BSE. It led some of the market participants to find innovative solutions, sometimes not legal, to meet their financing requirements.

The new free market environment put immense pressure on the public sector, in particular the nationalized banks, to improve financial performance and capital adequacy. Banks, holding large cash balances not subject to reserve requirements under the Portfolio Management Scheme and cash raised by the public sector units through foreign exchange borrowing, became eager to explore new venues of higher returns. The market did not take long to innovative ways of avoiding regulation and diverting funds from the banking system to the stock market. It was done mainly through the *ready forward deal* mechanism, a variant of *repo* or repurchase agreement, and the *badla* system often using fraudulent and non-existing securities. The resulting "securities scam," personified by Hashad Metha, led to a diversion of funds to the tune of over $ 1.2 billion from the banking system to the stock market during the period April 1991 to May 1992. For a detailed reconstruction of the scam, and regulatory response see Barua and Varma (1993).

With the discovery of the scam, the stock prices dropped by over 40% in less than two months, wiping out market value by about $35 billion. The government responded by setting up a special court and promulgated an ordinance with several harsh provisions, including attachment of the properties of the accused in the scam. It also voided all transactions in "tainted shares" that had been routed through involved brokers, which caused market disruption. An unintended consequence was to slow down the reform process which busted the speculative boom of early 1990.

The *badla* system was blamed for causing "excessive speculations" in the market and for the irregularities in the stock exchanges in the form of non-enforcement of margins, non-reporting of transactions and illegal trading outside the stock exchange. Consequently, in March 1994 the Securities and Exchange Board of India (SEBI) effectively banned the facility, but, yielding to the demands from the brokerage community, introduced a modified *badla* system subject to certain safeguards effective January 1996. In 1997 further safeguards were put in

place, such as segregation of carry forward transactions at the time of execution of trade, daily margin of 10%, 50% of which would be collected upfront, and overall carry forward limits per broker.

In the late 1990's the *dotcom boom* in information, communications, and entertainment stocks all over the world contributed to the bull run on the BSE, which almost doubled in a short period from January 1999 to February 2000. The speculative spell led to overextended positions, and afforded many opportunities for fraud and manipulation, personified by the *Bombay Bull*, Ketan Parekh, considered to have been the main villain. He had managed to manipulate ill-liquid stocks, known as the 'K-10' stocks, by borrowing from various companies and banks using the shares as collateral. It worked well in the bull market, but busted when the markets started crashing in March 2000, led by a fall in the NASDAQ. In the next two months, while the NASDAQ declined by 35.9%, Sensex lost 23% and the K-10 stocks crashed by 67%, (for details see ICFAI, 2002).

It appears that a lack of effective regulations and surveillance of *badla* financing permitted highly illegal and speculative positions. The ensuing market crash prompted SEBI to launch a cycle of regulation to control the damage including increasing margin requirements, imposing restriction on short sales, and requiring stock deliveries following sale. It suspended all the broker member directors of BSE's board and banned trading by exchange officers. The *badla* system was banned, effective from July 2001, and a rolling settlement system was introduced.

The Pakistan Experience

The KSE experienced a steady bull run as reflected in both the KSE 100 index and trading volumes, starting just after the last stock market crisis in May 2002, which accelerated towards the end of 2004. The KSE 100 saw an unprecedented rise of 65%, from 6,218 on December 31, 2004 to 10,303 on March 15, 2005, along with an increase in the value traded from around $300-400 million to $1-2 billion per day. The market turned negative in the second half of March, 2005 and index dropped to as low as 6,939 on April 12, 2005, a decline of 32.7 percent from its peak. The sharp rise in the index could not be explained by any change in the fundamentals. The following precipitous fall is also somewhat of a puzzle. Such a meteoric rise in index and a subsequent crash is indicative of a classical speculative bubble in the equity market.

Badla has been blamed as one of the reasons for the March 2005 crisis. Pakistan's influential financial newspaper Business Recorder stated two problems with "*badla*" financing: first, *badla* financing is only open to a small number of market players, which also includes financial institutions, as opposed to share trading. Second, *badla* financing is provided by short-term investors and the hot money can disappear overnight. During 2004-05 KSE investors were willing to borrow at exorbitant *Badla* rates (which were capped at 18% in KSE but rose in the uncapped Lahore Stock Exchange to over 100%) because the accelerated rise in stock prices made even expensive borrowing feasible. The COT (*badla*) financing ranged from 33% to 45% of investment at KSE throughout 2004. The higher demand for *badla* investment increased the average *badla* rates to 11.4% in 2004, ranging from 12 to 19 percent, from 9.4 % in 2003, even though market interest rates remained low through most of 2004.

The growing availability of *badla* financing brokers and institutions added to the buying frenzy, though some of the major *badla* providers were simultaneously selling in the futures market. In other words, "there was a strong nexus between lenders and brokers/investors who could influence market sentiment to their own advantage" (*Task Force Report, 2005*). The

chairman of SECP stated on July 16, 2005 that "*badla*" was the root cause of almost all previous crises at the bourses, and was to be rooted out, and that the *badla* and margin financing could not co-exist. The Task Force recommended that there was a need for structural reforms and steps were needed to protect public interest by ensuring that the financial might that has been accumulated by the stock brokerage and *badla* financing institutions should be effectively checked and brought to a reasonable size to ensure that they are unable to manipulate the market and adhere to international practices.

Besides *badla* financing, other factors which contributed to this "bull run" included, increased liquidity due to higher foreign remittances, a regime of low interest rates, IPO's of public sector enterprises marked for divestment and floatation of more mutual funds. During this period, especially since mid October, 2004, there was an unusual build-up in the media about the prospects of a rise in the KSE index. Statements from government officials linked the rise in the KSE index to good economic management, indicated that the market was destined to rise further, and announcement of the impending accelerated program for the privatization of prominent and profitable public sector corporations fuelled the bullish sentiment. Conduct of corporate officials contributed to the market speculation; for example, rumors of new oil and gas discoveries which would raise stock value manifold went un-refuted or clarified by the management. There were allegations of "wash trades" and "pump and dump" plays by brokers.

Analysis of Market Behavior

This section presents empirical analysis of the impact of abolishing *badla* system in the two countries in order to subdue speculative behavior with reference to stock price volatility. Among the related research, in the context of India, Bhattacharya, Sarkar, Mukhopadhyay and, Debabrata, (2003) examine the stability of the day-of-the-week effect in returns and volatility during 1991–2000 and do not find the estimated coefficient of the dummy variable for *badla* financing to be significant. Goswami and Angshuman (2000) also report that *badla* trading had no impact on the day-of the-week pattern of returns. Eleswarapu and Krishnamurti (2005) study whether *badla* financing facility had led to speculative volatility on the Bombay Stock Exchange prior to March 1994. They do not "find any evidence that supports the allegations made by regulators that *badla* trading destabilizes the stock prices and causes excessive volatility." The impact of abolishing of *badla* system in Pakistan has not been studied so far to our knowledge. However, Ahmed, Rosser and Uppal (1996) document the existence of bubbles over the period 1987-1994. Mangla and Uppal (1996) report market inefficiencies. The existence of price manipulative behavior on the KSE is rigorously documented by Khawja and Mian (2005).

In order to empirically analyze the impact of abolishing of *badla* system, we study the return volatility in the two stock exchanges before and after the events. It is strongly argued in the finance literature (e.g., De Long, Shleifer, et al, 1990a, 1990b) that *noise traders* cause excessive trading and volatility. Speculative trading in derivative securities has also been blamed for excessive volatility (Jegadeesh and Subrahmanyam, 1993). Some economists have argued for imposing tax on short-term trades to contain volatility (e.g., Stiglitz 1989).

Data and Sample Period

Data for this study was taken from the Datastream International, Ltd. Database for the Karachi Stock Exchange 100 Index (KSE100) and for Bombay Stock Exchange index of 30 major companies (BSE 30 SENSITIVE). Daily closing values of the indices were used for the

period from 1/1/1993 to 12/29/1995, and from 1/1/2000 to 3/31/2003 for the BSE to cover the two periods during the period of change. The corresponding event window is form 1/1/2004 to 2/28/2006 for the KSE. We study the market behavior by dividing it into sub-periods, before and after the structural change was implemented, as shown in Exhibit B.

Exhibit B:

MARKET	EVENT DATE	STUDY SUB-PERIODS
BSE	March, 1994	Sub-Period I: 1/1/1993 to 2/28/1994
		Sub-Period II: 6/1/1994 to 12/29/1995
	July, 2001	Sub-Period I: 1/1/2000 to 6/29/2001
		Sub-Period II: 10/1/2001 to 3/31/2003
KSE	March, 2005	Sub-Period I: 1/1/2004 to 2/28/2005
		Sub-Period II: 8/1/2005 to 2/28/2006

For the BSE, we leave out a three month intervals between the sub-periods to allow the market to adjust to the new financing environment. For the KSE, we exclude five months since the issue remained under consideration for longer period and the change was not implemented immediately. All price data was converted to "returns" by taking the natural log differences of the index level P_t thus: $R_t = ln(P_t) - ln(P_{t-1})$. Figure 1 graphs the market indices and return volatility for BSE and KSE for the periods under study. It is noteworthy that the Bombay stock exchange was quite bullish before the event date, March 1994, but had a mixed experience afterwards. During the 2000-03 period, the BSE index shows a general bearish trend. The graph for the KSE, however, shows that the market was strongly bullish before March 2005, but resumed its bullish course, after a brief 'crash' over the 3-4 month period. It is also observed that that the return volatility was lower for the BSE in the later period, while the volatility was higher in later period for the KSE.

Results

Summary statistical results for the first four moments for the return series are shown in Table 1. It is noteworthy that the return distributions in both countries exhibit significant departure from the normal distribution, Skewness and Kurtosis are very significant, and the Jarque-Bera statistic for both markets and for all periods strongly rejects normality hypothesis. Results for tests for difference in mean and variance of two sub-period samples are presented in Tables 2 and 3 respectively. For the 1994 instance of abolishing *badla* in India, the mean daily return for the BSE in the first sub-period is 0.1636%, while it is -0.0503% in the second sub-period. The t-test for mean difference is significant at 5% level; one-tail probability ($T \leq t$) is 3.5%. On the other hand, for the second event of banning *badla* system in 2001, the mean difference is not significant at conventional levels; the achieved significance level is 16.2%.

In Table 2, the t-test for mean difference in the daily return on the KSE in the two sub-periods is not significant; one-tail probability ($T \leq t$) is 16.6%. Though the mean difference is not significant, it is interesting to note that the sample mean return in the second period is 1.5 time higher than in the first period, i.e., 0.3% vs. 0.2%. It seems that the KSE bullish sentiment may have strengthened in the later period, contrary to the intentions of the regulators. Table 3 (panel A) presents the test results for difference in the variance over the studied events in the two markets. For the BSE, the F-test for unequal variance strongly rejects the null hypothesis both for the 1994 and 2001 episodes. For the 1994-95 study period the variance of daily returns in the

second sub-period was significantly lower than in the first; 0.0126% compared with 0.0327%. For the 2000-03 study period, the variance in the later sub-period (0.0128%) was significantly lower than in the first sub-period (0.0420%). The behavior of the KSE, however, appears to be quite opposite. The sample variance is actually higher in the second period than in the first, 0.0129% vs. 0.0098%. The F-test for unequal variance rejects the null with a p-value of 2.5%.

In order to study the response of the two markets with respect to the regulatory changes with more robust controls, we expanded the empirical tests to exclude possible external influences and *conditional auto-regressive heteroskedasticity* in the variance process. The former influence was incorporated by including the MSCI World index in a GARCH-M model and then examining the residuals. The results of the tests of variance equality on the residuals from the model are presented in panel B of Table 3, which conform to the first set of tests reported in panel A.

Summary and Conclusions

From our empirical tests, it appears that the bullish sentiment and volatility on the KSE continued unabated despite the measures taken by the SECP to curtail "speculative" trading allegedly fanned by the *badla* system. On the other hand the regulator of the BSE appears to have succeeded in their goals of cooling off the market in the 1994-1995 as well as in the 2000-03 periods. It is possible that extra-market manipulations by speculators may have frustrated the efforts of the KSE regulators, such as documented by Khawja and Mian (2005). Another possible explanation may be that the *badla* system may not have been a cause of the alleged "speculative bubbles" in the two markets, as reported by some other researchers for the Indian market.

We note, however, that the response of the Indian regulators in dealing with the market manipulations and securities fraud appears to be much stronger than was the case in Pakistan. The Indians regulatory response was three pronged: 1) discovering and punishing the guilty, 2) recovering the money, and 3) reforming the system. The Pakistani regulators on the other hand only pursued institutional restructuring mainly focusing on replacement of the *badla* system. No criminal or civil charges were filed, and no recovery was sought. This response may have been perceived by the market as weak, and may not have conveyed a strong signal to the market regarding government's resolve for effective enforcement. Another relevant factor is that in India the National Stock Exchange is a viable competitor to the BSE, and the competitive environment creates stronger pressures on the stock exchanges for reform, modernization and compliance.

TABLE 1
SUMMARY STATISTICS

	Bombay Stock Exchange 1993-1995			Bombay Stock Exchange 2000-03			Karachi Stock Exchange 2004-06		
Index Return Daily Percent	*Jan 93 to Dec95*	*Jan 93 to Feb 94*	*Jun 94 to Dec 95*	*Jan 00 to Mar 03*	*Jan 00 to Jun 01*	*Oct 01 to Mar 03*	*Jan 04 to Feb 06*	*Jan 04 to Feb 05*	*Aug 05 to Feb 06*
Mean	0.0222	0.1636	-0.0503	-0.0586	-0.0949	0.0207	0.1668	0.2025	0.3075
Variance	0.0206	0.0327	0.0126	0.0271	0.0420	0.0118	0.0201	0.0098	0.0129
Skewness	-0.1077	-0.2828	0.1524	-0.3388	-0.2583	0.2787	-0.4415	-0.5222	-0.3971
Kurtosis	2.9242	2.1863	0.8294	2.6123	1.1944	1.2321	2.2436	2.4753	1.9356
Minimum	-0.0899	-0.0899	-0.0385	-0.0742	-0.0742	-0.0395	-0.0470	-0.0356	-0.0361
Maximum	0.0563	0.0563	0.0418	0.0712	0.0712	0.0445	0.0580	0.0342	0.0373
Jarque-Bera	279.77	64.17	13.449	256.73	27.52	29.81	136.62	91.12	27.72
Observations	781	302	413	846	390	391	564	303	152

TABLE 2
TEST FOR MEAN EQUALITY

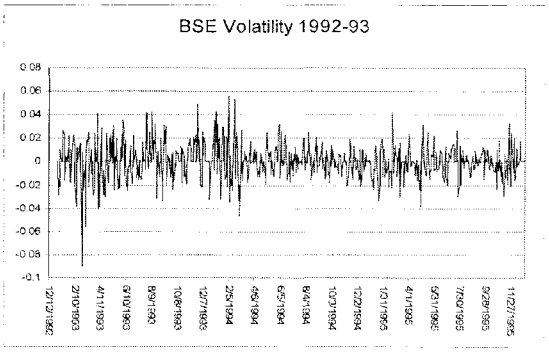
T-Test For Mean Difference: Assuming Unequal Variances			
Index Return Daily Percent	**BSE30 1993-95**	**BSE30 2000-2003**	**KSE100 2004-06**
Mean Ist Sub-period	0.1636	-0.0949	0.2025
Mean 2nd Sub-period	-0.0503	0.0207	0.3075
t Stat	1.8172	-0.9848	-0.9699
P(T<=t) one-tail	0.0349	0.1626	0.1665

TABLE 3
TEST FOR VARIANCE DIFFERENCE

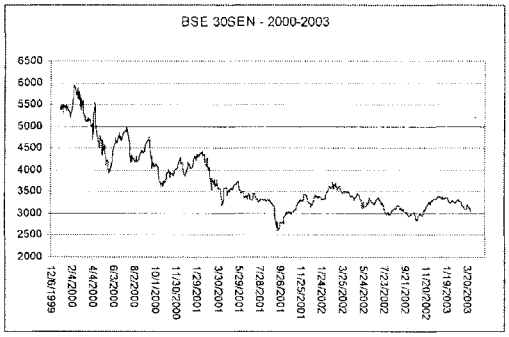
PANEL A: F-Test for Unequal Variances			
Index Return Daily Percent	**BSE30 1993-95**	**BSE30 2000-2003**	**KSE100 2004-06**
Variance Ist Sub-period	0.0327	0.0420	0.0098
Variance 2nd Sub-period	0.0126	0.0118	0.0129
F Stat	2.6024	3.5499	1.3101
P(F<=f) one-tail	0.0000	0.0000	0.0252
PANEL B: F-Test for Unequal Variances Using Residuals from the GARCH-M Model			
Index Return Daily Percent	**BSE30 1993-95**	**BSE30 2000-2003**	**KSE100 2004-06**
Variance Ist Sub-period	0.0333	0.0393	0.0099
Variance 2nd Sub-period	0.0123	0.0115	0.0128
F Stat	2.6998	3.4099	1.3031
P(F<=f) one-tail	0.0000	0.0000	0.0277

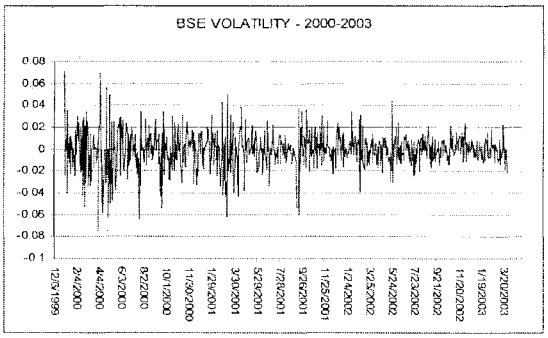
FIGURE 1: STOCK MARKET INDICES AND VOLATILITY

A: BSE, 1993-1995 PERIOD

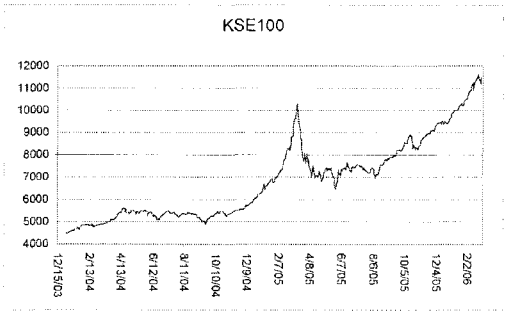


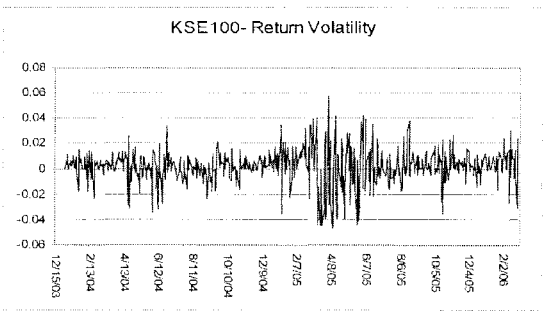
B: BSE, 2000-2003 PERIOD





C: KSE, 2004-2006 PERIOD





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Share Repurchase Policies and CEO Compensations: An Empirical Examination

Aidong Hu

Abstract

I examined how share repurchase activities are associated with complicated managerial compensation plans. The empirical evidence in this study suggests that managerial equity based compensation incentives to increase the amount of share repurchases at companies with potentially the most severe agency problems. That is to say, the amount of share repurchases is greater for those firms that are with longer listing history, higher executive power measured by CEO's tenure and the amount of cash compensation, and fewer investment opportunities. My results show that the complexity of managerial compensation contracts plays an important role in explaining the share repurchase decisions.

1. Introduction

Stock repurchases have been an important payout mechanism in recent years. In the last several years, both the amount of repurchases and the number of firms that repurchase have grown significantly (Fama and French (2001) and Allen and Michaely (2003)). A widely accepted explanation behind the payout decision is the signaling hypothesis. In addition, managers may decide to repurchase shares if 1) they are intended to be used in a merger; 2) to mitigate the dilution of the ownership for companies with employee stock compensation plans; 3) to manipulate Earnings Per Share (EPS) - especially for smaller, less profitable companies; 4) to serve the clientele with preferences for tax sheltering; 5) managers believe that company is undervalued.

It is obvious that share repurchase decisions are largely managerial decisions. Evidence in Brav et al (2005) shows that share repurchases are preferred by managers because repurchases are more flexible and can be adopted to achieve various managerial goals. While traditional theories of signaling and free cash flow hypotheses cannot fully explain the surge of share repurchase activities in the past several years from the real world, the managerial motive to repurchase shares becomes an interesting topic to explore. In this paper, I investigate the association between share repurchases and CEO characteristics under the influence of managerial entrenchment.

As in the free-cash-flow literature, the managerial entrenchment approach assumes that there is shareholder-manager conflict because managers can derive private benefits from managing the firm, for example, engaging in empire-building activities and etc. On the other hand, the entrenchment literature explicitly takes into account the costs of removing entrenched managers: a take-over or bankruptcy may be the only feasible way to remove the

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incumbent managers. The manager chooses imposing payout or capital structure policies to maximize his or her own utility (e.g., tenure, other private benefits, etc.) subject to avoiding a take-over or bankruptcy.[1] Consider, for example, Zwiebel's (1996) managerial entrenchment model. This model does not assume that managers can be made to pay out cash involuntarily. Rather, entrenched managers seek to avoid the possibility of an involuntary replacement (through a take-over or bankruptcy) by restraining their non-productive use of capital. The dynamically consistent way to do this is to pay out cash and set appropriate levels of debt voluntarily. The manager's optimal choice of payout and debt policy will depend on the type of investment projects available. In equilibrium, there is self-selection in terms of choice of payout and debt policy: managers with good projects (the more productive managers) choose a lower payout policy since they do not need "self-restraining" devices to avoid involuntary replacement as much as less productive managers. Hence there is an explicit relationship between managerial motives and a firm's repurchase decisions.

Most of the empirical literature on a firm's payout policies studies the effect of ordinary dividend payment. Brav et al. (2005) find maintaining the existing dividend level is in line with investment decisions while share repurchases are used to pay out the residual cash flow after investment spending. Therefore the decision of paying dividend is different from the decision of buying back common shares.

Few studies have examined directly the unambiguous refutable predictions of the entrenchment hypothesis with respect to share repurchases until now. I seek to fill this gap by investigating how equity incentives are related to the decision of share repurchases. This study tests both the amount and the likelihood of share repurchases that can be explained by the CEO characteristics while controlling for measures of free cash flow (Lambert et al. (1989) and Fenn and Liang (2001)). Moreover, this study extends the empirical framework to allow for the role of executive incentive compensation. Complex executive compensation contracts (including stock options, director shares, restricted stock awards and etc.) reduce the non-value-maximizing consequences of managerial entrenchment (Lewellen et al. (1987), Hall and Liebman (1998), and Zhou (2001)). I therefore extend the set of refutable predictions to include a positive relationship between repurchases and equity-based managerial incentives.

Managerial stock options can help to align the incentives of managers and shareholders. Fenn and Liang (2001) find that management stock options are related to the composition of payouts. They document a strong negative connection between dividends and management stock options; and a positive relationship between repurchases and management stock options. In a recent research, De Jong et al. (2003) investigate the payout decisions between dividends and share repurchases using a sample of non-financial Canadian firms. They find that firms with managerial option plans are less likely to pay dividends. However, few extant studies investigate the complexity of the executive compensation plans. In this study, I examine the association between stock repurchase activities and CEO compensation policies explicitly. The purpose of this study is to test the following hypothesis:

[1] Notice that the agency or the free-cash-flow approach assumes that shareholders can make the managers choose payout or capital structure policies that reduce the agency costs (for example, large payouts or high leverage).

There is a definite association between a CEO's compensation plan and a firm's share repurchase decision because of the potential equity dilution effect. In short, equity-based managerial compensation incentives to increase the amount of share repurchases at companies with potentially the most entrenched managers, that is, firms with longer listing history, higher executive power, and fewer investment opportunities or high free cash flows need to motivate their managers more through equity-based incentive payment.

There are several primary findings in this research. By incorporating multipart managerial compensation variables in the analysis, this research shows that the richness of executive compensation plans is an important factor in the process of repurchase decisions – both qualitatively and quantitatively. In my analysis, management stock options are an important factor in deciding whether to repurchase common stocks. However, the effect of stock options is insignificant in the determination of size (or amount) of stock repurchases. It appears that the significantly positive effect between repurchases and executive stock options in existing literature is due to the latent variable problem.

In addition, this study develops and demonstrates considerable empirical support for a perspective on share repurchases that integrates the influence of firm age, value of tangible asset, and heterogeneous management compensation. I also find that firm size, leverage, and investment opportunity related variables significantly impact the share repurchase decision. This analysis thus adds to the empirical literature that generally focuses on the signaling aspects of share repurchases (e.g., Vermalaen (1981) and Dann et al. (1991)), and identifies new links between firm characteristics and share repurchases, a matter of increasing interest (e.g., Jagannathan et al. (2000)). Finally, comparing the likelihood of repurchases and the amount of repurchases, I find that the entrenchment model is considerably more successful in explaining the amount of repurchases relative to the likelihood of whether to buy back shares.

2. Sample and Data Description

To investigate the relationship between share repurchases and a CEO's compensation plan, I use data from Standard & Poor's Compustat and Execucomp databases. Compustat is my source for share repurchases, and firm characteristics, while Execucomp is the source for managerial compensation variables.

2.1 Sample Selection

The primary data source is the 2001 Standard & Poor ExecuComp database. This database contains records of over 2,040 firms in various S&P indices, covering the period from 1992 to 2000. For each firm in the database, I take the annual compensation records for the CEO, and also obtain the firm's financial records from the Compustat file. The share prices are from the CRSP file. I then eliminate annual observations that are in regulated industries (SIC code 4990 through 4999 and 6000 through 6999). This procedure yields 9,677 firm-year records from 1992 through 2000. I refer to this as the full sample. Deleting observations with missing value from the proxy statements yields a final sample of slightly over 7,610 firm-year records. Most of my analyses are run on the restricted sample, but I use the full sample to study differences

between repurchase and non-repurchase firms with respect to firm-specific characteristics that are available from Compustat and CRSP.

2.2 Empirical Estimation and Proxy Variables

As we noted above, the theoretical managerial entrenchment models predict a negative relation between the amount (or size) of share repurchases and the strength of the managerial productivity, conditional on the firm making a repurchase decision. Therefore, I estimate the following empirical specification:

(1) $$Y^* = \alpha + \beta' X + \varepsilon$$

(2) $$\frac{R}{P} = \begin{cases} Y^* & \text{if} \quad Y^* > 0 \\ 0 & \text{if} \quad Y^* \leq 0 \end{cases}$$

In this model, R/P is the repurchase yield, defined as the dollar amount of repurchase of common shares divided by the market value of equity. To avoid the potential look-ahead bias, I take the repurchase in period t and divide it by the average market capitalization of the beginning and ending share prices (P) of that period.

I also construct logit models based on the above specification to test the likelihood of share repurchases. In the logit models, the dependent variables are defined as 1 if a repurchase yield is greater than 0, or 0 otherwise.

To derive the amount of a repurchase, I adopt the methodology outlined in Allen and Michaely (2003). I first take the purchase of common and preferred stock (Compustat annual item 115) and then adjust this quantity by net changes of preferred stock redemption value (Compustat annual item 56) from year t-1 to year t.[2]

CEO's compensation variables are derived from ExecuComp. The level of managerial entrenchment is inversely related to the effectiveness of internal corporate governance mechanisms and the potency of external takeover threats. The effectiveness of the internal mechanisms is measured through CEO-specific variables that are reflective of the CEO's power. Exhibit 1 gives an in-depth and accurate definition and the predicted sign of proxy variables used in both Tobit and logit analyses.

In this research, a firm's characteristics are also considered. First, I use the net tangible asset. This variable is introduced to control for differential structure of firms with different asset. The measure is calculated as net book value of property, plant and equipment divided by the book value of asset.

The second variable is firm age. Empirically, positive payout firms tend to be older or more mature firms (e.g., Fama and French (2001)). The age of a firm is calculated as the

[2] My methodology here is similar to that used by Jagannathan, Stephens and Weisbach (2000) and Grullon and Michaely (2002). In my study, some observations for the net changes of preferred stock redemption value are negative. Those observations are treated as missing values.

difference between the recording year in the ExecuComp database and the share listing date of the firm. The listing date is obtained through CRSP monthly file.

There is a potential look-ahead bias if we use regressors obtained from the end of the repurchase payout period, rather than the beginning of this period. In general, using end-of- the-period values are likely to overstate the explanatory power of the model. To control for this effect, all regressors are taken to be the beginning-of-the-year values. Thus, for stock variables (such as share holdings and the value of stock options held) are taken to be the values at the end of the previous year, while flow variables (such as cash salary and bonus) are those from the previous year. Also, the repurchase-yield measures for a given year are taken to be the cash payments paid in the year divided by the average of the closing prices at the beginning and end of that year. In my study, measurements of share repurchases are remarkably robust to various combinations of choices regarding the construction and timing of payments and the share prices.

3. Empirical Results

Since share repurchase is mainly a managerial decision, the propensity of repurchase has an important implication: managers need to decide whether or not to make a repurchase first. Conditional on choosing to buy back shares, managers then decide the amount of repurchase. Thus the strength of the managerial productivity is negatively related both to the likelihood of making a repurchase and the amount of the payout, conditional on making share repurchase. To address this sequential process, to test the robustness of the models and to examine the effect of different components of CEO's compensation, I estimate two separate models for Tobit and logit regressions.

The primary empirical results are reported in Table 1. I report both coefficients of the regressions, and model performance in general. For both Tobit and logit regressions, the results are very consistent. Turning first to the repurchase-yield regressions, I find that the results are strongly supportive of the theoretical predictions. Conditional on the making the decision to repurchase shares, the repurchase yield is significantly and positively associated with equity-based managerial compensation and length of service in the firm, and significantly and negatively associated with the CEO power proxies related to compensation, and the amount of a firm's tangible assets. I continue to find evidence of a non-linear impact of service length: CEOs with exceptionally long tenure tend to repurchase less, ceteris paribus.

However, there are a few interesting differences between the Tobit regressions and the Logit regressions for the repurchase decision. Note that the value of executive stock options has a significant (positive) influence on the likelihood of share repurchases. This result has some intuitive appeal: one would expect that while the basic repurchase decision may be largely driven by the overall quality of the firm's economic prospects (good versus bad), the amount of share repurchases would also depend on how good these prospects are. To the extent that executive stock options are an indicator of how well the firm performed, they would be expected to be significant in the repurchase-yield regressions.

Looking at Tobit regressions, I find that the executive stock option is insignificant when comparing to other incentive compensation variables. This is an interesting result in light of the

existing research mentioned earlier, it shows that researchers need to incorporate the complex effects of compensation contracts when studying the managerial incentive problems (e.g., Kole (1997)).

3.1 Size Effects

Some of the most influential variables for determining the repurchase decision and the repurchase-yield in the previous section are the length of CEO service, cash salary and bonus as a proportion of the CEO's total compensation, stock options exercised, and firm age. All of these variables are likely to be correlated with the quality of investment opportunity set or firm size. Firm size and age are positively correlated (e.g., Audretsch (1995)). In my sample, smaller firms are more likely to have a greater proportion of asset value in growth options; in addition, CEOs of small firms receive a significantly higher proportion of their compensation through equity-based compensation. I therefore examine whether the impact of the entrenchment-related variables on repurchase policy is really due to an underlying correlation between firm size and repurchase payout policy.

To test for size effects in repurchase decision, I enhance the specification of the basic repurchase decision and yield models to include firm size, defined as the market value of total assets. Table 2 reports the results of this analysis.

Tobit regressions in Table 2 make two major points. First, that the significance of the compensation variables in Table 1 is not a spurious finding due to a latent size effect. Both the significance and (algebraic) size of the coefficients for the various compensation related variables are unaffected even when I control for the firm size.

Second, firm size is positively and very significantly related to the likelihood of share repurchases, even after controlling for the age of the firm and the compensation related variables. The in-sample fit of the model in fact improves with the inclusion of size as an explanatory variable for the two logit models. These results imply that firm size is an important factor for managers when they try to make a decision of whether to buy back shares.

I turn now to the impact of firm size on the size of the repurchases. Results from Tobit models in Table 2 exhibit quite different effects about the firm size on the repurchase yield: the introduction of firm size does not improve the explanatory power of both tobit models. This result is quite interesting, it indicates that a firm's size has nothing to do with the amount of repurchases. This evidence shows that firm size has an influence on the propensity of share repurchases, but has no influence on the size of repurchases.

3.2 Leverage Effects

In previous sections, leverage related variables are absent in the basic repurchase models under managerial entrenchment. However, leverage should impact share repurchases for a variety of reasons according to theoretical literature (e.g., Zwiebel (1996)) and empirical evidence (e.g., Berger et al. (1997)). I examine the influence of firm leverage ratio in this section.

I expect leverage to have a negative impact on repurchases, other things held constant, for at least two reasons. There is a direct and restrictive impact of debt covenant restrictions on repurchase payouts. There may also be an indirect negative effect to the extent that debt related repurchases reduce firm liquidity and constrain (discretionary) payouts to shareholders. This prediction should hold even when there are endogenous debt effects, in which case my models should be interpreted as a structural probability model of share repurchases.

I test the hypothesis of a negative relation of leverage to repurchases by including firm leverage in the basic specification (cf. Table 1). Here I measure leverage through the debt-to-capitalization ratio using the market value of equity. But my results are unaffected when I use other measures such as the book value of debt-to-equity ratio.

Table 3 reports the leverage effect on the repurchase likelihood and repurchase-yield, respectively. I find that high leverage has a significantly negative relationship with the likelihood of repurchases. Furthermore, and conditional on a positive repurchase decision, leverage is significantly and negatively related to both repurchase yields. The analysis thus supports the hypothesis that leverage negatively affects repurchases, ceteris paribus. Note that the inclusion of leverage does not materially impact the role of the other independent variables, indicating that the role of the compensation variables in the repurchase regressions is not due to spurious correlation with leverage.

3.3 Investment Opportunity Effects

To test the impact of growth opportunities on the decision of share repurchases, I proxy the quality of the investment opportunity set in two ways. I use the market-to-book value ratio as a measure of portion of the market value of the firm comprised of growth options (Fama and French (1992) and Smith and Watts (1992)). However, market-to-book ratio may proxy for other issues. As an example, low market-to-book ratio may be interpreted as under-valued, out of favor firm, and hence low market-to-book ratio can be the incentive for share repurchase. To accommodate this potential problem, I also construct an investment opportunity factor using principal components introduced in Baber et al. (1996). I use principal components to extract the common growth-option factor from 4 underlying variables that are compiled from Compustat. These four variables are, 1) the firm's investment intensity from year t-2 to year t; 2) the geometric growth in the market value of assets from year t-2 to year t; 3) the market-to-book ratio of assets at the end of year t; and 4) the ratio of R&D expenses to the book value of assets at the end of year t.

Table 4 reports the results of this analysis using market-to-book value of asset as growth opportunity proxy. Effects of investment opportunities using the common growth factor are quite the same in this research and hence I do not report the results here. Looking at both Tobit and logit models, my analysis confirms the negative relationship between share repurchase and the growth options. For the Tobit models, it is also interesting to see that the significance of executive stock options improves (i.e., marginally insignificant) after introducing the growth opportunity proxy.

4. Conclusion

The theoretical literature on managerial entrenchment makes a number of relatively unambiguous refutable predictions regarding firm repurchase policy. It directly incorporates the strength of executive characteristics, external takeover threats, and firm characteristics. I extend this framework to also allow for the role of managerial incentive contracts. Under this framework, the predictions are that the likelihood and the size of share repurchase is positively related to the use of equity-based compensation contracts, but negatively related to the quality of the firm's investment opportunity set and the power of the top manager. These predictions are distinct from the implications of traditional signaling models and free cash-flow hypothesis.

This study investigates how corporate repurchase policy is related to top executive compensation contract. Using data for a sample of more than 2,040 companies, I present empirical evidence suggesting that managerial equity-based compensation incentives to increase cash payouts of companies with potentially the most entrenched managers, that is, those with longer listing history, higher executive power measured by CEO's tenure and the amount of cash compensation, and fewer investment opportunities or high free cash flows. This evidence shows that equity-based compensations help to reduce non-value-maximizing behaviors taken by the entrenched managers in general.

This empirical analysis largely supports the predictions made by the managerial entrenchment model, both for the likelihood of repurchases and the size of repurchases. In general, this study shows that the decision of share repurchase is directly related to executive and firm characteristics, and the richness of the managerial compensation contract plays an important role in the determination of share repurchase decision.

Exhibit 1. Definition of Variables

The dependent and independent variables used in the analysis are defined below. As a general rule, for dependent variables in year t, the regressors are taken to be the beginning of the year values. Thus, for stock variables, the values are as of the end of year t-1 and for follow variables the values are taken from year t-1. The theoretically predicted sign in the binary choice and repurchase yield regressions for the independent variables is also indicated. A positive (negative) sign implies that increases in variable value increase (decrease) the likelihood of repurchase or the amount of the repurchase, holding other things fixed.

Dependent variable		Construction of the variable
Stock Repurchase Yield		It is calculated as the dollar value of purchase of common shares in a given year divided by the average market value of equity in the beginning and the end of the year.
Stock Repurchase Index		An indicator equals to 1 if a firm's stock repurchase yield is greater than 0 in year t; otherwise 0.
Independent Variables	Predicted Sign	Definition of the variable
Service Length	Positive	Number of years credited toward the CEO's retirement plan: extracted from Execucomp database.
Long Tenure	Negative	A dummy variable equaling I only if the CEO has served on his/her position for more than 25 years.
Compensation Ratio	Negative	Percentage of a CEO's cash salary and bonus to his/her total compensation in a given year, calculated using records obtained from the ExecuComp database.
Stock Options Exercised	Positive	Log(1+Value of stock options exercised in year t): extracted from ExecuComp database.
Salary & Bonus	?	Log (1+ value of cash salary and bonus given to a CEO in year t): extracted from the ExecuComp database.
Long-term Incentive Plan	Positive	Log (1+value of long-term incentive plan in year t): extracted from ExecuComp database.
Executive Stock Options	Positive	Log (1+value of executive stock options): extracted directly from Execucomp database.
In-the-money Options	Positive	Log (1+value of in-the-money exercisable executive stock options): extracted from Execucomp database.
Director Shares	Positive	Log(1+MV of director shares in year t). Number of shares is obtained from ExecuComp, share price is obtained from CRSP daily file, it is the average price between year t-1 and year t.
Restricted Shares held by CEO	Positive	Log(1+value of restricted shares held by CEO in year t). Value of restricted shares is reported by the firm and is directly obtained from ExecuComp.
Common Shares held by CEO	Positive	Log(1+MV of shares held by CEO in year t):number of shares held by CEO is extracted from ExecuComp database; share price is obtained from CRSP daily file, it is the average price between year t-1 and year t.
Tangible Assets	?	(Net book value of Property, Plant, and Equipment) /value of assets. Both items are from Compustat.
Firm Age	Positive	Set equal to the current reporting year minus the beginning date of a firm's listing year obtained through CRSP monthly file.
Investment Opportunities	Negative	Market Value-to-Book Value Ratio of Firm Equity.
Firm Size	Positive	Log (1+ market value of assets), where market value of assets is calculated as the book value of liability plus market value of equity.
Leverage	Negative	Debt/(Debt + Equity). The book value of debt and the market value of equity are used.

Table 1. Tobit and Logit Analysis of the Share Repurchase

For the Tobit Repurchase Yield regression, the dependent variable is the repurchase yield that is calculated in a manner explicated in Exhibit 1. A positive (negative) coefficient sign indicates that the variable is positively (negatively) associated with the amount of repurchases. For the logit Repurchase Likelihood regression, the dependent variable is an index equal to 1 if a firm repurchases shares in year *t* (calendar year), or 0 otherwise.

Value of stock repurchase and the book value of asset are obtained from Compustat while market value of equity is obtained through CRSP. The associated *t*-statistic is reported in the parenthesis.

Explanatory Variables	Predicted Sign	Tobit Repurchase Yield		Logit Repurchase Likelihood	
		Specification (1)	Specification (2)	Specification (1)	Specification (2)
Intercept	—	-8.006 (-8.85)***	-6.495 (-10.96)***	-1.137 (-9.69)***	-0.933 (-12.04)***
Service Length	Positive	0.252 (3.12)***	0.417 (4.96)***	0.038 (3.56)***	0.063 (5.54)***
Long Tenure	Negative	—	-1.173 (-2.01)**	—	-0.171 (-2.21)**
Compensation Ratio	Negative	-0.636 (-1.56)	—	-0.199 (-3.83)***	—
Salary & Bonus	?	0.494 (3.69)***	—	0.122 (6.95)***	—
Executive Stock Options	Positive	—	0.047 (1.26)	—	0.018 (3.59)***
Director Shares	Positive	0.536 (5.87)***	—	0.102 (8.08)***	—
Stock Options Exercised	Positive	0.087 (2.59)**	0.153 (4.42)***	0.021 (4.87)***	0.032 (6.72)***
Long-term Incentive Plan	Positive	0.189 (3.67)***	—	0.037 (5.03)***	—
Restricted Shares held by CEO	Positive	—	0.068 (1.89)*	—	0.029 (5.66)***
Common Shares held by CEO	Positive	—	0.153 (3.14)***	—	0.042 (6.68)***
Tangible Assets	?	-2.012 (-3.78)***	-1.727 (-3.02)***	-0.337 (-4.95)***	-0.358 (4.75)***
Firm Age	Positive	0.858 (6.32)***	0.884 (6.28)***	0.178 (10.2)***	0.199 (10.65)***
Number of Observations		7101	6708	7101	6708
Percentage Correctly Predicted		—	—	61.3	60.1
Estimated Sigma		8.89	8.56	—	—
Log Likelihood		-9086.11	-7478.49	-5237.37	-4360.96
p-value of χ^2 of Log likelihood		< 0.001	< 0.001	< 0.001	< 0.001
Pseudo R^2		19.5%	33.7%	10.6%	9.7%

Asterisks *, **, *** indicate *t*-statistic significance at 10%, 5%, and 1% levels, respectively.

Table 2. The Effect of Firm Size on the Amount and the Likelihood of Share Repurchase

For the Tobit Repurchase Yield regression, the dependent variable is the repurchase yield that is calculated in a manner explicated in Exhibit 1. A positive (negative) coefficient sign indicates that the variable is positively (negatively) associated with the amount of repurchases. For the logit Repurchase Likelihood regression, the dependent variable is an index equal to 1 if a firm repurchases shares in year *t* (calendar year), or 0 otherwise.

Firm Size is measured as *log (1+market value of assets)* for year *t*. The market value of assets is calculated as book value of liabilities plus market value of equity. Dividends and the market value of equity are obtained from CRSP file while share repurchase and book value of asset are obtained through Compustat. The value of *t*-statistic is reported in the parenthesis.

Explanatory Variables	Predicted Sign	Tobit Repurchase Yield		Logit Repurchase Likelihood	
		Specification (1)	Specification (2)	Specification (1)	Specification (2)
Intercept	—	-7.643 (-8.15)***	-7.039 (-9.97)***	-1.257 (-10.40)***	-1.271 (-13.43)***
Service Length	Positive	0.267 (3.28)***	0.376 (3.95)***	0.032 (3.05)***	0.048 (4.11)***
Long Tenure	Negative	—	-1.110 (-1.89)*	—	-0.139 (-1.80)*
Compensation Ratio	Negative	-0.809 (-1.90)*	—	-0.147 (-2.72)**	—
Salary & Bonus	?	0.584 (3.97)***	—	0.095 (4.96)***	—
Executive Stock Options	Positive	—	0.034 (0.89)	—	0.011 (2.13)**
Director Shares	Positive	0.558 (6.04)***	—	0.094 (7.43)***	—
Stock Options Exercised	Positive	0.093 (2.75)**	0.142 (4.03)***	0.019 (4.39)***	0.026 (5.39)***
Long-term Incentive Plan	Positive	0.195 (3.76)***	—	0.035 (4.71)***	—
Restricted Shares held by CEO	Positive	—	0.058 (1.58)	—	0.023 (4.42)***
Common Shares held by CEO	Positive	—	0.131 (2.57)**	—	0.030 (4.59)***
Tangible Assets	?	-1.932 (-3.62)***	-1.779 (-3.11)***	-0.362 (-5.28)***	-0.397 (-5.22)***
Firm Age	Positive	0.902 (6.47)***	0.825 (5.65)***	0.164 (9.20)***	0.167 (8.65)***
Firm Size	Negative	-0.138 (-1.46)	0.136 (1.44)	0.044 (3.54)***	0.081 (6.26)***
Number of Observations		7101	6708	7101	6708
Percentage Correctly Predicted		—	—	61.4	60.3
Estimated Sigma		8.87	8.57	—	—
Log Likelihood		-9085.18	-7477.58	-5229.87	-4339.82
p-value of χ^2 of Log likelihood		< 0.001	< 0.001	< 0.001	< 0.001
Pseudo R^2		19.5%	33.7%	10.8%	10.3%

Asterisks *, **, *** indicate *t*-statistic significance at 10%, 5%, and 1% levels, respectively.

Table 3. Effect of Leverage on the Amount and the Likelihood of Share Repurchase

For the Tobit Repurchase Yield regression, the dependent variable is the repurchase yield that is calculated in a manner explicated in Exhibit 1. A positive (negative) coefficient sign indicates that the variable is positively (negatively) associated with the amount of repurchases. For the logit Repurchase Likelihood regression, the dependent variable is an index equal to 1 if a firm repurchases shares in year *t* (calendar year), or 0 otherwise.

Leverage is measured as the market value debt-capitalization ratio (i.e., debt/(debt + equity)). Consistent with the standard corporate finance practice, I use the market value of equity but the book value of debt. Leverage and market capitalization records are extracted from Compustat. The value of *t*-statistic is reported in the parenthesis.

Explanatory Variables	Predicted Sign	Tobit Repurchase Yield		Logit Repurchase Likelihood	
		Specification (1)	Specification (2)	Specification (1)	Specification (2)
Intercept	—	-7.851 (-8.62)***	-6.283 (-10.39)***	-1.068 (-9.03)***	-0.823 (-10.41)***
Service Length	Positive	0.273 (3.36)***	0.440 (5.18)***	0.049 (4.59)***	0.076 (6.63)***
Long Tenure	Negative	—	-1.246 (-2.12)**	—	-0.202 (-2.26)**
Compensation Ratio	Negative	-0.637 (-1.56)	—	-0.201 (-3.85)***	—
Salary & Bonus	?	0.4973 (3.70)***	—	0.1224 (6.92)***	—
Executive Stock Options	Positive	—	0.046 (1.22)	—	0.017 (3.42)***
Director Shares	Positive	0.555 (6.04)***	—	0.110 (8.66)***	—
Stock Options Exercised	Positive	0.072 (2.12)**	0.142 (4.04)***	0.014 (3.26)***	0.025 (5.31)***
Long-term Incentive Plan	Positive	0.190 (3.66)***	—	0.037 (5.02)***	—
Restricted Shares held by CEO	Positive	—	0.071 (1.97)*	—	0.031 (6.08)***
Common Shares held by CEO	Positive	—	0.144 (2.93)***	—	0.037 (5.86)***
Tangible Assets	?	-1.753 (-3.21)***	-1.516 (-2.59)**	-0.209 (-3.00)***	-0.239 (-3.09)***
Firm Age	Positive	0.874 (6.39)***	0.899 (6.34)***	0.191 (10.88)***	0.211 (11.19)***
Leverage	Negative	-1.623 (-2.51)**	-1.365 (-1.96)*	-0.756 (-9.15)***	-0.733 (-7.99)***
Number of Observations		7074	6684	7074	6684
Percentage Correctly Predicted		—	—	62.5	61.0
Estimated Sigma		8.90	8.59	—	—
Log Likelihood		-9058.85	-7455.79	-5175.23	-4311.53
p-value of χ^2 of Log likelihood		<0.001	<0.001	<0.001	<0.001
Pseudo R^2		19.8%	33.9%	11.9%	10.8%

Asterisks *, **, *** indicate *t*-statistic significance at 10%, 5%, and 1% levels, respectively.

Table 4. The Effect of Investment Opportunities on the Amount and the Likelihood of Share Repurchase

For the Tobit Repurchase Yield regression, the dependent variable is the repurchase yield that is calculated in a manner explicated in Exhibit 1. A positive (negative) coefficient sign indicates that the variable is positively (negatively) associated with the amount of repurchases. For the logit Repurchase Likelihood regression, the dependent variable is an index equal to 1 if a firm repurchases shares in year *t* (calendar year), or 0 otherwise.

I use market-to-book value of asset as a proxy for the investment opportunity set. The market value of assets is calculated as book value of liabilities plus market value of equity. The market value of equity is obtained from CRSP file while book value of asset and liability are obtained through Compustat. The value of *t*-statistic is reported in the parenthesis.

Explanatory Variables	Predicted Sign	Tobit Repurchase Yield		Logit Repurchase Likelihood	
		Specification (1)	Specification (2)	Specification (1)	Specification (2)
Intercept	—	-7.498 (-8.11)***	-6.167 (-10.07)***	-1.077 (8.97)***	-0.894 (-11.10)***
Service Length	Positive	0.238 (2.95)***	0.399 (4.74)***	0.035 (3.36)***	0.061 (5.29)***
Long Career	Positive	—	-1.209 (-2.07)**	—	-0.174 (-2.26)**
Compensation Ratio	Positive	-0.764 (-1.86)*	—	-0.213 (-4.08)***	—
Salary & Bonus	?	0.479 (3.58)***	—	0.120 (6.83)***	—
Executive Stock Options	Positive	—	0.054 (1.44)	—	0.019 (3.79)***
Director Shares	Positive	0.528 (5.78)***	—	0.100 (7.89)***	—
Stock Options Exercised	Positive	0.091 (2.73)**	0.156 (4.51)***	0.022 (4.98)***	0.032 (6.81)***
Long-term Incentive Plan	Positive	0.185 (3.58)***	—	0.0369 (4.96)***	—
Restricted Shares held by CEO	Positive	—	0.064 (1.77)*	—	0.028 (5.58)***
Common Shares held by CEO	Positive	—	0.145 (2.97)***	—	0.041 (6.50)***
Tangible Assets	?	-2.315 (-4.25)***	-2.002 (-3.42)***	-0.371 (3.31)***	-0.390 (-5.01)***
Firm Age	Positive	0.833 (6.12)***	0.863 (6.12)***	0.175 (10.04)***	0.196 (10.46)***
Investment Opportunity	Negative	-4.599 (-2.61)**	-3.646 (-2.07)**	-0.497 (2.26)**	-0.4.2 (-1.77)*
Number of Observations		7013	6672	7013	6672
Percentage Correctly Predicted		—	—	61.4	60.5
Estimated Sigma		8.89	8.56	—	—
Log Likelihood		-9084.38	-7477.39	-5234.65	-4359.03
p-value of χ^2 of Log likelihood		< 0.001	< 0.001	< 0.001	< 0.001
Pseudo R^2		19.5%	33.7%	10.7%	9.9%

Asterisks *, **, *** indicate *t*-statistic significance at 10%, 5%, and 1% levels, respectively.

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Emerging Market Stocks: Higher Returns But at What Risk

George S. Swales, Jr., John S. Bowdidge and C. Edward Chang

Introduction

In the past two years, returns on many U.S. stocks have been flat or negative. Movement of most major indices has been within a comparatively narrow range. The Dow Jones Industrial Average (DJIA), for example, has repeatedly vacillated between 10,100 and 10,700. Increasing oil prices and interest rates, the war in Iraq, and slow economic growth have left restless investors uncertain about their future asset allocation and investment decisions. Anemic returns have left many investors in a quandary. This uncertainty has resulted in asking others where to invest money to reap higher returns, while at the same time exercising caution and recognizing the advantages of diversification for portfolios.

Much has been written about the benefits and risks of international investing. [Odier and Solnik, 1993; Solnik, 1995] Including foreign assets in a portfolio together with domestic securities can promote diversification. Such an approach may enhance portfolio returns, but expose the investor to significant financial and country risk. Under traditional valuation theory, changing exchange rates, together with capital gains and dividends, impact the total return on investment equation. In an attempt to increase portfolio returns, some investors venture beyond the confines of the familiar into the relative unknown of countries, whose economies and financial markets are emerging onto the world scene.

Emerging markets may offer an attractive investment alternative to investors who practice active portfolio management. Is there a relationship between an emerging market country's economic output and its markets returns? Are returns on these equities comparable with U.S. stocks? How variable are these returns and should investors include emerging market stocks in a portfolio? These questions serve as the guideposts for this exploratory research.

Literature Review

Investment risks inherent in emerging markets are plenty. External and internal events can cause, at times, drastic changes to a country's economy and its financial markets. Changing political climates, economic circumstances, budget deficits, supply and demand for commodities, inflation and interest rates can all impact economic and financial market growth rates of a given country.

In any given year, country events can cause a wide variation of economic output and stock market return growth rates in emerging market countries. In a similar manner, when

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investors use fundamental analysis to determine intrinsic value, a nation's economy can be a critical element in determining industry performance. [Bodie, Kane and Marcus, 2005]

There are many meanings of the term "emerging markets." One definition focuses on investments and defines emerging markets as markets of less developed countries that potentially offer investors high returns, but are also markets fraught with high risks. [Jones, 2000]

International diversification can reduce the risk of a portfolio by as much as half, but as recent data show, correlations across markets have increased. [Bodie, Kane and Marcus, 2005; Longin and Solnik, 1995; Longin and Solnik, 2001] As a result, international diversification may have limited value, especially if asset returns are closely related.

Investors, wanting to increase the anemic returns on portfolios, may want to research emerging market stocks and bonds. Limited exposure to emerging markets can enhance portfolio performance, but returns on selected equities can be volatile. Asset allocation, through assigning different weights to selected equities based on returns, can provide substantial benefits. [Chong, 2004; Odier and Solnik, 1993] With the average Price-Earnings (PE) ratio currently around ten, some writers point out these stocks look like bargains and emerging equity securities could have above-average performance in the next decade. [Economist, 2004] With "baby boomers" retiring and selling equity holdings, future buyers will come from developing countries and provide support for the developed world's stock markets. [Burton, 2005]

Emerging market bonds, however, exhibited higher returns over the past five years than equities and offer the added feature of broader portfolio diversification. [Tan, 2004] Diversification of emerging country stocks and bonds is a balanced approach that can maximize returns, while controlling and managing risk. [Hoguet, 2004]

Investors may want to invest in mutual funds to diversify portfolios. A recent study notes that including emerging market equities in a diversified portfolio enlarges the efficient set of assets for investments, but concludes using aggregate diversified index funds of these equities does not improve portfolio performance. Country and stock selection strategies should be used in a global portfolio if the investor wants to achieve enhanced performance. [Nuno, 2004] Investing in mutual funds has resulted in several global emerging market funds producing positive absolute returns, albeit with a wide divergence of returns. [Citywire, 2005] The increased risk has resulted in a premium being placed on high-risk assets. [Ferliel, 2005] In the aggregate, emerging markets have increased their returns about 40% in the past year, with fast-growing countries exhibiting strong economies, trade surpluses and investment-grade bond ratings. [Landis and Anderson, 2005]

Other investors may like the benefits offered by Exchange-Traded-Funds (ETFs). ETFs offer diversification, relatively low cost when compared with mutual funds, tax benefits, and trade much like a stock so the investor has more control over the timing of investment decisions. ETFs are now appearing in the portfolios of some investment managers. [Landis and Anderson, 2005] MSCI Emerging Market Index Fund ishares, administered by Barclays Global Fund

Advisors, attempts to replicate the price and yield performance of MSCI Emerging Markets Free Index. Eight of their top ten holdings are international ADRs. [AMEX, 2005]

The literature search highlights several questions. Is there a relationship between a country's GDP and its markets return? How have stock market indexes for a selected group of emerging market countries performed over time in comparison with a U.S. stock index? How variable are these returns? Can including emerging market securities in a portfolio reduce risk? This research seeks to answer these questions.

Methodology

The researchers selected indices from sixteen international countries and the United States for analysis. These countries represent a cross-section of emerging markets in Latin America, the Middle East and Asia.

Gross Domestic Product (GDP) and market return growth data for these countries for 2000 through 2004 were gathered. Pearson Product Moment Correlation coefficients were then calculated to determine the relationship between GDP and stock return data.

To focus on stock returns for each of the sixteen emerging market countries, year-over-year changes in equity market data were gathered for the 2000 through 2004 time period. Means and standard deviations were calculated as were Pearson Product Moment Correlation coefficients. Results are discussed below.

Results

Table I shows selected emerging market country GDP growth rates and their respective change in stock market returns for the most recent year available at the time this research was conducted, 2004. The data in the Table indicates all countries selected for this study had positive increases in GDP and stock returns, which is unusual. Eleven of the sixteen emerging market countries had GDP growth rates higher than the United States. All of the emerging market countries had higher market returns than the 9.10% S&P 500 return.

If Table I were expanded to cover the five year period, a wide variation in both measures among the countries selected for this research would be evident. Over the five year time period, many countries displayed negative GDP and/or stock return data. Thus,

higher growth in GDP is not necessarily reflected in positive stock returns or returns of the same magnitude and vice versa.

Table II displays Pearson Product Moment Correlation coefficients between GDP growth rates and stock market returns for each of the sixteen emerging market countries for the five year time period. Inverse associations between GDP growth and stock market returns listed in local

currency were found for ten of the sixteen countries studied. When returns were expressed in dollars, positive associations between GDP growth and stock market returns were calculated for ten countries. While many of the calculated associations between the variables were large, only Egypt's negative associations were statistically significant at the .05 level.

The aggregate Pearson Product Moment Correlation coefficients between all sixteen emerging market country's GDP growth and their respective equity market returns in local currency and dollar terms for 2000 through 2004 are displayed in Table III. An inverse relationship was found to exist between GDP growth rates and market returns in local currency in each of the five years studied. The association between GDP growth and market returns in dollar terms, however, varied by year: positive in 2002 and 2003, but negative in 2000, 2001 and 2004. This later finding shows the impact currency exchange rates had on market returns. The relationship between GDP growth rate and local currency market return was statistically significant at the .05 level in 2001 and 2002.

Table IV shows the mean and standard deviation data for the sixteen emerging market countries and the DJIA for the United States. Investors in many countries experienced negative equity returns in 2000, 2001, and 2002. The number of countries with negative equity returns, however, declined in 2003. Returns for the sample were positive for all selected countries and the United States in 2003 and 2004.

The mean returns over the five-year period for each emerging market country ranged from a low of 0.62% in the Philippines to 51.11% in Venezuela. Five countries had lower standard deviation of returns than the Philippines. One country had a higher standard deviation of returns than Venezuela. The lowest and highest standard deviations of returns were 15.14% in South Africa and 75.74% in Egypt, respectively. The mean and standard deviation of returns for the DJIA over that time period were lower than any of the emerging market countries studied, with an exception of standard deviation in South Africa.

Table V shows the mean return Pearson Product Moment Correlation coefficients for each of the sixteen countries studied and the DJIA. The weakest and strongest association of mean returns over the five year period is between the USA DJIA and Columbia and Israel, respectively. Statistically significant correlations at the .05 level were found to exist between the returns of the United States and the following emerging equity markets: Brazil, Chile, Israel and Venezuela.

Conclusions

There is ample evidence that investing in emerging markets can be risky. Many factors, some of which a specific country or region may have little control over, can readily affect economic and investment returns. Authors of this research found there can be a wide variation in GDP growth between different countries in any given year. In addition, equity returns of these countries may not be always associated with economic activity and also display wide variation. Assessing financial and country risk prospects will help the investor make appropriate long-term investment, asset allocation, and portfolio selection decisions.

Nevertheless, investors continue to search world-wide for investments that can enhance the value of their holdings. This research found that portfolio returns can be increased by carefully selecting and adding emerging market equities and bonds into the asset allocation mix. It has been shown that including low correlation assets in a portfolio can reduce risk. Although this could be done by individuals, lack of resources and information may lead some investors to seek mutual funds or ETFs to further diversify holdings.

Investors can increase their portfolio returns. In some years, returns on emerging market equities exceed (at times greatly) domestic investments. Emerging financial markets may exhibit strong growth in coming years. The growth potential of these markets is recognized, but investors should also be aware of the risks involved in ownership of these securities. Through active investment management, inclusion of emerging country equities in a portfolio can reduce total risk, while increasing aggregate return.

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Table I
Emerging Markets and United States
GDP Growth Rates and Stock Market Returns: 2004

Country	GDP Growth (%)	Stock Market Return (%)	
		In Local Currency	In US Dollar
Argentina	8.30	27.50	26.00
Brazil	6.10	17.50	25.60
Chile	6.80	21.90	28.50
Columbia	2.40	87.00	114.80
Czeck Republic	3.60	54.80	76.70
Egypt	4.30	102.40	100.30
Hungary	3.70	54.30	77.30
India	7.40	12.40	17.40
Indonesia	5.00	45.10	31.10
Israel	3.40	17.90	19.20
Mexico	4.40	46.80	47.40
Philippines	6.30	26.60	24.90
Poland	4.80	25.20	57.10
South Africa	3.80	21.20	43.60
Turkey	4.50	33.90	39.10
Venezuela	15.80	34.20	50.80
USA (S&P 500)	4.00	9.10	9.10

Source: Compiled from data in *The Economist*, January 1-7, 2005.

Table II
Emerging Market Countries
Pearson Product Moment Correlation Coefficients: 2000-2004
GDP Growth Rates and Stock Market Returns

Country	In Local Currency	In US Dollar
Argentina	-0.0184	0.7068
Brazil	-0.5352	-0.4938
Chile	0.0435	0.0231
Columbia	-0.2897	-0.0896
Czeck Republic	0.4055	0.3795
Egypt	-0.9490*	-0.8853*
Hungary	-0.4672	-0.5471
India	0.7173	0.7147
Indonesia	-0.1558	-0.3299
Israel	0.2755	0.3438
Mexico	-0.3479	-0.3733
Philippines	0.4404	0.3983
Poland	0.4920	0.5437
South Africa	-0.6235	0.1127
Turkey	-0.4979	0.0958
Venezuela	-0.4819	0.4776

* Significant association at the .05 level

Table III
Emerging Market Countries
Pearson Product Moment Correlation Coefficients: 2000-2004
GDP Growth Rates and Stock Market Returns (n=16)

Year	In Local Currency	In US Dollar
2000	-0.2883	-0.2519
2001	-0.7025*	-0.0896
2002	-0.6932*	0.4112
2003	-0.4303	0.2812
2004	-0.2806	-0.2969

* Significant association at the .05 level

Table IV
Emerging Markets and United States Equity Return Data
Yearly Performance 2000-2004

Country	2004	2003	2002	2001	2000	Mean	SD
Argentina	28.30%	104.20%	77.70%	-29.10%	-24.30%	31.36%	59.62%
Brazil	17.80%	97.30%	-17.00%	-11.00%	-10.70%	15.27%	47.81%
Chile	21.30%	48.50%	-15.60%	9.10%	-3.00%	12.06%	24.57%
Columbia	86.20%	61.70%	54.00%	39.60%	-28.60%	42.60%	43.21%
Czeck Republic	56.60%	43.10%	16.80%	-17.50%	-2.30%	19.32%	30.75%
Egypt	105.30%	116.70%	1.80%	-30.50%	-42.90%	30.10%	75.74%
Hungary	57.20%	20.30%	8.90%	-9.20%	-11.10%	13.23%	27.80%
India	13.10%	72.90%	3.50%	-17.90%	-20.70%	10.20%	37.83%
Indonesia	44.60%	62.80%	8.40%	-5.80%	-38.50%	14.29%	40.31%
Israel	19.00%	60.70%	-25.60%	-6.90%	1.50%	9.75%	32.70%
Mexico	46.90%	43.60%	-3.90%	-13.00%	-21.60%	10.39%	32.45%
Philippines	26.40%	41.60%	-12.80%	-21.80%	-30.30%	0.62%	31.55%
Poland	24.60%	33.80%	3.30%	-33.50%	1.80%	6.01%	25.99%
South Africa	21.90%	12.00%	-11.20%	26.50%	2.80%	10.40%	15.14%
Turkey	34.10%	65.00%	-14.00%	64.10%	-32.30%	23.38%	44.72%
Venezuela	34.90%	177.00%	22.00%	-3.70%	25.40%	51.11%	71.81%
USA (DJIA)	3.20%	28.40%	-16.80%	-7.10%	-6.80%	0.30%	15.41%

Source: Compiled from data in *The Wall Street Journal*, "Year in Review," January 2001-2005.

Table V
Emerging Equity Market Return
Correlation Coefficients with the DJIA

Country	Correlation Coefficient
Argentina	0.4999
Brazil	0.9795*
Chile	0.9707*
Columbia	0.3190
Czeck Republic	0.5812
Egypt	0.7771
Hungary	0.3770
India	0.8793
Indonesia	0.7354
Israel	0.9940*
Mexico	0.7441
Philippines	0.8380
Poland	0.6709
South Africa	0.3622
Turkey	0.6161
Venezuela	0.9216*
USA (DJIA)	1.0000*

* Significant association at the .05 level

FINANCE AND INTERNATIONAL BUSINESS STUDENTS AND THEIR KNOWLEDGE OF THE EURO

Ralph A. Pope and Ken Chinen

The implementation of the Euro in 1999—a currency that rivals the dollar and the world's second most important reserve currency—has had a major impact on the international currency market. From its initial price on January 1, 1999, of one Euro = $1.17, the Euro lost value rapidly. By October of 2000, one Euro was approximately $.82 at its lowest point. Since that time, the Euro strengthened, surpassing the $1.30 mark. At this writing one Euro = $1.23.

The GDP of the 12 countries in the Eurozone (the European Monetary Union) equals that of the United States. In 2007, the first of the ten newest countries in the European Union (which now consists of 25 nations) should start using the Euro. Other attempts have been made by several countries adopting a single currency. All have failed without the structure of a fully integrated political union (as Germany in the 1800s and the United States). If the Euro is successful, it will be the largest and uniquely successful undertaking of this kind in history.

Objective of the Study

The objective of this study is to investigate what business students (primarily Finance and International Business students) know about the Euro. The survey was given to both undergraduate finance students (the second course in Financial Management and the first course in International Business) and graduate students (both in Finance and in International Business). The survey was given the first week of the fall semester 2005 before the Euro was discussed in any of the classes. Altogether, approximately 227 students participated in this study.

This study is the repeat of a study previously undertaken in the fall of 2000 when the Euro equaled approximately $.85. Some of the wording of the instrument has been changed so that the survey corresponds with the current year 2005. At the time this survey was distributed to students, 1 Euro equaled between $1.21 and $1.25.

Content of Study

Some of the areas that will be explored consist of what is the Euro; where the Eurozone is geographically located at the present time; how many countries use the Euro at the present time. Students were also asked what is the approximate price of the Euro with respect to the dollar at the time the survey instrument was administered.

This study also explores the student's knowledge of other monetary questions. For example, students were asked whether nations that use the Euro must also give up the use of their

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own currencies, such as the French franc, the mark, etc. Students were also asked if the nations that use the Euro must also give up the use of their own monetary policy as an economic tool. They were also asked the purpose of the European Central Bank.

Some of the classification variables used in this study is the student's major, the student's grade point average (GPA) and whether the student is an undergraduate student or a graduate student. The student's gender was also used.

Research Design in Brief

Data is being analyzed primarily by using Chi-square and t tests. The survey instrument consists of 13 questions and statements. Further analysis was done with the current data set. Comparisons were made with respect to the results of the present data set and the study performed in the fall of the year 2000. Since the wording of the surveys administered in 2000 and 2005 differed somewhat from each other, no side to side tables are presented. The questionnaire was administered at one regional university, California State University, Sacramento. This is a multicultural university in northern California. A future study will include several universities in the United States. The survey used is included in the Appendix.

What is the Euro?

Students were asked to continue the statement "The Euro is . . . ." The students were allowed to select from the four choices shown in the three following tables.

Table I
What is the Euro, By Major

	Finance		IB		Other Business Major	
	Number	**%**	**Number**	**%**	**Number**	**%**
A new currency in Russia	2	2.2	1	4.2	0	0
A new currency in several countries in Western Europe	72	80.0	21	87.5	91	82.0
A new currency in Eastern Europe	11	12.2	1	4.2	14	12.6
I do not know	5	5.6	1	4.2	6	5.4
Total	90	100%	24	100%	111	100%
Pearson Chi-square	*Value = 4.936*		*Df = 6*		*Sig. = .552*	

At least 80% of the respondents in all of the groups knew that the Euro is the new currency in several countries in Western Europe. In the study presented in the Review of the Academy of Finance (March 2001), the results are very similar. In that study, 74% of Finance majors, 87% of IB majors, and 81.2% of Other Business Majors indicated the correct answer.

Also, when the responses were divided into two groups by gender, a T-test showed no significant difference between males and females.

This question was also analyzed to determine the relationship of student GPA with respect to the correct answer.

Table II
What is the Euro, By GPA

	< 3.2		> 3.2	
	Number	**%**	**Number**	**%**
A new currency in Russia	1	1.0	1	1.0
A new currency in several countries in Western Europe	79	77.5	89	87.3
A new currency in Eastern Europe	14	13.7	9	8.8
I do not know	8	7.8	3	2.9
Total	102	100%	102	100%
Pearson Chi-square	*Value = 3.955*	*Df = 3*	*Sig. = .266*	

A T-test was performed on the correct answer with data divided into two groups: those with a GPA < 3.2 and those with a GPA ≥ 3.2. The results were significant at the .05 level of significance, with students having higher GPAs being correct more frequently.

This question was also analyzed to compare the responses of undergraduate students and graduate students.

Table III
What is the Euro, By Undergraduate/Graduate

	Undergraduate		Graduate	
	Number	**%**	**Number**	**%**
A new currency in Russia	3	1.7	0	0
A new currency in several countries in Western Europe	137	77.8	47	95.9
A new currency in Eastern Europe	24	13.6	2	4.1
I do not know	12	6.8	0	0
Total	176	100%	49	100%
Pearson Chi-square	*Value =8.736*	*Df = 3*	*Sig. = .033*	

A T-test was performed with respect to the correct answer. The result was found to be significant at the .05 level of significance. That is, graduate students were significantly more likely to select the response that the Euro is a new currency in several countries in Western Europe than undergraduates. Although, more than three quarters of each group selected the correct answer.

The Current Value of the Euro

Students were asked "What is the present approximate value of the Euro with respect to the dollar?" The eight choices that the students could select from are shown below. The data is classified by major. The survey was given when the Euro was between $1.22 and $1.24. The researchers deemed that a "correct" answer for this survey would be either 1 Euro = $1.20 or 1 Euro = $1.30. Using this as the "correct" range, Finance majors were correct approximately 46.7% of the time, while 15.2% had no idea of what was considered correct. International Business (IB) majors, while consisting of only 24 students were correct 50% of the time (only 8.3%--that is two IB students—had no idea). With respect to "Other Business Majors," only 28.2% answered the question correctly with 18.2% having no idea.

Table IV
Current Value of the Euro, By Major

	Finance		**IB**		**Other Business Major**	
	Number	**%**	**Number**	**%**	**Number**	**%**
1 Euro = $1.50	23	25.0	6	25.0	28	25.5
1 Euro = $1.30	22	23.9	5	20.8	12	10.9
1 Euro = $1.20	21	22.8	7	29.2	19	17.3
1 Euro = $1.10	4	4.3	2	8.3	9	8.2
1 Euro = $1.00	2	2.2	1	4.2	3	2.7
1 Euro = $.95	0	0	0	0	4	3.6
1 Euro = $.85	6	6.5	1	4.2	15	13.6
I do not have any idea	14	15.2	2	8.3	20	18.2
Total	92	100%	24	100%	110	100%
Pearson Chi-square	*Value = 17.2*		*Df = 14*		*Sig. = .246*	

A similar question was asked in the survey which appeared in the Review of the Academy of Finance (March 2001). At the time when that survey was administered (Fall 2000), 1 Euro = $.85. The answer was deemed correct if the student answered 1 Euro = $.95 or 1 Euro = $.85. In that study 48.1% of the Finance majors were correct and 40% of the IB majors were correct. With respect to Other Business Majors, 37.2% were correct.

The number of students that "had no idea" was generally higher. With respect to Finance majors 27.3% had no idea of the correct answer, 6.7% of the IB majors had no idea, and 38.6% of Other Business Majors had no idea.

Giving Up the Use of a Country's Currency

Students were presented with the following statement:

"Nations that use the Euro as its currency gave up the use of their own currency, such as the French franc, the mark, etc."

Three responses followed:
a) True
b) False
c) I do not know.

Again students were grouped into the following majors: Finance, International Business, and Other Business Majors. The responses are shown below:

Table V
Nations Will Give Up the Use of Their Own Currency, By Major

	Finance		IB		Other Business Major	
	Number	**%**	**Number**	**%**	**Number**	**%**
True	58	63.0	12	50.0	77	69.4
False	22	24.0	12	50.0	21	18.9
I do not have any idea	12	13.0	0	0	13	11.7
Total	92	100%	24	100%	111	100%
Pearson Chi-square	*Value = 12.12*		*Df = 4*		*Sig. = .016*	

At least 50% of each of the three groups found that statement to be true. Also, when dividing the responses by gender, using a T-test, no significant difference was found between males and females.

Loss of a Nation's Monetary Policy

Students were presented with the following statement:

"Nations that use the Euro as its currency gave up the use of their own monetary policy as an economic tool."

This statement was analyzed by the student's major, by the student's GPA (< 3.2; ≥ 3.2), and whether the student was an undergraduate or graduate student. The last two of these are used as a proxy for intelligence.

Three tables are shown below depicting these three. The data for the last two tables were also analyzed by t-tests.

In Table VI, less than 50% of each group stated that nations that use the Euro as their currency would give up the use of its monetary policy as an economic tool. Approximately 61% of IB students stated that those countries using the Euro will **not** give up their monetary policy, while 35% of Finance students indicated the same answer.

Table VI
Loss of a Nation's Monetary Policy, By Major

	Finance		IB		Other Business Major	
	Number	**%**	**Number**	**%**	**Number**	**%**
Will give up monetary policy	40	44.0	6	26.1	48	43.2
Will not give up monetary policy	32	35.2	14	60.9	40	36.0
I do not know	19	20.9	3	13.0	23	20.7
Total	91	100%	23	100%	111	100%
Pearson Chi-square	*Value = 5.584*		*Df = 4*		*Sig. = .232*	

Placing the data into two groups (GPA < 3.2; GPA ≥ 3.2); those that answered correctly ("will give up monetary policy") was significantly different at the .01 level of significance when performing a T-test. That is, a student's GPA is a significant factor in predicting if the student answered the question correctly.

Table VII
Loss of a Nation's Monetary Policy, By GPA

	< 3.2		> 3.2	
	Number	**%**	**Number**	**%**
Will give up monetary policy	34	33.3	54	52.4
Will not give up monetary policy	44	43.1	33	32.0
I do not know	24	23.5	16	15.5
Total	102	100%	103	100%
Pearson Chi-square	*Value = 7.712*	*Df = 2*	*Sig. = 0.21*	

Table VIII
Loss of a Nation's Monetary Policy, By Undergraduate/Graduate

	Undergraduate		Graduate	
	Number	**%**	**Number**	**%**
Will give up monetary policy	65	36.9	29	59.2
Will not give up monetary policy	71	40.3	15	30.6
I do not know	40	22.7	5	10.2
Total	176	100%	49	100%
Pearson Chi-square	*Value =8.497*	*Df = 2*	*Sig. = .014*	

When the data was analyzed with respect to undergraduate vs. graduate level status, a T-test was significant at the .05 level. Graduate students were more likely to answer the question correctly than undergraduates.

Responses were also divided into two groups by gender. A T-test showed no significant difference between the two groups of responses.

The Number of Countries in the Eurozone

When students were asked the number of countries in the Eurozone, less than 40% of any major answered the question correctly (i.e. 12 countries in the Eurozone).

Table IX
Number of Countries in the Eurozone, By Major

	Finance		IB		Other Business Major	
	Number	**%**	**Number**	**%**	**Number**	**%**
5	0	0	1	4.2	6	5.4
8	20	22.0	5	20.8	23	20.7
12	27	29.7	9	37.5	29	26.1
15	14	15.4	4	16.7	10	9.0
20	2	2.2	1	4.2	3	2.7
None of the above	8	8.8	1	4.2	9	8.1
I don't know	20	22	3	12.5	31	27.8
Total	91	100%	24	100%	111	100%
Pearson Chi-square	*Value = 12.299*		*Df = 14*		*Sig. = .582*	

Thirty-seven percent of IB students answered the question correctly, while approximately 30 percent of Finance majors answered this question correctly.

These answers are similar to the study performed in the Fall of 2000 when 11 countries were in the Eurozone. In that survey, 40 percent of IB students answered the question correctly, while 27.3 percent of Finance majors answered correctly.

The European Central Bank

Students were also asked the following question:

"With the introduction of the Euro, the European Central Bank will be the dominant monetary authority in the area using the Euro."

Students could answer: a) True
b) False
c) I do not know

Table X
The European Central Bank, By Major

	Finance		IB		Other Business Major	
	Number	**%**	**Number**	**%**	**Number**	**%**
True	62	67.4	13	59.1	62	55.9
False	9	9.8	2	9.1	14	12.6
I do not have any idea	21	22.8	7	31.8	35	31.5
Total	92	100%	22	100%	111	100%
Pearson Chi-square	*Value = 3.053*		*Df = 4*		*Sig. = .549*	

About 67 percent of Finance majors answered correctly as well as 59 percent of IB students. Other Business Majors answered correctly 56 percent of the time. This is a marked increase from the previous Fall of 2000 survey, where the correct responses were 62% (finance), 47% (IB), and 43% (Other Business Majors).

When responses to the question were divided into two groups by gender, a T-test found no significant difference between the responses of females and males.

Conclusion

The purpose of this study is to ascertain students' knowledge of the Eruo and the Eurozone. A similar—although not identical survey—was administered to students five years ago.

In that time period, students did not demonstrate any dramatic differences in their responses. A large number of students did know that the Euro was a new currency in several countries in Western Europe. The results to the question which asked for the current value of the Euro were similar to the survey administered five years ago. Fifty to 69 percent of majors knew that nations would give up the use of their own currencies if they became members of the Eurozone. Less than 50 percent of each major realized that a nation in the Eurozone would give up its own monetary policy. Responses to the European Central Bank being the dominant monetary authority in the Eurozone were somewhat higher than the survey given five years ago.

Also, the study suggested that there was no significant difference between the responses of males and females. Finally, when responses were analyzed by GPA and undergraduate vs. graduate status, a significant difference was found.

SURVEY

YOUR KNOWLEDGE OF THE EURO

1. **What is your major?**
   a. Finance.
   b. International Business.
   c. Other Business Major. Please state: _____
   d. Other (Non-Business Major). Please state: _____

2. **The Euro:**
   a. Is a new currency used in the former Soviet Union.
   b. Is a new currency in several countries in Western Europe.
   c. Is a new currency in Eastern Europe.
   d. I do not know.

3. **What is the present approximate value of the Euro with respect to the dollar? (Select the best approximate answer. The following range may be a helpful guide: Select any answer from 1 Euro = $.50 to 1 Euro = $2.00.**
   a. 1 Euro = $_____
   b. I do not have any idea.

4. **What is the present approximate value of the Euro with respect to the dollar?**
   a. 1 Euro = $1.50.
   b. 1 Euro = $1.30.
   c. 1 Euro = $1.20
   d. 1 Euro = $1.10.
   e. 1 Euro = $1.00.
   f. 1 Euro = $.95.
   g. 1 Euro = $.85.
   h. I do not have any idea.

5. **Approximately how many countries are currently participating in the Euro, or Eurozone?**
   a. 5
   b. 8
   c. 12
   d. 15
   e. 20
   f. The correct number of countries is not stated above.
   g. I do not know.

6. **Please state a number for question #5 above: _____. It does not have to be one of the answers given.**

7. **Nations that use the Euro as its currency gave up the use of their own currency, such as the French franc, the mark, etc.**
   a. True.
   b. False.
   c. I do not know.

8. **Nations that use the Euro as its currency gave up the use of their own monetary policy as an economic tool.**
   a. True.
   b. False.
   c. I do not know.

9. **With the introduction of the Euro, the European Central Bank will be the dominant monetary authority in the area using the Euro.**
   a. True.
   b. False.
   c. I do not know.

10. **Were you born in the United States?**
    a. Yes, I was born in the United States.
    b. No, I was not born in the United States.

11. **What is your gender?**
    a. Male.
    b. Female.

12. **Are you fluent in a language other than English?**
    a. Yes.
    b. No.

13. **What is your approximate G.P.A.?**

    _____

Developing and Teaching an Online Course: Adventures in Cyberspace with Personal Finance Online

Eddie Ary

Introduction

Over the last several years, more universities have begun to offer at least some of their curriculum online. The Sloan Survey of Online Learning (Allen and Seaman, 2004), a survey of over 1,100 colleges and universities in 2003 and 2004, found that at least one online course was offered by around 90 percent of public colleges and universities, 89 percent of private, for-profit universities, and 53 percent of private, nonprofit universities. Over 60 percent of both public and private, for-profit institutions surveyed felt that online education was critical to their long-term strategy; almost 40 percent of private, nonprofit institutions regarded online education as a critical element of their long-term strategy.

The Sloan Survey of Online Learning found that almost 2,000,000 students were involved in online courses in the fall of 2003. The colleges and universities surveyed expected over 2,500,000 online students in the fall of 2004.

Many universities are offering online courses year round; others offer online courses only in the summer as a service to students, and as a method of retaining students who might otherwise take courses at other universities and transfer the classes. Often students would rather take summer school classes at their chosen university, but because of the need to work or for other reasons elect to attend a college or university near their home. Summer online courses enable universities to build the goodwill of such students and at the same time avoid the loss of much needed revenue.

The main purpose of this paper is to provide some suggestions for creating and delivering an online course based on a review of the literature as well as the author's personal experience in teaching a personal finance online course during the last three summers. The paper should be helpful to professors who are in the process of developing an online course, regardless of the subject matter. Professors already involved in online teaching may also find the paper beneficial.

Developing an Online Course

Meyen and Lian (1997) contend that "keys to online teaching are the course design, how the content is delivered, and how the instructor interacts with students as they progress through the course. However, course development is the most important of these." Cook and Dupras (2004) argue that "designing web-based learning involves more than simply putting together a colorful webpage."

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Effective online learning requires the teacher to carefully construct a program that integrates principles of active learning, motivation, and evaluation with creative Web design."

Before trying to develop an online course, taking a course yourself should be considered. Caplan (2005) emphasizes that taking an online course, preferably one dealing with developing online instruction, is an invaluable experience. However, even if the course is not specifically oriented to online instruction, it will provide exposure to many of the same problems and challenges that students will face in the online course you eventually develop.

Because creating an online course requires hours and hours of work, it is important that online instructors have a great desire to teach online. It is obvious that the instructor should be computer literate and enjoy working with computers. The instructor also needs to be somewhat creative and able to provide directions that are easy to follow and understand. Due to the need to have the course completed before students actually begin work, the instructor must be a good planner and able to pay attention to detail.

Creation of an online course is enhanced by the use of a course management system (CMS) like Blackboard, Web CT, etc. The university where the author teaches makes a CMS called Educator available to all faculty. Through the use of a user name and password, the learning materials and other resources for personal finance online can be made available only to students who have paid for the course. In fact, after some problems with student payment for the course during the first summer it was offered, the author now only adds students to his online course after receiving notification from the Business Office that they have paid or made arrangements for payment.

A CMS makes it easy for the teacher of an online course to prepare online quizzes and provide links to the syllabus, class calendar, PowerPoint presentations, learning objectives, tutorials, and other course materials the instructor may desire to provide. Students also like the ability to be able to check their grades on assignments submitted. According to the 2004 survey of the Campus Computing Project (a survey of over 600 United States colleges and universities), 43 percent of classes at public universities were using CMSs compared to around 18 percent in 2000. CMS use at private universities was 47 percent of classes, up from 19 percent in 2000.

If possible, creators of online courses should be given a summer stipend for course development; but if the course is being developed during the regular school year, a stipend, a reduced course load, or both should be made available. Schifter (2004) in a survey of two-year colleges and four-year universities in 2002 found that only about 10 percent of faculty responding received time off to develop online courses. She found the average minimum and maximum overload pay for developing an online course was $1,620 and $2,740 respectively in 2002.

Following are some suggestions to consider in the process of developing an online course.

Learning Objectives

To help online students focus their study, learning objectives can be provided. As each chapter is introduced, the author asks students to view the learning objectives for the chapter before completing the reading assignment, enabling students to read more closely the sections of the chapter relating to the concepts the professor considers most important. Learning objectives are also provided for the mid-term and final exams; items on these exams are based on the learning objectives.

Orientation

Jarmon (1999) feels that the instructor of an online course should prepare a page providing hints for success covering such topics as time management, study skills, etc. He also suggests the creation of a Frequently Asked Questions page as a means of reducing questions received from students. Yang and Cornelious (2005) argue that "students must move from being more traditional passive classroom learners to more active online inquirers." They emphasize that "online learners must take more responsibility, adjust to a new climate, adjust to new context, synthesize ideas, know how to participate, apply ideas or concepts, and stimulate their curiosity."

Ethical Conduct

Since an online course offers more opportunities for cheating than a traditional course, the importance of ethical behavior should receive greater emphasis. The university where the author teaches has an Honor Code which must be signed by all students upon admission. Online personal finance students are reminded of the code and the importance of abiding by it. To reduce the impact of potential cheating on the course grade, the final exam (which must be taken on campus either during the summer or just before the start of the fall semester) accounts for about 45 percent of the total points for the course.

Technology

Fein and Logan (2003) emphasize that "simplicity, transparency, and reliability" are much more important in an online course than "bells and whistles." The professor must keep in mind that more than likely some students will have high speed internet access, but others will only have dial-up access. The time involved in downloading learning activities and other resources for the course should be considered. Students will become quite frustrated if they either cannot download course materials, or have a prolonged wait in gaining access to them. Professors who use PowerPoint presentations should provide a link to the Microsoft website where Power Point viewer software can be downloaded just in case some students do not have the software already installed on their computers. To hear audio presentations, Windows Media Player or compatible software is required.

The Textbook

In the absence of face to face classroom meetings, the textbook as a learning resource assumes increased importance. The textbook enables students to study offline and thus avoid continually staring at a computer monitor. Selection of a textbook for an online course (as in a traditional classroom setting) depends much on the desires and objectives of the professor; however, clarity of explanation, visual appeal, and ability to hold the attention of students are traits that are obviously necessary. Problems, exercises, and case studies that help the student apply the concepts being studied may assume increased importance in an online course since the professor may be pressed for time to personally develop them. The availability of PowerPoint presentations may be of concern to the online professor who does not desire to create them on his own. The student website provided by the publisher of the textbook may also prove useful.

Syllabus

The syllabus for an online course is not much different from that of a traditional course. In both settings, the syllabus should provide information about how students can contact the professor, course objectives, the textbook and other resources needed for the course, the grading scale and a breakdown of the total points for the course, exam and assignment make-up policy, and any other information the professor feels needs to be shared with students. In an online course, it is especially important to emphasize the importance of keeping up with work, preferably on a daily basis. However, the professor may find, especially in a summer online class when many students are working a full-time job, a need to allow students extra time to submit the required work for the week. For example, the author requires all work for a given week to be submitted by 11:50 p.m. on Sunday, allowing those who are working throughout the week to devote more time to the course on weekends. Points are deducted for work submitted late unless the student has a good reason for not being able to get the work completed on time.

Course Calendar

Having a course calendar for communicating the daily learning activities to students is of utmost importance. Using Microsoft Front Page, the author prepares a weekly calendar which lists the learning activities for each day of a week. The calendar is made as attractive as possible by including clip art relating to the topic under study on a given day. The calendar for each day lists the reading assignment, directions for taking the reading assignment quiz, links to any instructor prepared resources, as well as a link to any assignment to be submitted. A Thought for the Week relating to one of the major topics being studied is also posted at the beginning of the weekly calendar. A link to the weekly calendar is added to the course management system menu so that students can readily access it.

Online Reading Quizzes

Online instructors, like those in the traditional classroom, wrestle with the problem of motivating students to read the text. The author uses online reading assignment quizzes (they

are actually referred to as "Test Your Comprehension Exams") as a method of encouraging student reading. Each quiz is worth five points and normally consists of ten multiple-choice items. Quiz items are scrambled and selected by the CMS from a test bank developed by the author. Students are allowed to use their textbook in completing the quizzes and may take as much time as needed. When quizzes are submitted, they are automatically graded and posted to student records by the CMS. In an anonymous survey, only four of sixty-six students who took the author's online course during the summers of 2004 and 2005 felt that the online quizzes did not cause them to devote more attention to the textbook. One student said, "I had to pay attention while reading in order to do well on the quizzes and finish them more quickly." Another student exclaimed, "If I had not been held accountable for my studies by these quizzes, I probably wouldn't have worked so hard or tried to read as thoroughly."

Instructor Prepared Resources

Resources prepared by the instructor assume an important role in an online course. Since visual cues are not available to alert the teacher to the topics students do not comprehend, an effort must be made to anticipate such topics and prepare learning aids to enhance student understanding. This is fairly easy for instructors who have taught the course in a traditional classroom setting. Preparing such things as PowerPoint presentations, lectures for broadcast, tutorials, etc. make creating an online course very time consuming, but they are a very important ingredient in making the course a success. In fact, the author has found that the more resources made available to students, the less time spent in answering e-mail questions and the greater the overall satisfaction of students. Of course, the professor must make sure that resources prepared are of high quality. For example, posting ten to twenty pages of lecture notes used in a traditional classroom is not likely to be effective; breaking the notes down by topic and presenting them in small bites will make student utilization much greater.

Providing opportunities for students to test their comprehension of concepts is also important. Practice objective and problem exams (with answers provided at the conclusion of the exams) can help accomplish this objective.

Internet Sites

The Internet can be of tremendous help in creating online courses. Especially in personal finance, there are many excellent sites that can be used for developing learning activities. Below are just a few examples of how the web can be used for classroom assignments.

- Morningstar (www.morningstar.com) can serve as the source of information for ranking mutual funds.
- Yahoo Finance (quote.yahoo.com) and many other investments websites can be used for finding detailed information on stocks.
- The online web site of a local bank can be used for researching and choosing a checking account.

A professor wanting to utilize personal finance websites would find it beneficial to consult a paper by Corcoran (1998) which provides extensive information about websites that relate to various aspects of personal finance.

Exams

Students are more likely to cheat on online exams than on any other work graded in the course. To overcome this problem, some teachers require that the exams be proctored by the student's youth leader, pastor, high school counselor or teacher, or some other trustworthy person. However, using such a procedure adds to the time commitment of the course and is often an imposition on proctors. Other teachers make any online exam worth a relatively small part of the total points for the class. For example, the author gives an online mid-term exam worth 11 percent of the total points for the course. When students submit the exam, they are reminded that they are pledging that they did not use any references nor get help from any individual; in addition, they are promising to not share questions with any other member of the class. Some online instructors require students to come to campus to take the final exam. This partially defeats one of the major advantages of an online course (being able to do all the work from your home) but does make it more likely that no cheating will occur, as long as photo-identification is presented at the test center.

Olt (2002) suggests the following methods for helping to prevent cheating in testing: "disseminate a special username and password to students prior to the assessment being made available, make all assessments open-book, set time limits and number of permissible accesses, randomize questions from a question pool, and use courseware, such as WebCT to track the time, duration, and number of attempts that a student accesses the tests."

Delivering an Online Course

Sherry (1996) feels that "the most important factor for successful distant learning is a caring concerned teacher who is confident, experienced, at ease with the equipment, uses media creatively, and maintains a high level of interaction with students." Yang and Cornelious (2005) emphasize that online teaching tends to be student-centered while traditional education is often professor-centered. They view the online instructor as a "facilitator, mentor, and coach." Powers (2003) observes that success in teaching in the traditional classroom is no guarantee of success in teaching online. He observes, "There are dynamite classroom instructors who fail miserably online, and boring, lackluster, monotone classroom teachers whose online courses ring, whiz, and shine with learning. Teaching in the classroom and online require two totally different approaches to activity and task design for accomplishing learning objectives for the class."

Communication appears to be of extreme importance in teaching online. Ortiz-Rodriguez and her fellow researchers (2005) found in a survey of 214 students at a large university in the southeastern United States that communication was ranked as the number one factor determining the success of distance education courses. The students felt feedback was the most important factor in quality communication, specifically feedback in the form of prompt answers to questions and timely evaluation of assignments and tests.

Following are some suggestions for effective teaching of an online course.

Have a Meeting with Students Before the Course Begins

If at all possible, the teacher of an online class should meet with students before the course begins. This allows the professor to provide students with a preview of the course and answer any questions they may have. Some information that the teacher might consider providing to students (preferably both orally and in writing) follows:

- The tuition and refund policy as well as the last day to drop
- The textbook to be used in the course
- How to access the course, the syllabus, course calendar, etc.
- Exams and other forms of evaluation that will be utilized
- The office and home phone numbers of the instructor as well as information about how often the instructor will be checking and answering e-mail, and when he is likely to be online
- The importance of checking for announcements on a regular basis.

Encourage Communication

As was mentioned earlier, many students seem to feel that communication is the principal factor contributing to the quality of distance education. E-mail is the primary means of communication in many online courses so it is important that the online instructor answer student e-mails as quickly as possible. Because students expect and deserve prompt answers, the author tries to check e-mail at least three times per day. If two or three student e-mails indicate difficulty in understanding a particular concept, the professor may need to send an e-mail of explanation to the entire class.

Some instructors find discussion groups and chat rooms effective in promoting student to student and professor to student interaction. These forms of communication can be used as question-answer sessions, for discussion of a relevant topic, etc. Discussion groups and chat rooms will likely be more effective if they are structured by the instructor; otherwise, they may turn into simply visitation periods. A great advantage of such groups is that often students who would be intimidated to contribute to discussion in a traditional classroom feel free to join in the discussion. Many instructors count participation in discussion groups a part of students' grades.

Use the Announcement Feature of Your Course Management System

The teacher of an online personal finance course can reduce e-mail volume by posting announcements at the course site. Announcements can be used to provide a preview of the learning activities for the coming week, remind students of important dates, and clarify assignment instructions that appear to have been misunderstood by students.

Grade Submitted Assignments Promptly

Students will learn more if they receive feedback on their performance promptly. The author uses Microsoft FrontPage to prepare forms that enable students to type their answers online and submit their finished work to his e-mail address. If possible, the professor should

provide specific feedback to the student. Of course, the size of the class and the professor's concern for assignment security will influence the extent of feedback provided.

Offer Words of Encouragement

As in a traditional classroom setting, online students can benefit from words of encouragement from the professor. Write e-mails of praise to students who are doing really good work and staying on schedule, or perhaps even ahead of schedule. Express concern to students who are falling behind and ask if there are special circumstances that are to blame.

Let Your Personality Show

In interactions with students, let them know that you are human, not some robot conducting the course. Inject humor whenever possible to provide some comic relief to students who may not only be trying to keep up with their coursework, but perhaps working a part-time or full-time job as well. The author includes a link to jokes at intervals on the calendar; the jokes normally relate in some way to the topic under study. For example, there are tons of jokes on bankers and stockbrokers, as well as funny descriptions of auto accidents, humorous used car ads, etc. Of course, opportunities for injecting humor or in some other way letting your personality show, will often arise when replying to student e-mails, posting announcements, and providing feedback on graded assignments.

Modify the Course

As a professor teaches an online course, he will discover approaches that work effectively and those that do not. Students who have completed the course can also provide valuable feedback. Ask them to share their likes and dislikes, as well as suggestions for improving the course.

Fein and Logan (2003) urge online instructors to avoid the "in-the-can syndrome" (leaving the course unchanged over time). Just as companies must modify and improve their products and services over time, the online instructor should strive to make changes that will facilitate student learning. In addition, Cook and Dupras (2004) point out that the instructor of an online course must periodically check links to make sure that they still work, as well as update information (a very important aspect in a personal finance course).

Conclusion

Drawing from experience as an online instructor of personal finance and from the experiences of others, the author has presented some suggestions for developing and delivering an online course. As the number of universities offering online courses increases, more professors are likely to be asked to develop and teach an online course. Creating an online course requires many hours of work. Careful planning, patience, attention to detail, creativity, some knowledge of technology, and a desire to teach online are traits that are needed in course development.Compared to traditional classes, online courses put great responsibility on the student for learning. The instructor's role changes as well. Instead of

taking center stage, as often occurs in the face-to-face classroom, the professor becomes a guide and facilitator of learning; as Hiltz (1994) put it, the instructor must transform from "sage on the stage" to "resource in the wings." Instead of meeting with students on a set schedule, the online instructor interacts with students throughout the day. The written word assumes greater importance than the spoken word.

Despite the time involved in developing and teaching an online course, many professors have found the experience worthwhile and enjoyable--they, like the author, are teaching online and loving it!

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Do Students with Grades Curved in Mathematics Prerequisites Perform Better or Worse in Business Finance?

Chien-Chih Peng

Introduction

Business finance, the first required finance course for business majors, is arguably one of the most difficult courses in a typical business program. Successful performance in this course requires good quantitative and analytical skills developed from a background in mathematics, accounting, and economics, as well as an understanding of financial terminologies. For this reason, students are generally required to complete prerequisites in mathematics, accounting, and economics prior to enrolling in business finance.

Research studies have examined the determinants of student performance in the undergraduate business finance course. Didia and Hasnat (1998) find that aptitude as measured by cumulative grade point average (GPA), background as measured by average grades in accounting prerequisites, economics prerequisites and high school mathematics, maturity as measured by age, and effort as measured by hours of study are significant determinants of student performance in the introductory finance course. Borde, Byrd, and Modani (1998) find that gender, transfer status, cumulative GPA, hours of work, and average grade in prerequisite accounting courses are significant determinants of student performance in introductory corporate finance course. A recent study by Terry (2002) finds that student performance in the introductory corporate finance course is significantly related to gender, major, exam-type, grades in prerequisite classes, cumulative GPA and to whether the course is taken during the summer.

In light of the importance of the mathematics preparation, some studies focus on the relationship between the mathematics background and student performance in business finance. Ely and Hittle (1990) find that performance in business finance is improved by completing accounting courses but is not influenced by mathematical background. Cooley and Heck (1996) find that 80% of the faculty in the survey only cover six concepts in "much detail": present/future value of single sums and annuities, net present value, internal rate of return, stock valuation and bond valuation. Those six finance concepts require the use of basic mathematical skills. Pritchard, Romeo, and Saccucci (2000) find that student test scores in basic algebra and basic computation skills are positively correlated with student performance in the principles of finance course. Marcal and Roberts (2001) find that students who satisfy the business statistics requirement receive higher grades than those who do not.

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Some studies provide suggestions about how to improve student performance in business finance. Clark and Webster (1995) investigate whether addition in-class time specifically designated to reinforce quantitative work would improve student performance in the introductory finance course. They find that adding instruction time by one credit hour per semester improves performance for students performing at average or below-average levels, but does not materially influence the performance of the above-average and superior students. Pritchard, Romeo, and Saccucci (2000) mention two recommendations from their reviewers. One is to systematically test students the quantitative materials at the beginning of the Principles course. The other is to work more closely with the Mathematics Department to adjust the quantitative course to better prepare business students e.g., devote more time to the review of basic algebra concepts.

This study is a continuation of research to determine ways to improve student performance in business finance. It focuses primarily on student competency in two quantitative courses (college algebra and business statistics) as explanatory variables to examine the student performance in business finance. Since those quantitative courses are difficult and challenging to most of the students, it is likely in many cases that some instructors would "curve" students' grades. Curving student's grades in those courses may send an unintended and erroneous message about student mathematical background to business finance instructors. Thus, this study takes a closer look at whether such curving is associated with performance in business finance. Finally, this study also considers some other student demographics variables that have not been examined in the finance education literature.

The remainder of the paper is organized as follows. Section II describes the data, the variables used in the estimation, and the preliminary data analysis. Section III describes the regression models and presents the empirical results. Section IV offers a summary and conclusions.

Data and Preliminary Analysis

This study is conducted at a four-year state university in Appalachian region. The College of Business, recently accredited by the AACSB International, is organized into three departments: the Department of Accounting, Economics, and Finance, the Department of Information Systems, and the Department of Management, Marketing, and Real Estate. Business finance (FIN 360) is an introductory finance course and is a required core course for all business majors. Students are required to complete six homework assignments (20 points each), one project (100 points), eleven quizzes (10 points each), and four examinations (100 points each; three non-cumulative examinations and one comprehensive final examination). The three non-cumulative exams reflect the content in quizzes and homework assignments. The comprehensive final examination reflects the content in the three non-cumulative examinations. Formulas are given in all exams. One exam and three quizzes with the lowest scores are dropped. Students' final grades are calculated by dividing students' accumulated scores with total possible score of 600. According to the advised course taking sequence, business students are required to take college algebra (MATH 152)

in the freshman year and business statistics (MATH 354) in the sophomore year. MATH 152 is a prerequisite for FIN 360, but MATH 354 is not.

Students in four sections of FIN 360 in the spring and fall semesters of 2005 are the subjects of this empirical study. One hundred and six students were officially enrolled. A survey with questions covering various areas in student characteristics, academic background, and learning experience was given. Ninety students took the survey. Table 1 shows the description of the variables used in this study.

Descriptive statistics of the sample appear in Table 2. As the table indicates, the mean course grade is about 73% or a low "C", but the range is sufficiently wide (from 1% to 99%) to provide a meaningful analysis. The mean age of students is 23 years with the range from 20 to 42 years. The sample is almost evenly split between male and female students, though there are a few more females than males. Seventy-seven percent of the students are in-state students. The sample is classified into accounting and finance (32%), information system (20%), and management, marketing and real estate (48%). The mean grade point average is 3.05 with the range from 2 to 4. The mean ACT (American College Testing) score of students is 21.68. Thirty percent of the students are transferred students, and twenty-seven percent of the students live on the campus. Fifty-six percent of students have a job while taking FIN 360, and their average number of hours worked in a week is almost 14. The mean course grade in MATH 152 is 2.6 or in a "C" range, and thirty-two percent of students indicate that their MATH 152 instructors curve grades. Almost seventy-five percent of students have taken business statistics or take business statistics concurrently with FIN 360. The mean course grade in MATH 354 is 2.7, and thirty-two percent of students indicate that their MATH 354 instructors curve grades.

Table 3 shows the frequency distribution classified by age, gender, major, transfer status, and grades in college algebra and business statistics. The means and the standard deviations of the student performance were calculated. In AGE classification, students who are 21 years old have the best performance in the classes. Students who are 22 years old have the worst performance in the classes. The distribution shows a negative relationship between student age and student performance. In GENDER classification, female students performed better than male students, but the difference in means is not significant in t-test. In MAJOR classification, students with a major in management, marketing, or real estate have the best performance in the class, whereas students with a major in information system have the worst performance in the class. In TRANSFER STATUS classification, transferred students do not perform better than non-transferred students. The difference in means is not significant, however.

The following two panels show the relationship between the performance in college algebra or business statistics and performance in business finance for the sample. In MATH 152 grade classification, students who get an "A" in college algebra have the best performance, whereas students who get an "E" in college algebra have the worst performance. The frequency distribution also shows a positive relationship between performance in college algebra and performance in business finance. In MATH 354 grade classification, students who have taken the business statistics have better performance than

students who have not taken business statistics or are taking concurrently with business finance. The t-statistic for testing the difference in means is –2.69 and is significant at 1% level. Of the students who have taken the business statistics, students who have an "A" in the business statistics have the best performance, whereas students who have a "C" in the business statistics have the worst performance. The relationship between performance in business statistics and performance in business finance is similar to the relationship between college algebra and business finance.

Regression Analysis and Results

Numerous finance education studies examining the factors that affect student performance in introductory finance course use the standard production function approach, where output is the grade received and inputs are factors incorporating student characteristics such as maturity, background, aptitude, and effort. Since the dependent variable (FIN360) in this study is continuous in nature, the ordinary-least-squares regression analysis is employed. The independent variables were described in Table 1. The variable denoting the students with Information system major (IS) is dropped for avoiding the dummy variable trap.

Table 4 reports the regression results. Equations (1) and (2) focus on the relationship between performance in college algebra and performance in business finance. The number of observations in the estimations is 73. The F-statistics to test the null hypothesis that regression coefficients are jointly equal to zero can be rejected at 1% level. The overall fits, as reflected in the R^2, are good. The variance inflation factors for all independent variables in both equations are less than 10, suggesting that there is no severe multicollinearity.

Turning to individual estimates, the coefficients of M152G are positive and significant at 5% level in Equation (1) and at 10% level in Equation (2), suggesting that students who have higher grades in college algebra perform better in business finance than those who have lower grades in college algebra. The interaction term, M152G × M152C, is employed to measure whether there is any difference in performance between students who have and who do not have their grades curved in college algebra. The coefficient of the interaction term in Equation (2) is positive but insignificant, suggesting that there is no difference in performance between students who have and who do not have their grades curved in college algebra.

The coefficients of GPA are positive and significant at 1% level, suggesting that students with higher GPA prior to the enrollment in FIN 360 have better performance than those with lower GPA. The coefficients of ACT are negative but insignificant, suggesting that students' performance on ACT cannot determine their performance in business finance course.

The coefficients of FROM are negative and significant at 5% level, suggesting that in-state students do not perform as good as out-of-state students. The coefficients of MMR are positive and significant at 5% level, suggesting that management, marketing, or real estate students perform better in FIN 360 than computer information system students. The coefficients of AF are also positive but insignificant, suggesting that there is no difference in performance between accounting or finance students and information system students.

The coefficients of AGE have negative sign but not significant, suggesting that there is no difference in performance between older and younger students. The coefficients of GENDER are negative but insignificant, suggesting that there is no difference in performance between male and female students. The coefficients of TRANSFER are negative but insignificant, suggesting that there is no difference in performance between transferred students and students starting at the university. The coefficients of CAMPUS are positive but insignificant, suggesting that there is no difference in performance between students who live on campus and students who commute to school from their homes. The coefficients of WORKHR are positive but insignificant, suggesting that there is no difference in performance between students who work and students who do not work.

In Table 4, Equations (3), (4), and (5) focus on the relationship between performance in business statistics and performance in business finance. The number of observations in the estimations is 80 for Equation (3) and 64 for Equation (4) and (5). The F-statistics to test the null hypothesis that regression coefficients are jointly equal to zero can be rejected at 1% level only in Equation (3). The overall fits, as reflected in the R^2, are good. The variance inflation factors for all independent variables in both equations are less than 10, suggesting that there is no severe multicollinearity.

In Equation (3), the signs and the coefficients for MMR and GPA are quite similar to the results in Table 4. Focusing on M354DUM, the coefficient is positive and significant at 1 percent level, suggesting that students who take business statistics have better performance than those without having business statistics. GPA is the only variable significant in Equation (4) and (5). The coefficients of M354G are positive but insignificant, suggesting that there is no difference in performance between students who have higher grades and students who have lower grades in business statistics. The interaction term, M354G × M354C, is employed to measure whether there is any difference in performance between students who have and who do not have their grades curved in business statistics. The coefficient of the interaction term in Equation (5) is positive but insignificant, suggesting that there is no difference in performance between students who have and who do not have their grades curved in business statistics.

Conclusions

This study employs regression techniques to determine whether there is a relationship between performance in mathematics courses (college algebra and business statistics) and performance in business finance, and whether students have their grades curved in the mathematics courses has any impact on the performance in business finance. The results indicate that students who earn higher grades in college algebra perform significantly better than those who do not. There is no significant difference in performance between students who have their grades curved in college algebra and students who do not. Students who fulfill the business statistics perform significantly better than those who do not. Among students who complete the business statistics, those with higher business statistics grades perform insignificantly better in business finance. There is no significant difference in performance between students who have their grades curved in business statistics and students who do not.

Two implications can be drawn from this study. First, business students are expected to have good command in dealing with numbers. In order to perform better in business finance, it is recommended that students gain more mathematics experience by taking business statistics prior to the enrollment of business finance even though business statistics may not be a prerequisite. Second, the grade received in a course may not necessarily reflect student learning in the course. Conventional wisdom suggests a strong positive relationship between grade received and student learning. In reality, that a student receiving an "A" learns more than a student receiving a "B" sometimes cannot be justified for at least one reason: instructors curve students' grades. However, if business finance instructors can reinforce and test the same materials to students repeatedly, students' prior performance in mathematics courses can be irrelevant to their performance in business finance. This implication is supported by the insignificant interaction terms in this study.

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Table 1: Variable Description

Variable	Description
FIN 360	Student's course grade recorded as a percentage in business finance
AGE	Student's age in years when enrolled in FIN 360
GENDER	Binary variable: 1 if the student's age is male; 0 otherwise
FROM	Binary variable: 1 if the student is a in-state student; 0 otherwise
AF	Binary variable: 1 if the student is an accounting or finance major; 0 otherwise
IS	Binary variable: 1 if the student is a information system major; 0 otherwise
MMR	Binary variable: 1 if the student is a management, marketing, or real estate major; 0 otherwise
GPA	Student's cumulative grade point average prior to FIN 360 enrollment
ACT	Student's ACT score
TRANSFER	Binary variable: 1 if the student transferred to the university in the study; 0 otherwise
CAMPUS	Binary variable: 1 if the student lives on the campus; 0 otherwise
WORKHR	Number of hours spent working per week on average
M152G	Student's final grade in college algebra; A = 4, B = 3, C = 2, D = 1, E = 0
M152C	Binary variable: 1 if the college algebra instructor curved the students' grades; 0 otherwise
M354DUM	Binary variable: 1 if the student completed business statistics; 0 otherwise
M354G	Student's final grade for business statistics; A = 4, B = 3, C = 2, D = 1, E = 0
M354C	Binary variable: 1 if the business statistics instructor curved the students' grades; 0 otherwise

Table 2: Descriptive Statistics

Variable	# of Obs.	Mean	Std. Dev.	Min	Max
FIN 360	106	0.728	0.193	0.008	0.991
AGE	90	22.9	4.195	20	42
GENDER	106	0.481	0.502	0	1
FROM	106	0.774	0.420	0	1
AF	106	0.321	0.469	0	1
IS	106	0.198	0.400	0	1
MMR	106	0.481	0.502	0	1
GPA	87	3.054	0.477	2	4
ACT	82	21.683	3.197	15	30
TRANSFER	90	0.3	0.461	0	1
CAMPUS	90	0.267	0.445	0	1
WORKHR	90	13.322	13.504	0	40
M152G	80	2.638	1.009	0	4
M152C	81	0.321	0.470	0	1
M354DUM	90	0.744	0.439	0	1
M354G	67	2.657	1.067	0	4
M354C	73	0.315	0.468	0	1

Table 3: Frequency Distribution Classified by Age, Gender, Major, Transfer Status, and Grades in College Algebra (MATH 152) and Business Statistics (MATH 354)

	FIN 360		
AGE	Freq.	Mean	Std. Dev.
20	17	0.801	0.137
21	30	0.808	0.085
22	14	0.708	0.142
23	11	0.731	0.164
>=24	18	0.725	0.208
GENDER			
Female	55	0.737	0.207
Male	51	0.718	0.178
MAJOR			
ACC & FIN	34	0.707	0.225
IS	21	0.643	0.234
MGT, MKT & RST	51	0.777	0.131
TRANSFER STATUS			
Non-transfer	63	0.780	0.132
Transfer	27	0.732	0.178
MATH 152			
A	18	0.858	0.102
B	27	0.739	0.146
C	24	0.716	0.149
D	10	0.750	0.105
E	1	0.311	0
MATH 354			
Not completed	39	0.623	0.236
Completed	67	0.789	0.130
A	17	0.889	0.070
B	22	0.769	0.135
C	17	0.716	0.141
D	10	0.794	0.086
E	1	0.730	0

Table 4: Regression Results on the Relationship between Business Finance and College Algebra and Business Statistics

	Equation (1)		Equation (2)		Equation (3)		Equation (4)		Equation (5)	
	Coeff.	t-stat	Coeff.	t-stat	Coeff.	t-stat	Coeff.	t-stat	Coeff.	t-stat
Intercept	0.513	4.157***	0.508	3.985***	0.462	3.908***	0.601	4.746***	0.613	4.870***
AGE	-0.002	-0.728	-0.002	-0.773	-0.001	-0.436	-0.005	-1.615	-0.005	-1.539
GENDER	-0.043	-1.497	-0.048	-1.563	-0.022	-0.857	-0.018	-0.691	-0.021	-0.792
FROM	-0.060	-1.989**	-0.057	-1.759*	-0.047	-1.599	-0.043	-1.498	-0.043	-1.466
AF	0.024	0.543	0.026	0.573	0.003	0.064	-0.008	-0.200	-0.001	-0.021
MMR	0.085	2.392**	0.082	2.271**	0.064	1.680*	0.043	1.290	0.042	1.297
GPA	0.136	4.048***	0.140	4.135***	0.130	4.030***	0.115	2.732***	0.109	2.557***
ACT	-0.010	-1.547	-0.009	-1.565	-0.006	-1.308	-0.002	-0.436	-0.002	-0.439
TRANSFER	-0.001	-0.019	0.000	0.011	-0.020	-0.633	-0.015	-0.447	-0.015	-0.438
CAMPUS	-0.007	-0.255	-0.007	-0.226	0.008	0.287	-0.016	-0.600	-0.021	-0.767
WORKHR	0.000	0.459	0.000	0.400	0.000	0.382	-0.000	-0.601	-0.001	-0.734
M152G	0.038	2.141**	0.035	1.808*						
M152C × M152G			0.006	0.591						
M354DUM					0.104	2.670***				
M354G							0.012	0.653	0.011	0.621
M354C × M354G									0.009	1.254
# of obs.	73		73		80		64		64	
F-statistic	4.96***		4.60***		5.12***		3.73***		3.77	
Adjusted R^2	46.08%		46.36%		44.99%		37.79%		38.77%	

***Significant at the 1% level
**Significant at the 5% level
*Significant at the 10% level

Mutual Fund Managerial Ownership and Fund Performance

James Philpot and Stanley Adamson

Introduction

Financial theory and practice posit that firm performance will improve as the financial incentives of managers are aligned with those of the owners. As a result, boards of directors offer managers varied compensation schemes that are designed to improve manager performance via alignment of manager and stockholder interests. Most commonly, these compensation plans include performance incentive-based salary and bonuses and stock and options ownership. Extending this reasoning from industrial firms to money managers, investors should expect greater care, effort, and diligence from professional portfolio managers as each manager's personal financial stake in his or her own performance increases. In fact many money management firms recognize this relationship and offer portfolio managers incentive compensation and/or encourage their portfolio managers to own shares of stock in the funds they manage.

Individual and institutional clients should be interested in and value information regarding the potential financial incentives of their portfolio managers. For a long period of time, mutual fund companies have been required to disclose the amount and method of compensating their portfolio managers, particularly whether managers receive performance-based compensation. However, only within the last year have mutual funds been required to report the fund share ownership position of the funds' portfolio managers.

In this paper, we examine mutual fund ownership by the fund portfolio managers. Namely, we: 1) discuss the new manager reporting requirements and practical aspects for researchers and investors in finding and interpreting the newly-reported data; 2) conduct an initial investigation into the relationship between portfolio manager ownership and fund performance; and 3) suggest questions and directions for future research in this area.

Key Prior Literature

Seminal theoretical and empirical finance literature supports using managerial stock ownership as a performance incentive. Jensen and Meckling (1976) explain how, as a manager's personal financial stake in the firm decreases, the value of outside equity claims is discounted to reflect monitoring and bonding costs and deadweight losses. Empirical studies of public, industrial firms at least partially confirm this relation. Morck, Shleifer and Vishny (1988) show a non-monotonic relationship between the proportion of a firm owned by management and the firm's Tobin's q ratio. Specifically, they find that for low levels of managerial ownership, firm value increases with managerial ownership. For higher levels of manager ownership, the relation is negative and then becomes positive again. More recent evidence (Mcconnell and Servaes; 1990) supports the Morck, et al. finding that at least at low levels of manager ownership, firm value increases with manager ownership.

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Much empirical work has examined incentive-based compensation in the mutual fund industry. Generally, mutual fund management companies are compensated based on a percentage of assets; individual portfolio managers typically are salaried and may also be compensated via an SEC-compliant performance incentive scheme. Golec (1988) compares the performance of a sample of mutual funds whose managers have performance-incentive compensation to a matched (by assets, expense, and load) sample of funds without performance incentives. Golec finds that incentive-compensated managers outperform non-incentive compensated managers, and that the incentive-managed funds have more systematic risk and less non-systematic risk than the funds of non-incentive managers. Elton, Gruber and Blake (2003) find that incentive-compensated fund managers exhibit superior stock-selection ability, and their funds have lower expenses than funds whose managers do not receive incentive compensation. Because reliable data regarding ownership of fund shares by portfolio managers has only recently become available, no work has examined relationships between mutual fund manager ownership and fund performance.

Security and Exchange Commission Reporting Rules

In July 2004, the SEC revised its rule (17 CFR §274.11A) regarding reporting of mutual fund portfolio manager names, compensation and fund share ownership. The rule changes took effect in February 2005. Every mutual fund is required to report in its prospectus the name(s) of its portfolio manager(s); in the event of a management committee with more than five members, the fund is required to report the names of the five committee members with most day-to-day decision making responsibility. Funds are required in their statement of additional information (SAI) to report other accounts managed by the named fund manager(s), potential conflicts of interest, compensation structure, and ownership of fund shares by the named portfolio managers. In its reasoning for the rule change, the SEC states that such disclosure allows investors to determine "whether a manager's interests are aligned with their own," (SEC; 2004). The Commission's assumption of investor interest is consistent with the theoretical and empirical findings of works cited above.

Specifically, the new rules require the reporting of the dollar range of the value of fund shares owned by each named manager. The range categories are: none, $1-$10,000, $10,001-$50,000, $50,001-$100,000, $100,001-$500,000, $500,001-$1,000,000, and over $1,000,000. The range format is intended to allow disclosure of the degree of manager ownership without compromising the privacy of the portfolio manager(s).

Obtaining and Interpreting the Data

These newly reported data may be very helpful to investors in evaluating potential investments as well as researchers in the study of the mutual fund industry. In addition to investors now being able to determine alignment of interests, researchers may now directly test for efficacy of such alignment of interests. Prospectus and SAI data are publicly available through fund web sites, from filings in the SEC's EDGAR database, or in some cases through web sites of financial advisors who sell funds.

There are several practical issues related to the collection and use of the reported data:

- As the ownership levels are reported as ranges, the data are not continuous, and non-continuous data limit the types and power of statistical tests that can be conducted.
- The reporting is truncated, with the highest level reported as "over $1 million." As a result, there is no distinction between the portfolio manager who owns $1,000,001.00 worth of shares and a manager who owns $20 million. Also, because the data are reported as ranges, managers may have incentive to own just $1 more than the lower limit of a range in order to "break" into that range and present a more favorable picture to potential investors.
- There is no standard format for reporting the ownership levels; funds may use narrative text or tables. The former is common for funds where the portfolio manager owns no shares, with a sentence like, "None of the portfolio managers own any fund shares," included in a large paragraph.
- As the data must be manually collected, researchers must take care to distinguish between a manager's share ownership reported as a trustee or as a portfolio manager. Trustee ownership is also reported, but the highest level is "over $100,000."
- Some funds do not follow the reporting convention. For example, Navellier Mid-cap Growth reports Louis Navellier's precise share ownership, rather than his dollar range.

Thus, while the data are reported and available, collection and use require special effort and care.

Sample

We examine manager ownership and fund performance for a sample of mutual funds. Our initial sample consisted of every tenth fund listed in the Wall Street Journal's quarterly mutual funds report published November 7, 2005. We eliminated funds that were duplicate share classes, funds whose managers had less than three years' tenure, and funds for which prospectus data and SAI were not readily available electronically. Our final sample consisted of 203 mutual funds. For each fund, we collected returns and risk data from Morningstar as of December 31, 2005 and ownership data for the lead portfolio manager listed in each fund's prospectus.

Our sample includes 98 equity funds, 43 bond funds, and 62 balanced funds. Of this group, 77 (38%) funds' lead managers owned no shares in the fund; this represented a plurality of the funds. The second most frequent ownership level was the $100,001-$500,000 range, with 45 funds (22%). Twenty-nine funds (14%) reported that their lead manager owned over $1 million worth of fund shares.

Several funds in our sample are managed by the "proprietor" (or someone with a proprietary interest) of that fund's management company. Such managers are compensated not only for management of the fund, but also as owner of the management company. Thus, these managers have a financial interest in fund growth and fund marketing efforts. If these managers believe that fund investors value managerial ownership as an interest-alignment device, they will own significant amounts of shares, if for no other reason, to bolster fund marketing efforts. Table I lists "proprietor"-managed funds and the ownership positions of their managers. Almost all these managers report ownership in one of the top two levels, or at least $500,001 of fund shares. The most notable exception is Steven Leuthold who owns no shares of his Grizzly Short

Fund; even this result is not surprising given this fund's highly specialized objective. Proprietor-managers appear to accept the notion that investors value managerial share ownership.

Performance Characteristics Tests

Consistent with prior work, we posit that increased levels of portfolio manager ownership of fund shares will align manager and owner interests and improve fund performance. We examine the sub-sample of 98 equity mutual funds. Of this group, 27 funds reported that their manager owned no shares in the fund, while 14 reported that the manager owned fund shares worth in excess of $1 million. Table II, panel A contains results of pooled t-tests for differences in mean values of 1-year return, 3-year return, 3-year alpha (versus the S&P 500 Index), and 3-year beta among funds in which managers own any amount of shares and funds with no managerial ownership. The funds in our sample show no significant differences in the means of any of these variables among the two groups.

In order to examine potential differences over a longer time period, we also perform the t-tests for 79 funds with manager tenure greater than five years. Of this group, 18 funds reported that their manager owned no shares in the fund, while 11 of the remaining 61 funds reported that the manager owned fund shares worth in excess of $1 million. Table II, panel B displays the results of pooled t-tests with this sub-sample of funds. Tests with this sub-sample provide results similar to panel A for the 1 and 3-year performance and risk variables. In addition, there is no significant difference in mean values for 5-year return, 5-year alpha or 5-year beta. Thus there is no evidence that performance of equity mutual funds improves when the portfolio manager owns shares in the fund versus owning no shares in the fund.

We also examine whether the degree of ownership influences these performance variables. That is, while there are no differences when the categories are ownership versus no ownership, there may be differences in performance variables when the level of ownership is considered. We conduct ANOVA tests for differences in mean values of performance variables across the seven range categories of managerial ownership, again focusing on the equity funds subsample. Table III displays the results of these tests. The very low F-statistic values indicate no difference in mean values of 1-year return, 3-year return, 3-year alpha, and 3-year beta across funds in the different managerial ownership categories. There are also no mean differences in these variables across ownership categories in the 5-year manager tenure sub-sample of 79 equity funds. The very low (all $< 10\%$) values of R^2 in all the ANOVA tests indicate that managerial ownership would at most account for only a small amount of the variability in fund performance.

These results indicate that manager ownership has no effect on fund returns. While such a finding is contrary to agency theory predictions, there are at least two potential explanations. One explanation is market efficiency. Unlike in the case of a manager of an industrial firm, capital market efficiency may render mutual fund manager effort of little value, regardless of manager incentives. Another possible explanation is that the use of incentive compensation by funds may serve as an effective substitute for direct share ownership as a device for aligning the interests of the portfolio manager and fund investors.

Conclusions and Future Research

In this paper, we have examined mutual fund share ownership by fund portfolio managers, using newly-reported data. These new data, although requiring manual collection and fraught with potential obstacles for interpretation, may yield new insight into fund and industry operations. Our basic investigation of ownership and fund performance indicated no relationship between a portfolio manager's ownership of fund shares and several performance-related fund variables.

There are additional potential questions for future research in this area. One is what are the determinants of a manager's ownership of his or her fund's shares? There are legitimate reasons why a dedicated fund manager would not own shares in his fund, such as the fund being inappropriate for the manager's goals, life situation, etc. Another question for future research is whether fund share ownership and other incentives such as performance-based pay are used in practice as substitutes for each other. Finally, it may be useful to examine whether investors value the newly-reported manager ownership information.

Table I

"Proprietor"-Managed Funds

Fund Name	Portfolio Manager	Ownership Level
Baron Asset	Ronald Baron	$500,001-$1 million
Calamos Growth	Nick Calamos	$500,000-$1 million
Davis Financial	Christopher Davis	Over $1 million
Gabelli Asset	Mario Gabelli	Over $1 million
Leuthold Grizzly Short	Steven Leuthold	None
Navellier Mid-cap Growth	Louis Navellier	$100,001-$500,000 *
Nicholas Fund	Albert Nicholas	Over $1 million
Nicholas High Income	David Nicholas	$500,001-$1 million
Northeast Investors Trust	Ernest Monrad	Over $2 million
Pennsylvania Mutual	Charles Royce	Over $1 million
Stratton Small-cap Value	James Stratton	Over $1 million

* Fund SAI reports Mr. Navellier's fund share quantity holdings rather than dollar range.

Table II

Results of pooled t-tests (one-tailed) for difference in means of fund performance variables between equity mutual funds in which the lead portfolio manager owns fund shares and those in which the lead portfolio manager does not own shares.

Panel A: Funds with manager tenure > 3 years as of 12/31/2005			
Variable	$Mean_{own}$	$Mean_{no\text{-}own}$	t-value (p(t))
1-year Return	8.68%	8.07%	0.41 (0.34)
3-year Average Return	17.94%	18.68%	-0.41 (0.66)
Alpha 3-year	2.01%	1.08%	0.23 (0.41)
Beta 3-year	1.068	1.062	0.07 (0.47)
Number of Funds	71	27	
Panel B: Funds with manager tenure > 5 years as of 12/31/2005			
Variable	$Mean_{own}$	$Mean_{no\text{-}own}$	t-value (p(t))
1-year Return	8.86%	9.03%	-0.09 (0.57)
3-year Average Return	17.90%	19.48%	-0.68 (0.75)
5-year Average Return	4.92%	5.70%	-0.34 (0.63)
Alpha 3-year	2.08%	2.16%	-0.07 (0.53)
Alpha 5-year	3.92%	3.44%	0.25 (0.40)
Beta 3-year	1.053	1.027	0.26 (0.40)
Beta 5-year	0.899	0.909	-0.10 (0.54)
Number of Funds	61	18	

Table III

Summary of results of ANOVA tests for unequal means of selected performance variables among seven categories of mutual fund portfolio manager ownership.

Panel A: Funds with manager tenure > 3 years as of 12/31/2005			
Variable	R^2	F	p(F)
1-year Return	0.075	1.05	0.403
3-year Average Return	0.028	0.37	0.917
Alpha 3-year	0.075	1.05	0.403
Beta 3-year	0.011	0.15	0.994
Number of Funds	98		
Panel B: Funds with manager tenure > 5 years as of 12/31/2005			
Variable	R^2	F	p(F)
1-year Return	0.060	0.65	0.714
3-year Average Return	0.034	0.36	0.921
5-year Average Return	0.088	0.98	0.455
Alpha 3-year	0.083	0.92	0.496
Alpha 5-year	0.088	0.98	0.449
Beta 3-year	0.009	0.09	0.999
Beta 5-year	0.034	0.35	0.926
Number of Funds	79		

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Contagion and Industry Risk

Chu-Sheng Tai

Introduction

The financial crisis of East Asia in 1997 was largely unanticipated and was characterized by sharp falls in currency values and stock prices in several countries simultaneously. A number of complex factors trigged the financial crisis in Asia, but, fundamentally, unbridled expansion and subsequent contraction of banking lending played a leading role. One of the biggest challenges facing scholars studying the East Asian financial crisis is to explain this contagion in which crisis emanating from one country soon swept across all countries in the region.

There are number of reasons why banking centers may add to financial contagion. They can be classified into two types of financial contagion (see Van Rijckeghem and Weder (1999)). The first has been called the "common bank lender channel." Due to the increasing cross-border integration among banks, a common lender can be the main source of funds for several countries. But, competition for funds from the same bank might become a problem. For example, consider the case in which the firms from two countries A and B borrow from the same banking system (say, country C). When a crisis hits A, banks from C may face defaults on loans to A. To restore capital adequacy ratios, country C can provoke a credit crunch in country B by calling in the loans. Thus, the productive sector of country B comes under pressure and eventually the whole country may face a crisis. In this case, even if B's economy is not directly linked to A's, the presence of a third party C makes the crisis spread from one country to the other. The second kind of contagious response also leads to outflows but, in contrast with the common lender channel there is no need for a real linkage through losses. In other words, even if banks had no exposure in the primary crisis country they might still react with a generalized reduction of credit to other countries, due to revisions of expected returns in this asset class or a generalized increase in risk-aversion. This financial contagion due to common bank lenders will not be considered as "pure contagion effect" according to Masson (1999). Instead, it will be categorized as "spillover effect" due to financial interdependence. However, the second type of financial contagion can be qualified as the pure contagion effect because the transmission of financial crises is not due to financial interdependence and neither can it be explained by changes in fundamentals.

In this paper, I examine whether there are pure contagion effects in both conditional means and volatilities of four developed markets' bank stock returns, namely Germany, Japan, the United Kingdom, and the U.S. during the 1997 Asian crisis. There are a number of reasons why negative events relating to the Asian financial crisis might be expected to have a negative effect on the financial markets of non-crisis countries. Firstly, as financial markets become more integrated, shocks can be transmitted quickly between them. To the extent that financial crises in some countries result in a generalized increase in uncertainty in world financial markets, we should expect increased volatility in financial markets in non-crisis countries. Secondly, some market participants might have factored in some possibility that contagion of the crisis could have spread as far as, for example, the U.S., perhaps due to financial institutions' debt exposures to the crisis countries as discussed earlier. Finally, even if financial market participants do not expect that those developed countries will experience financial crisis, they may expect that portfolio rebalancing behavior could result in sharp

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declines in asset prices in countries with unrelated fundamentals (see Kaminsky and Schmukler (1999)).

By using an asymmetric Multivariate General Autoregressive Conditional Heteroscedastic in Mean (MGARCH-M) approach to model the conditional mean and asymmetric volatility spillovers during the crisis period, I find strong evidence of contagion effects in the conditional means of bank stock returns after systematic risks have been accounted for. Specifically, the lead/lag relationships appear to be multidirectional since the return shocks originating in any one of the markets tend to spill over to the other markets. As for the contagion-in-volatility effects, they are not significant. In addition, the global industry risk priced, suggesting the importance of incorporating the industry risk into the conditional ICAPM.

The remainder of the paper is organized as follows. Section one presents the theoretical asset pricing model used to control for systematic risks, and the econometric methodology employed to estimate the model. Several test hypotheses are presented in Section two. Section three describes the data and empirical results are reported in Section four. Some conclusions are offered in the final section.

The Model and Econometric Methodology

We know that the first-order condition of any consumer-investor's portfolio optimization problem can be written as:

$$E[M_t R_{i,t} \mid \Omega_{t-1}] = 1, \ \forall i \qquad (1)$$

where M_t is known as a stochastic discount factor (SDF) or an intertemporal marginal rate of substitution (IMRS); $R_{i,t}$ is the gross return of asset i at time t and Ω_{t-1} is market information known at time $t-1$. Without specifying the form of M_t, equation (1) has little empirical content since it is easy to find some random variable M_t for which the equation holds. Thus, it is the specific form of M_t implied by an asset pricing model that gives equation (1) further empirical content. In empirical tests, the SDF is projected onto two factors: the world market and industry factors. The selection of these two factors is theoretically justified based on the intertemporal CAPM (ICAPM) of Merton (1973). In particular, the conditional two-factor ICAPM model is specified as,

$$r_{i,t} = \lambda_{mkt,t-1} Cov(r_{i,t}, r_{mkt,t} \mid \Omega_{t-1}) + \lambda_{ind,t-1} Cov(r_{i,t}, r_{ind,t} \mid \Omega_{t-1}) + \varepsilon_{i,t} \ \forall i \qquad (2)$$

where "*mkt*" denotes world market risk and "*ind*" is the global industry risk.

The conditional ICAPM in equation (2) has to hold for every asset. However, the model does not impose any restrictions on the dynamics of the conditional second moments. Several multivariate GARCH (MGARCH) models have been proposed to model the conditional second moments, such as the diagonal VECH model of Bollerslev, Engle, and Wooldridge (1988), the constant correlation (CCORR) model of Bollerslev (1990), the factor ARCH (FARCH) model of Engle, Ng, and Rothschild (1990), and the BEKK model of Engle and Kroner (1995). Among these four popular MGARCH models, the BEKK model is better suited for the purpose of this paper because it not only guarantees that the covariance matrices in the system are positive definite, but also allows the conditional variances and covariances of different markets to influence each other, which is very important for testing contagion in this paper. As a result, a BEKK structure with asymmetric volatility effects is selected over the other MGARCH specifications to model the conditional second moments of

bank stock returns and to test contagion effects among those banks. Specifically, the dynamic process for the conditional variance-covariance matrix of stock returns is specified as:

$$\begin{aligned} H_t &= C'C + A' \cdot H_{t-1} \cdot A + B' \cdot \varepsilon_{t-1}\varepsilon_{t-1}' \cdot B + D' \cdot \eta_{t-1}\eta_{t-1}' \cdot D \\ &+ G' \cdot \psi_{t-1}\psi_{t-1}' \cdot G + K' \cdot \xi_{t-1}\xi_{t-1}' \cdot K + L' \cdot \mu_{t-1}\mu_{t-1}' L + M' \cdot \nu_{t-1}\nu_{t-1}' \cdot M + N' \cdot \theta_{t-1}\theta_{t-1}' \cdot N \\ &+ P' \cdot \varsigma_{t-1}\varsigma_{t-1}' \cdot P + Q' \cdot \tau_{t-1}\tau_{t-1}' \cdot Q + S' \cdot \upsilon_{t-1}\upsilon_{t-1}' \cdot S + V' \cdot \zeta_{t-1}\zeta_{t-1}' \cdot V + Y' \cdot \rho_{t-1}\rho_{t-1}' \cdot Y \end{aligned} \quad (3)$$

where H_t is 6×6 time-varying variance-covariance matrix of asset returns; C is restricted to be a 6×6 upper triangular matrix and A, B, D, G, K, L, M, N, P, Q, S, V, and Y are diagonal matrices whose general form, X, is given by:

$$X = \begin{bmatrix} x_{GM} & 0 & 0 & 0 & 0 & 0 \\ 0 & x_{JP} & 0 & 0 & 0 & 0 \\ 0 & 0 & x_{UK} & 0 & 0 & 0 \\ 0 & 0 & 0 & x_{US} & 0 & 0 \\ 0 & 0 & 0 & 0 & x_{Bank} & 0 \\ 0 & 0 & 0 & 0 & 0 & x_{World} \end{bmatrix} \quad (4)$$

The 6×1 vector, η_{t-1}, captures the asymmetric impact that the vector of past negative shocks has on the conditional covariance matrix in a manner similar to that of Glosten et al. (1993). The effects of past shocks of other markets on a market's conditional variance or conditional covariances (volatility spillovers) are captured by the vectors ψ_{t-1}, ξ_{t-1}, μ_{t-1}, ν_{t-1}, and θ_{t-1}. Several papers in the literature show that volatility spillovers between markets are asymmetric in the sense that negative innovations in a market increase volatilities in other markets more than do positive innovations in that market. Consequently, it will be interesting to see whether such asymmetric volatility spillovers do occur during the *crisis*. The vectors ς_{t-1}, τ_{t-1}, υ_{t-1}, ζ_{t-1}, and ρ_{t-1} capture this asymmetry. The difference between the first set of innovation vectors (ψ_{t-1}, ξ_{t-1}, μ_{t-1}, ν_{t-1}, θ_{t-1}) and the second set of innovation vectors (ς_{t-1}, τ_{t-1}, υ_{t-1}, ζ_{t-1}, ρ_{t-1}) is that the first set captures overall volatility spillovers during the *entire* sample period, while the second set captures the asymmetric volatility spillovers during the *crisis* period. By including vectors ς_{t-1}, τ_{t-1}, υ_{t-1}, ζ_{t-1}, and θ_{t-1}, I can then test the incremental influences of volatility shocks on the banking sectors, which is a true test of contagion-in-volatility. In this model, for example, the conditional variance of excess German bank stock returns, $h_{GM,t}$, depends on its past conditional variance, $h_{GM,t-1}$, through the parameter, a_{GM}, its own past shocks, $\varepsilon_{GM,t-1}$, through the parameter, b_{GM}, and past shocks of the other markets through the parameters, g_{GM}, k_{GM}, l_{GM}, m_{GM}, and n_{GM}. This conditional variance also depends on its own past negative shocks through the parameter, d_{GM}, and on past negative shocks of the other markets through the parameters, p_{GM}, q_{GM}, s_{GM}, v_{GM}, and y_{GM} during the crisis. Here, these parameters measure the incremental amounts by which bad news in one market at time $t-1$ affect the conditional variance of excess German bank stock returns at time t.

Under the assumption of conditional normality, the log-likelihood to be maximized can be written as:

$$\ln L(\varpi) = -\frac{TN}{2}\ln 2\pi - \frac{1}{2}\sum_{t=1}^{T}\ln|H_t(\varpi)| - \frac{1}{2}\sum_{t=1}^{T}\varepsilon_t(\varpi)' H_t(\varpi)^{-1}\varepsilon_t(\varpi) \quad (5)$$

where ϖ is the vector of unknown parameters in the model. Since the normality assumption is often violated in financial time series, I use quasi-maximum likelihood estimation (QML) proposed by Bollerslev and Wooldridge (1992) which allows inference in the presence of departures from conditional normality. Under standard regularity conditions, the QML estimator is consistent and asymptotically normal and statistical inferences can be carried out by computing robust Wald statistics. Optimization is performed using the Broyden, Fletcher, Goldfarb, and Shanno (BFGS) algorithm.

Hypothesis Testing

Testing Time-varying Risk Premium

Many empirical studies have shown that the prices of risks are time-varying. (e.g., De Santis and Gerard (1997, 1998), among others.) This time-varying price of risk is economically appealing in the sense that investors use all available information to form their expectations about future economic performance, and when the information changes over time, they will adjust their expectations and thus their expected risk premia when holding different risky assets. Therefore, to test time-varying risk premium hypothesis, I allow not only the conditional second moments (covariance risks) to change over time, but also the prices of covariance risks to be time-varying (equation (2)).

The dynamic of price of world market risk is chosen according to the theoretical asset pricing model developed by Merton (1980). In his model, the price of world market risk is the coefficients of risk aversion of risk averse investors, and thus should be positive. Consequently, similar to De Santis and Gerard (1997, 1998), an exponential function is used to model the dynamic of $\lambda_{mkt,t-1}$ and for the dynamic of $\lambda_{ind,t-1}$, a linear specification is adopted because the model does not restrict the price of industry risk to be positive.

$$\lambda_{mkt,t-1} = \exp(\varphi_{mkt}' z_{t-1}) \quad (6)$$

$$\lambda_{ind,t-1} = \varphi_{ind}' z_{t-1} \quad (7)$$

where Z_{t-1} is a vector of information variables observed at the end of time $t-1$ and φ's are time-invariant vectors of weights. Thus, the price of global industry risk is assumed to be a linear function of the information variables in Z_{t-1}, and the price of world market risk is assumed to be an exponential function of information variables in Z_{t-1}. Given the dynamics of prices of risks, I can then test the whether the world prices of market and industry risks are significantly priced and change over time by testing whether the information variables in Z_{t-1} are significant in addition to significant GARCH parameters.

Testing Contagion in Mean and Volatility

To test whether a country's past idiosyncratic shocks have significant impact on the other countries' condition returns (contagion-in-mean) during the Asian crisis, I incorporate past country-specific innovations into equation (2). Specifically, the equation (2) can be modified as:

$$r_{i,t} = \lambda_{mkt,t-1} Cov(r_{i,t}, r_{mkt,t} \mid \Omega_{t-1}) + \lambda_{ind,t-1} Cov(r_{i,t}; r_{ind,t} \mid \Omega_{t-1}) + \sum_{i,j} \phi_{ij} \varepsilon_{j,t-1} + crisis(\sum_{i,j} \omega_{ij} \varepsilon_{j,t-1}) + \varepsilon_{i,t}; \forall i, j \quad (8)$$

where "*crisis*" is a dummy variable, which is equal to one during the crisis period (07/04/1997 – 12/25/98) and zero otherwise. In testing the contagion-in-mean effects, I allow the past country-specific innovations to affect bank stock returns in the *entire* sample period, and then test whether there are any incremental influences of past innovations on these returns during the *crisis* period. Thus, the contagion-in-mean hypothesis can be examined by testing whether the coefficients, $\omega_{ij}(i \neq j)$, are individually or jointly significant after the systematic risks have been accounted for.

Data and Summary Statistics

Weekly observations of bank stock total return indices from Germany (GM), Japan (JP), the United Kingdom (UK), and the U.S. (US) are examined. Datastream world total bank ($Bank$) and market return indices ($World$) are used to proxy global industry and market risks, respectively. 7-day Eurodollar interest rate is used as conditionally risk-free rate to compute excess returns on all indices.

I select a set of conditioning variables that have been widely used in the international asset pricing literature (e.g., De Santis and Gerard (1997, 1998), among others). They are excess dividend yield measured by the dividend yield on $World$ in excess of the 7-day Eurodollar interest rate (DIV), the change in the U.S. term premium, measured by the first difference of the yield difference between 10-year Treasury constant maturity rate and 7-day Eurodollar rate ($\Delta USTP$), the U.S. default premium, measured by the yield difference between Moody's Baa-rated and Aaa-rated U.S. corporate bonds ($USDP$), the lagged excess return on $World$, and a constant ($CONSTANT$).

The weekly data ranges from April 6, 1990 to March 23, 2001, which is a 573-data-point series. However, I work with rates of return and use the first difference of conditioning variables, and finally all the conditioning variables are used with a one-week lag, relative to the excess return series; that leaves 571 observations expanding from April 20, 1990 to March 23, 2001. All the data are extracted from Datastream.

Table 1 presents summary statistics of the continuously compounded stock returns. As can be seen from panel A, among all the return series UK has the highest weekly mean returns, 0.273%, and JP, on the other hand, performs worst with a return of -0.219% per week and a standard deviation of 4.237%. Table 1 also reports Bera-Jarque and Ljung-Box statistics. Bera-Jarque test rejects normality for all return series. The Ljung-Box test statistics for raw returns ($LB(20)$) are only significant at the 5% level in two markets: GM and JP, implying that linear dependencies are not very strong in the sample. However, for squared returns, $LB^2(20)$ is significant at the 1% level for all series except UK, indicating strong nonlinear dependencies in the sample. This is consistent with the volatility clustering observed in most stock markets, suggesting that the use of a conditional heteroscedasticity model is advisable. The unconditional correlation coefficients for the conditioning variables are reported in panel B of Table 1. The correlation coefficients are pretty small, and none of them are statistically significant, indicating that the selected conditioning variables contain sufficiently orthogonal information.

Empirical Evidence

The quasi-maximum likelihood estimation of the conditional ICAPM (equation (8)) is reported in Table 2. The hypothesis tests regarding the prices of risks and the predictability of conditioning variables are presented in Table 3. The hypothesis tests concerning the contagion in mean are shown in Table 4.

The evidence of time-varying risk premia

First, consider the test results for the existence of time-varying risk premia for global industry and market risks, the joint hypothesis of zero prices of industry and market risks is strongly rejected by Wald statistic ($Wald$ = 586.387) with a p-value nearly zero. The joint hypothesis of constant prices of industry and market risks is also rejected ($Wald$ = 67.374). Next, the joint hypothesis of constant price of industry risk is strongly rejected by Wald test ($Wald$ = 25.388), and the joint hypothesis of constant price of market risk is also rejected ($Wald$ = 24.758). These test results imply that both industry and market risks are not only priced but also time varying. The conditioning variables useful in predicting the dynamics of the risk prices include excess dividend yield (DIV) and lagged excess return on world market portfolio ($World$) as evidenced from the hypothesis tests (#7 and #10) reported in Table 3.

Evidence of Mean Spillover and Contagion in Mean

After controlling the systematic industry and market risks, I can then test contagion-in-mean effects among four banking sectors. However, before that, I need to control for the overall mean spillovers in the entire sample period, so any incremental mean spillover effects can be tested during the crisis period. It can be seen from Table 4 that the hypothesis of no mean spillover (#1 - #4) is rejected at the 1% level for GM and UK. To find out the sources of mean spillover for these two markets, one can check statistical significance of individual mean spillover parameter, ϕ, reported in Table 2. Table 2 indicates that the source of mean spillover for GM comes from JP, and for UK, the sources are from JP and US. However, JP appears to be the major market in generating return shocks for the other markets based on the Wald statistic ($Wald$ = 37.561) for the hypothesis test (#10) reported in Table 4.

Now, considering the test results of contagion in mean effects, as shown in Table 4, these effects are statistically significant at the 1% level for all markets. For example, the joint hypothesis of no contagion in return shocks for GM ($H0: \omega_{GM,j} = 0; \forall j = JP, UK, US$) during the crisis is strongly rejected by the Wald statistic ($Wald$ = 14.771) at the 1% level. The same rejection also applies to JP, UK, and US. To find out the sources of contagion in return shocks for GM, one can again examine the individual significance of contagion-in-mean parameter, $\omega_{JP,j}$, reported in Table 2 based on robust standard errors. Basically, the current returns in GM are affected by past return shocks in JP ($\omega_{GM,JP}$ = -0.052) and UK ($\omega_{GM,UK}$ = 0.109). The current return shocks in JP are due to the past return shocks in the other three markets in addition to its own past return shocks. That is the contagion-in-mean parameters for JP, $\omega_{JP,j}$, are all significant. Similarly, the current return shocks for UK and US are also affected by the other three markets. By examining the significance of these individual contagion-in-mean parameters, one can conclude that basically the lead/lag

relationships appear to be multidirectional since return shock originated from any one of the markets tend to spill over to the other three markets, and this conclusion has been confirmed by the hypothesis tests (#13 - #16) reported in Table 4. However, Germany and U.K. appear to be the major markets in generating those contagion effects because the Wald test statistics for the hypotheses of no contagion in return shocks from *GM* and *UK* (#13 and #15) are significant higher than those for *JP* and *US*.

Evidence of Volatility Spillover and Contagion in Volatility

Turning to volatility spillovers and contagion effects on the conditional variances of excess stock returns, it can be seen from Table 2 that none of the volatility spillover parameters is statistically significant except $m_{World,US}$, implying that there is no volatility spillover among the four banking sectors in the entire sample period. It will be interesting to examine next where the dynamics of conditional variances of these bank stock returns behave differently during the crisis. In particular, I test whether countries' negative idiosyncratic shocks become contagious during the crisis after controlling the overall volatility spillovers in the entire sample period. That is, I test contagion-in-volatility hypothesis. As shown in Table 2, none of the contagion-in-volatility parameters is statistically significant, suggesting that there is no volatility spillover even during the crisis period. Finally, in addition to the volatility spillover and contagion-in-volatility parameter estimates shown in Table 2, Table 2 also reports the estimates for GARCH and ARCH parameters (a_i, b_i) and own asymmetric volatility shock parameters, d_i. The GARCH parameters are all significant at the 1% level, implying that all the conditional variance processes are highly persistent. However, none of the parameters, d_i, is significant, suggesting that asymmetries are not present in the bank stock returns.

Summary and Concluding Remarks

This paper tests whether contagion can occur at the industry level, in particular the banking industry. Previous studies on contagion have failed to take into account the important distinction between the two concepts of interdependence and contagion. Specifically, in this paper I define 'contagion' as significant spillovers of country-specific idiosyncratic shocks during the crisis after economic fundamentals or systematic risks have been accounted for. To control for the economic fundamentals, I rely on the ICAPM, which provides me a theoretical basis in selecting the economic fundamentals. The economic fundamentals under ICAPM are world market and industry risks, so the evidence of contagion is based on testing whether idiosyncratic risks - the part that cannot be explained by the world market and industry risks, are significant in describing the dynamics of conditional mean and volatility of bank stock returns during the 1997 Asian crisis.

The empirical results indicate strong contagion effects in the conditional means of bank stock returns after systematic risks have been accounted for. Specifically, the lead/lag relationships appear to be multidirectional among four banking sectors since the return shocks originating in any one of the markets tend to spill over to the other three markets. As for the contagion-in-volatility effects, they are not significant. In addition, the global industry risk is significantly priced, suggesting the importance of incorporating the industry risk into the conditional ICAPM.

Table 1

Panel A: Summary statistics of bank and world stock returns

	GM	*JP*	*UK*	*US*	*Bank*	*World*
Mean (%)	0.011	-0.219	0.273	0.249	0.030	0.066
Std. Dev. (%)	3.021	4.237	3.465	2.999	2.365	1.866
Minimum (%)	-13.135	-15.322	-10.260	-10.079	-9.076	-9.127
Maximum (%)	14.091	19.402	17.413	16.041	10.272	7.608
$B-J$	115.818**	110.780**	46.418**	105.358**	82.657**	164.580**
$LB(20)$	37.357*	37.438*	19.194	23.331	20.468	15.972
$LB^2(20)$	141.468**	63.099**	27.877	208.999**	153.123**	118.952**

Panel B: Unconditional correlation of conditioning variables

	DIV	*ΔUSTP*	*USDP*	*World*
DIV	1			
ΔUSTP	0.087**	1		
USDP	-0.031	0.058	1	
World	0.034	-0.031	0.015	1

* and ** denote statistical significance at the 5% and 1% level, respectively.

Table 2

Quasi-Maximum Likelihood estimation of the conditional ICAPM

Panel A: Conditional mean process

	World prices of market and industry risks				
	CONSTANT	*DIV*	*ΔUSTP*	*USDP*	*World*
φ_{mkt}	1.512	0.979	0.736	4.383	-31.405
	(1.384)	(1.657)	(1.676)	(10.012)	(7.184)**
φ_{ind}	6.766	9.227	-9.047	23.768	65.063
	(0.906)**	(2.017)**	(46.252)	(18.669)	(82.563)
	Mean spillovers				
	$j=GM$	$j=JP$	$j=UK$	$j=US$	
$\phi_{GM,j}$	-0.002	0.069	-0.006	0.055	
	(0.030)	(0.023)**	(0.024)	(0.029)	
$\phi_{JP,j}$	-0.016	-0.010	0.027	-0.025	
	(0.021)	(0.024)	(0.022)	(0.035)	
$\phi_{UK,j}$	-0.019	-0.081	-0.192	0.099	
	(0.023)	(0.018)**	(0.021)**	(0.033)**	
$\phi_{US,j}$	0.021	-0.017	0.002	-0.065	
	(0.024)	(0.021)	(0.022)	(0.020)**	
	Contagion in mean				
	$j=GM$	$j=JP$	$j=UK$	$j=US$	
$\omega_{GM,j}$	0.043	-0.052	0.109	-0.051	
	(0.055)	(0.026)*	(0.040)**	(0.066)	
$\omega_{JP,j}$	-0.271	-0.305	0.247	-0.132	
	(0.024)**	(0.011)**	(0.022)**	(0.028)**	
$\omega_{UK,j}$	-0.119	0.128	-0.083	0.123	
	(0.030)**	(0.038)**	(0.025)**	(0.054)*	
$\omega_{US,j}$	0.250	0.098	-0.158	0.002	
	(0.059)**	(0.046)*	(0.063)*	(0.072)	

Panel B: Conditional variance process

	$i = GM$	$i = JP$	$i = UK$	$i = US$	$i = Bank$	$i = World$
a_i	0.963	0.953	0.949	0.955	0.955	0.956
	(0.018)**	(0.021)**	(0.020)**	(0.017)**	(0.017)**	(0.016)**
b_i	0.177	0.275	0.217	0.274	0.251	0.221
	(0.065)**	(0.078)**	(0.070)**	(0.071)**	(0.049)**	(0.048)**
d_i	0.903	0.156	-1.665	0.846	0.457	1.550
	(1.879)	(0.788)	(2.223)	(1.892)	(1.295)	(1.627)

Volatility spillovers [a]

	$i = GM$	$i = JP$	$i = UK$	$i = US$	$i = Bank$	$i = World$
$j = GM$		-0.004	-0.002	0.009	0.001	-0.003
		(0.025)	(0.057)	(0.035)	(0.016)	(0.011)
$j = JP$	0.034		0.018	0.001	0.000	0.003
	(0.058)		(0.026)	(0.036)	(0.003)	(0.006)
$j = UK$	0.118	0.005		0.004	0.010	0.003
	(0.072)	(0.037)		(0.058)	(0.010)	(0.005)
$j = US$	-0.035	-0.053	0.076		0.003	0.062
	(0.054)	(0.064)	(0.101)		(0.006)	(0.014)**
$j = Bank$	0.033	0.008	-0.086	-0.056		0.009
	(0.100)	(0.050)	(0.054)	(0.094)		(0.016)
$j = World$	0.034	-0.005	-0.002	0.004	0.006	
	(0.116)	(0.095)	(0.086)	(0.126)	(0.045)	

Contagion in asymmetric volatility [a]

	$i = GM$	$i = JP$	$i = UK$	$i = US$	$i = Bank$	$i = World$
$j = GM$		0.333	0.584	0.291	-0.005	0.310
		(2.341)	(1.997)	(1.084)	(0.395)	(0.817)
$j = JP$	0.185		-0.195	0.041	-0.005	0.000
	(0.985)		(0.926)	(0.362)	(0.181)	(0.158)
$j = UK$	0.019	-3.707		-0.016	0.158	0.090
	(2.288)	(3.794)		(1.411)	(0.887)	(0.309)
$j = US$	0.647	0.292	-0.817		-0.376	0.010
	(2.403)	(5.364)	(4.167)		(1.234)	(0.682)
$j = Bank$	1.882	-2.834	-0.120	1.489		-0.087
	(4.422)	(4.779)	(2.379)	(2.215)		(1.687)
$j = World$	-3.670	-4.978	1.415	-0.087	0.073	
	(11.101)	(11.979)	(10.962)	(3.948)	(3.087)	

[a] The reported parameter estimates for both the volatility spillover and contagion-in-asymmetric-volatility coefficients can be interpreted as follows. For example, if x_{ij} represents the volatility spillover coefficient from market j to market i, then the volatility spillover coefficient estimate from JP to GM is 0.034, which corresponds to $g_{GM,JP}$ in matrix G in the variance-covariance matrix in equation (3). Similarly, the volatility spillover coefficient estimate from UK to GM is 0.118, which corresponds to $k_{GM,UK}$ in matrix K in the variance-covariance matrix in equation (3), and so on. The reported parameter estimates for the contagion-in-asymmetric-volatility coefficients have the same interpretation as those for volatility spillover coefficients. Robust standard errors are given in parentheses. * and ** denote statistical significance at the 5% and 1% level, respectively.

Table 3
Hypothesis tests: prices of risks and predictability of conditioning variables

Null Hypothesis	Wald	d.f.	P-Value
1. Are the prices of industry and market and risks equal to zero? $H0: \varphi_{ind} = \varphi_{mkt} = 0; Z_{t-1} = \{CONSTANT, DIV, \Delta USTP, USDP, World\}$	586.387	10	0.000
2. Are the prices of industry and market risks constant? $H0: \varphi_{ind} = \varphi_{mkt} = 0; Z_{t-1} = \{DIV, \Delta USTP, USDP, World\}$	67.374	8	0.000
3. Is the price of industry risk equal to zero? $H0: \varphi_{ind} = 0; Z_{t-1} = \{CONSTANT, DIV, \Delta USTP, USDP, World\}$	203.462	5	0.000
4. Is the price of industry risk constant? $H0: \varphi_{ind} = 0; Z_{t-1} = \{DIV, \Delta USTP, USDP, World\}$	25.388	4	0.000
5. Is the price of market risk equal to zero? $H0: \varphi_{mkt} = 0; Z_{t-1} = \{CONSTANT, DIV, \Delta USTP, USDP, World\}$	90.205	5	0.000
6. Is the price of market risk constant? $H0: \varphi_{mkt} = 0; Z_{t-1} = \{DIV, \Delta USTP, USDP, World\}$	24.758	4	0.000
7. Is there no predictability from excess dividend yield? $H0: \varphi_{ind,k} = \varphi_{mkt,k} = 0; \forall k = DIV$	21.308	2	0.000
8. Is there no predictability from the change in term premium? $H0: \varphi_{ind,k} = \varphi_{mkt,k} = 0; \forall k = \Delta USTP$	0.198	2	0.905
9. Is there no predictability from the U.S. default premium? $H0: \varphi_{ind,k} = \varphi_{mkt,k} = 0; \forall k = USDP$	2.325	2	0.312
10. Is there no predictability from the world market portfolio? $H0: \varphi_{ind,k} = \varphi_{mkt,k} = 0; \forall k = World$	19.141	2	0.000

Table 4
Hypothesis tests: mean spillover and contagion in mean

Null Hypothesis	Wald	d.f.	P-Value
1. Is there no mean spillover for GM **?** $H0:\phi_{GM,j}=0;\forall j=JP,UK,US$	11.618	3	0.000
2. Is there no mean spillover for JP **?** $H0:\phi_{JP,j}=0;\forall j=GM,UK,US$	3.057	3	0.382
3. Is there no mean spillover for UK **?** $H0:\phi_{UK,j}=0;\forall j=GM,JP,US$	31.557	3	0.000
4. Is there no mean spillover for US **?** $H0:\phi_{US,j}=0;\forall j=GM,JP,UK$	1.538	3	0.673
5. Is there no contagion in return shocks for GM **?** $H0:\omega_{GM,j}=0;\forall j=JP,UK,US$	14.771	3	0.002
6. Is there no contagion in return shocks for JP **?** $H0:\omega_{JP,j}=0;\forall j=GM,UK,US$	214.791	3	0.000
7. Is there no contagion in return shocks for UK **?** $H0:\omega_{UK,j}=0;\forall j=GM,JP,US$	30.687	3	0.000
8. Is there no contagion in return shocks for US **?** $H0:\omega_{US,j}=0;\forall j=GM,JP,UK$	30.205	3	0.000
9. Is there no mean spillover from GM **?** $H0:\phi_{i,GM}=0;\forall i=JP,UK,US$	2.183	3	0.535
10. Is there no mean spillover from JP **?** $H0:\phi_{i,GM}=0;\forall i=JP,UK,US$	37.561	3	0.000
11. Is there no mean spillover from UK **?** $H0:\phi_{i,UK}=0;\forall i=GM,JP,US$	1.605	3	0.658
12. Is there no mean spillover from US **?** $H0:\phi_{i,US}=0;\forall i=GM,JP,UK$	14.664	3	0.002
13. Is there no contagion in return shocks from GM **?** $H0:\omega_{i,GM}=0;\forall i=JP,UK,US$	312.761	3	0.000
14. Is there no contagion in return shocks from JP **?** $H0:\omega_{i,JP}=0;\forall i=GM,UK,US$	21.364	3	0.000
15. Is there no contagion in return shocks from UK **?** $H0:\omega_{i,UK}=0;\forall i=GM,JP,US$	137.002	3	0.000
16. Is there no contagion in return shocks from US **?** $H0:\omega_{i,US}=0;\forall i=GM,JP,UK$	35.453	3	0.000

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Do Enhanced Index Funds Outperform Pure Index Funds?

C. Edward Chang and George S. Swales, Jr.

Introduction

Over the past 25 years, index funds have gained tremendous popularity among equity investors. Recently, a special group of quasi-index funds, including enhanced, leveraged, and inverse index funds (Ferri, 2002, pp. 149-150), have evolved as a synthesis between pure index funds and actively managed funds. Enhanced index funds are funds that make adjustments to indexed portfolios in an effort to increase returns relative to the benchmark market index. According to Morningstar, "Like index funds, this group includes funds that attempt to match an index's performance. Unlike an index fund, however, enhanced index funds attempt to better the index by either adding value or reducing volatility through selective stock-picking."

In this paper, we first distinguish enhanced indexing from pure indexing, then review the literature on performance studies of enhanced index funds, and examine the characteristics and performance of pure index funds and enhanced index funds.

Enhanced Indexing vs. Pure Indexing

Where does enhanced indexing belong? Active portfolio managers seek to outperform the market as defined in the prospectus. Managers of an index fund attempt to match a specified index. If enhanced indexing is to outperform the market, the approach must involve active management techniques. If enhanced indexing is to closely track the targeted index, it must share with indexing certain techniques designed to control risk. "Risk-controlled active management" may be a more appropriate phrase, but enhanced indexing may better reflect marketing imperatives more than any desire for linguistic precision. If enhanced indexing delivers consistent excess returns with close tracking and few disappointments, investors may prefer it to traditional forms of indexing or active management.

Two factors distinguish enhanced indexing from pure indexing. The first factor consists of the degree of active management and portfolio turnover. Pure index funds are passively-managed portfolios, in which trades are made only when necessary to rebalance the portfolio and to realign the portfolio's risk and return characteristics with those of the index. Enhanced index funds are actively-managed portfolios in which trades are intended to rebalance the portfolio and to capture any available investment opportunities. Therefore, enhanced index funds typically have higher turnover rates than pure index funds. The second factor consists of the direction and magnitude of realized tracking error. Pure index funds are managed with the objective of minimizing realized tracking error, while enhanced index funds are managed with the objective of maximizing positive realized tracking error.

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How enhanced indexing accomplishes its objective varies across a spectrum of techniques. Loftus (2000), McKee (1998), Schoenfeld and Yang (2004), as well as Steinberg and Madigan (1999) discuss the major methods of enhanced equity indexing. With security-based methods, fund managers may underweight or eliminate stocks they think are overvalued and increase the weight of stocks they think are undervalued. Other security-based methods focus on equally-weighted portfolios. Using this approach, portfolio managers place the same amount of money in each stock in the fund rather than allocating funds by its value in the index. With synthetic methods, funds create an index fund using derivatives such as futures, options, and equity swaps in an attempt to capture small anomalies in stock or bond market pricing and in an attempt to beat the market by a small margin.

Review of Previous Studies

Are enhanced index funds worthy of investors' money? That depends on whom we ask. Mutual fund firms who manufacture and sell the funds claim they are index funds that can be used to enhance returns (e.g., Neal, 1999). DiBartolomeo (2000) argues that investing in enhanced index funds is a better alternative to investing in a combination of index and actively managed funds. In his view, compared with combination strategies, enhanced index funds reduce transaction costs and avoid capitalization biases, while better utilizing manager forecasting skills.

Many other observers, including index purists and academics (e.g., Gutner, 1999; Haslem, 2003; McDowell, 1999; Polyak, 2000; Scott and Stumpp, 2003; and Swedroe, 2004), would say that these funds are actively managed funds and do not belong in any index fund portfolio. These safe-sounding funds attempt to provide returns higher than a specified index, but not without assuming more risk. Zweig (1999) discusses three types of enhanced index funds, but concludes that they provide "a jumble of erratic performance, higher risks, higher taxes and higher expenses." Riepe and Werner (1998) study eight large-blend funds, but only two provide enhanced returns while exhibiting characteristics reasonably consistent with the S&P 500 index. Barbee (1998) examines enhanced index funds and concludes that they are "hardly a no-lose proposition." Jorion (2003) warns that enhanced index funds may result in seriously inefficient portfolios since funds managers pay no attention to total portfolio risk. Ahmed and Nanda (2005) find that enhanced index funds do not outperform their benchmarks.

In this paper, we examine the characteristics and performance of pure index funds and enhanced index funds. Characteristics include expense ratios and annual turnover. Performance measures include Morningstar's category-based risk and return ratings, and analysis of three-year average returns, risk (measured by standard deviation and beta) and risk-adjusted returns (measured by the Sharpe ratio and Alpha).

Data

All pure index funds and enhanced index funds in the U.S., with data available on September 30, 2005, were collected from Morningstar and Yahoo! Finance. As shown in Table I, of 11,018 stock and bond mutual funds in 21 categories by Morningstar, 443 pure index funds and 216 enhanced index funds were found to have expense ratio and annual turnover data. In order to make meaningful comparisons, we then chose only categories that have three-year risk and performance measures data for both pure index funds and enhanced index funds. As a result, we found 372 pure index funds and 176 enhanced index funds in 16 categories that were directly comparable. Large blend is the most popular category with both types of index funds, followed by small blend, mid-blend, foreign large blend, large growth, and intermediate-term bond categories.

Results

Expense ratios and annual turnover rates are shown in Table II. Pure index funds have much lower expense ratios (0.64%) and turnover (110.05%) than both enhanced index funds (1.73%, 500.85%) and the average of all mutual funds (1.52%, 119.56%) across all categories. Enhanced index funds have higher expense ratios and much higher turnover than the category average. Lower turnover will lead to better tax efficiency for capital-gains considerations.

Morningstar return, risk and "star" (or risk-adjusted return) ratings are shown in Table III. Morningstar rates mutual funds from 1 to 5 stars based on how well they have performed (after adjusting for risk and accounting for sales charges) in comparison to similar funds. Within each Morningstar category, the top 10% of funds receive 5 stars and the bottom 10% receive 1 star (the next 22.5% receive 2 and 4 stars, the middle 35% receive 3 stars). Funds are rated for up to three time periods (three-, five-, and 10-years) and these ratings are combined to produce an overall rating. Return and risk are assessed in a similar manner. This study finds that, over the past 10 years, pure index funds exhibit higher returns (3.29 vs. 2.80), lower risk (2.92 vs. 3.67), and higher risk-adjusted return (3.35 vs. 2.48) ratings than enhanced index funds. The only exceptions are found in the categories of taxable-bond funds, where pure index funds exhibit higher risk (3.74 vs. 2.48) than enhanced index funds.

Annualized NAV returns over the past three-year period ended September 30, 2005 are shown in Table IV. Morningstar calculates NAV total return by taking the change in a fund's NAV (assuming the reinvestment of all income and capital gains distributions on the actual reinvestment date used by the fund during the period), and then dividing by the initial NAV. This study finds pure index funds, compared to enhanced index funds, exhibit higher NAV returns in the categories of all international-stock funds and half of taxable-bond funds, but mostly (8 of 11) lower NAV returns in the categories of domestic-stock funds. Overall, pure index funds and enhanced index funds exhibit higher NAV returns than the average of all categories of stock mutual funds, but they don't perform as well in taxable-bond funds.

Table IV also shows results of standard deviations (risk) and Sharpe ratios (risk-adjusted return) over the same three-year period. Standard deviation is a statistical measure of the dispersion of a fund's performance. When a fund has a high standard deviation, the predicted range of performance is wide, implying greater volatility. At Morningstar, the standard deviation is computed using the trailing monthly total returns for the appropriate time period. All monthly standard deviations are then annualized. The Sharpe ratio is calculated for the past 36-month period by dividing a fund's annualized excess returns over the risk-free rate by its annualized standard deviation. The Sharpe ratio is then recalculated on a monthly basis and the higher the ratio, the better the fund's historical risk-adjusted performance. Pure index funds exhibit lower standard deviations (12.13%) than the average of all mutual funds (12.61%) and enhanced index funds (17.24%) across all categories, with the exception of taxable-bond funds where pure index funds exhibit the highest standard deviations. Pure index funds exhibit higher Sharpe ratios than enhanced index funds (1.30% vs. 1.03%).

Additional three-year results of market risk, measured by beta coefficients, and risk-adjusted returns, measured by Alphas, are shown in Table V. Beta is a measure of a fund's sensitivity to market movements. Alpha measures the difference between a fund's actual returns and its expected performance, given its risk level as measured by beta. A positive alpha indicates the fund has performed better than its beta would predict. Pure index funds exhibit lower beta coefficients (0.94 vs. 1.37 against standard index; 0.94 vs. 1.23 against best fit index) and higher Alphas (3.00% vs. -0.33% against standard index; -0.54% vs. -5.05% against best fit index) when compared with enhanced index funds.

Conclusion

Enhanced index funds are a hybrid between actively managed funds and passive index funds. They set an explicit objective to outperform a benchmark. Ordinary investors would expect enhanced index funds to live up to their names---enhance their performance. Our results, based on data from Morningstar and Yahoo! Finance, however, suggest that enhanced index funds have mostly lower returns, much higher risk, and end up with lower risk-adjusted returns. Enhanced index funds behaved more like actively-managed funds, with higher expense ratios and very high turnover. Investors beware!

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Table I

The Number* of Available and Comparable Pure Index Funds and Enhanced Index Funds

Morningstar Category	Total Number of Funds	Available**		Comparable***	
		Pure Index Funds	Enhanced Index Funds	Pure Index Funds	Enhanced Index Funds
Domestic-Stock Funds					
Large Blend	1,581	211	80	187	67
Large Growth	1,397	32	22	25	20
Large Value	1,119	9	6	5	5
Mid-Cap Blend	397	37	12	32	12
Mid-Cap Growth	791	4	7	2	6
Mid-Cap Value	289	2	1		
Small Blend	480	41	17	36	17
Small Growth	703	6	5	4	4
Small Value	286	6	1		
Specialty-Financial	116	1	8		
Specialty-Health	179	1	10		
Specialty-Natural Resources	118	1	2		
Specialty-Real Estate	236	6	2	5	2
Specialty-Technology	274	6	6	4	6
Specialty-Utilities	94	2	2	1	2
Moderate Allocation	1,027	3	7	3	7
International-Stock Funds					
Europe Stock	93	5	2	5	2
Foreign Large Blend	524	40	3	34	3
Japan Stock	41	3	4	3	4
Taxable-Bond Funds					
Intermediate-Term Bond	920	24	14	23	14
Short-Term Bond	353	3	5	3	5
Total Number of Funds	11,018	443	216	372	176

* As of September 30, 2005 at Morningstar and Yahoo! Finance.

** Available for at least expense ratio and annual turnover rate.

*** Comparable for all three-year measures.

Table II
Expense Ratio and Annual Turnover

Morningstar Category	Expense Ratio (%)			Annual Turnover (%)		
	AMFs	PIFs	EIFs	AMFs	PIFs	EIFs
Domestic-Stock Funds						
Large Blend	1.21	0.66	1.31	73.95	22.56	257.33
Large Growth	1.50	0.89	1.83	101.45	167.59	535.82
Large Value	1.39	0.86	1.83	62.16	180.22	673.50
Mid-Cap Blend	1.45	0.78	1.58	95.34	69.76	217.08
Mid-Cap Growth	1.59	1.27	1.55	130.11	662.50	309.57
Mid-Cap Value	1.46	0.26	1.46	72.20	23.00	731.00
Small Blend	1.50	0.79	1.33	79.91	40.83	126.65
Small Growth	1.71	0.84	1.74	124.62	313.33	267.00
Small Value	1.54	0.79	1.47	67.62	199.00	744.00
Specialty-Financial	1.74	0.28	2.17	178.87	9.00	448.25
Specialty-Health	1.83	0.28	2.21	148.86	8.00	484.60
Specialty-Natural Resources	1.57	0.28	2.14	159.31	8.00	634.00
Specialty-Real Estate	1.60	0.83	2.05	108.84	19.50	1,303.00
Specialty-Technology	1.92	1.14	2.21	205.35	10.50	608.33
Specialty-Utilities	1.53	0.57	2.39	133.72	20.50	1,001.00
Moderate Allocation	1.23	0.13	1.63	77.97	26.00	637.86
International-Stock Funds						
Europe Stock	1.78	0.93	1.99	114.19	299.80	350.00
Foreign Large Blend	1.62	0.90	1.35	81.41	17.79	58.33
Japan Stock	1.65	0.25	2.07	160.88	3.00	738.00
Taxable-Bond Funds						
Intermediate-Term Bond	1.06	0.37	1.19	202.43	110.75	289.57
Short-Term Bond	1.00	0.27	0.89	131.47	99.33	103.00
Averages						
Domestic-Stock Funds	1.55	0.67	1.81	113.77	111.27	561.19
International-Stock Funds	1.68	0.69	1.80	118.83	106.86	382.11
Taxable-Bond Funds	1.03	0.32	1.04	166.95	105.04	196.29
Above Three Categories	1.52	0.64	1.73	119.56	110.05	500.85

AMFs: Average of All Mutual Funds
PIFs: Pure Index Funds
EIFs: Enhanced Index Funds

Table III
Morningstar Return, Risk and Star Ratings

	Return Rating		Risk Rating		Star Rating	
Morningstar Category	PIFs	EIFs	PIFs	EIFs	PIFs	EIFs
Domestic-Stock Funds						
Large Blend	2.95	3.06	3.11	3.13	2.87	3.03
Large Growth	3.48	2.85	3.72	4.20	3.38	2.75
Large Value	3.22	4.20	3.78	4.60	3.33	2.40
Mid-Cap Blend	3.09	3.25	3.21	3.33	3.09	3.42
Mid-Cap Growth	3.00	2.67	2.00	2.33	3.00	3.00
Small Blend	2.61	3.35	3.71	3.29	2.58	3.29
Small Growth	3.50	2.50	2.67	3.00	3.50	2.50
Specialty-Real Estate	2.40	4.00	3.40	5.00	2.40	1.50
Specialty-Technology	3.75	2.33	1.50	5.00	4.50	2.00
Specialty-Utilities	4.00	2.50	3.00	5.00	4.00	2.00
Moderate Allocation	3.00	1.29	2.00	4.00	3.33	1.29
International-Stock Funds						
Europe Stock	2.60	2.50	3.00	4.00	2.60	2.50
Foreign Large Blend	3.44	3.67	2.75	2.33	3.47	3.67
Japan Stock	4.00	2.00	1.33	4.50	4.00	1.50
Taxable-Bond Funds						
Intermediate-Term Bond	3.57	2.64	3.48	2.36	3.57	2.79
Short-Term Bond	4.00	2.00	4.00	2.60	4.00	2.00
Averages						
Domestic-Stock Funds	3.18	2.91	2.92	3.90	3.27	2.47
International-Stock Funds	3.35	2.72	2.36	3.61	3.36	2.56
Taxable-Bond Funds	3.79	2.32	3.74	2.48	3.79	2.40
Above Three Categories	3.29	2.80	2.92	3.67	3.35	2.48

PIFs: Pure Index Funds
EIFs: Enhanced Index Funds

Table IV
Three-Year Average Annual Return, Standard Deviation and Sharpe Ratio

	Annual Return (%)			Standard Deviation (%)			Sharpe Ratio (%)	
Morningstar Category	AMFs	PIFs	EIFs	AMFs	PIFs	EIFs	PIFs	EIFs
Domestic-Stock Funds								
Large Blend	15.72	16.12	16.89	11.03	11.09	11.76	1.25	1.25
Large Growth	14.62	20.05	20.29	12.72	16.85	21.37	1.08	0.86
Large Value	17.75	20.10	20.98	11.15	11.94	22.22	1.46	1.05
Mid-Cap Blend	21.57	22.04	24.62	13.00	12.36	14.63	1.54	1.51
Mid-Cap Growth	19.58	15.21	13.94	14.27	11.54	13.87	1.15	0.98
Small Blend	23.25	23.48	25.98	14.61	15.38	17.52	1.35	1.36
Small Growth	21.17	22.05	14.63	16.71	14.45	17.21	1.34	0.78
Specialty-Real Estate	25.93	24.05	30.21	15.00	15.63	23.85	1.36	1.17
Specialty-Technology	24.67	26.17	40.53	25.08	21.42	46.77	1.13	0.91
Specialty-Utilities	25.76	24.49	31.78	10.08	10.20	16.46	2.05	1.68
Moderate Allocation	12.40	12.49	7.23	7.32	6.55	8.37	1.57	0.71
International-Stock Funds								
Europe Stock	26.94	25.30	25.16	14.18	13.83	17.90	1.59	1.26
Foreign Large Blend	22.03	23.86	23.71	11.91	11.72	11.07	1.75	1.84
Japan Stock	18.04	22.18	18.83	18.62	14.17	27.25	1.37	0.71
Taxable-Bond Funds								
Intermediate-Term Bond	4.01	3.77	3.95	4.13	4.45	3.95	0.47	0.57
Short-Term Bond	2.13	2.47	1.40	1.99	2.47	1.64	0.31	-0.18
Averages								
Domestic-Stock Funds	20.22	20.57	22.46	13.72	13.40	19.46	1.39	1.11
International-Stock Funds	22.34	23.78	22.57	14.90	13.24	18.74	1.57	1.27
Taxable-Bond Funds	3.07	3.12	2.68	3.06	3.46	2.80	0.39	0.20
Above Three Categories	18.47	18.99	20.01	12.61	12.13	17.24	1.30	1.03

AMFs: Average of All Mutual Funds
PIFs: Pure Index Funds
EIFs: Enhanced Index Funds

Table V
Beta Coefficients and Alphas

	Against Standard Index						Against Best Fit Index			
	Beta			Alpha (%)			Beta		Alpha (%)	
Morningstar Category	AMFs	PIFs	EIFs	AMFs	PIFs	EIFs	PIFs	EIFs	PIFs	EIFs
Domestic-Stock Funds										
Large Blend	0.95	1.00	1.04	-0.18	-0.49	-0.38	1.00	1.04	-0.68	-1.08
Large Growth	1.03	1.39	1.70	-2.12	-1.94	-5.48	0.99	1.19	-2.25	-7.50
Large Value	0.94	1.05	1.72	1.81	2.36	-4.82	1.09	1.80	-1.80	-8.78
Mid-Cap Blend	0.98	0.97	2.08	4.56	5.12	-4.88	1.00	1.36	-0.52	-7.39
Mid-Cap Growth	1.06	0.88	1.50	2.03	0.51	-7.21	0.94	1.41	-4.71	-11.23
Small Blend	1.04	1.15	1.26	5.39	4.18	4.95	0.98	1.15	-0.39	-1.65
Small Growth	1.19	1.04	1.18	1.80	4.47	-3.63	0.88	0.88	0.59	-4.84
Specialty-Real Estate	0.38	0.38	0.65	17.15	15.73	18.50	0.97	1.48	-1.38	-6.50
Specialty-Technology	1.90	1.73	3.44	-3.86	-1.04	-7.14	1.05	2.16	-3.01	-12.62
Specialty-Utilities	0.54	0.43	0.42	14.06	14.66	21.46	0.64	1.17	3.85	-3.70
Moderate Allocation	0.58	0.57	2.27	1.94	2.14	-5.54	0.58	1.11	1.55	-5.33
International-Stock Funds										
Europe Stock	1.04	1.07	1.39	1.11	-0.69	-6.96	1.00	1.24	0.62	-5.46
Foreign Large Blend	0.97	0.99	0.92	-1.58	-0.33	0.81	0.99	0.93	-0.57	0.51
Japan Stock	0.72	0.72	1.10	1.32	4.14	-3.98	1.00	1.40	0.47	-4.33
Taxable-Bond Funds										
Intermediate-Term Bond	0.95	1.05	0.93	0.15	-0.29	0.15	1.01	0.83	-0.33	-0.17
Short-Term Bond	0.43	0.57	0.36	-0.56	-0.51	-1.12	0.99	0.62	-0.02	-0.80
Averages										
Domestic-Stock Funds	0.96	0.96	1.57	3.87	4.15	0.53	0.92	1.34	-0.80	-6.42
International-Stock Funds	0.91	0.93	1.14	0.28	1.04	-3.38	1.00	1.19	0.17	-3.09
Taxable-Bond Funds	0.69	0.81	0.65	-0.21	-0.40	-0.49	1.00	0.73	-0.18	-0.49
Above Three Categories	0.92	0.94	1.37	2.69	3.00	-0.33	0.94	1.23	-0.54	-5.05

AMFs: Average of All Mutual Funds
PIFs: Pure Index Funds
EIFs: Enhanced Index Funds

Dollar-Cost Averaging Withdrawals: A Simulation Comparison of Interval Length and Timing

Brian Porter

Abstract

Dollar-cost averaging (DCA) is a common investment technique. The premise being, by investing a fixed amount in a given security over equal periodic intervals, one will buy more shares when the price of the security is low, and less shares when the price is high. To its advantage, DCA's instinctive purchasing of more shares when the price of a security is low, partially fulfills the cliché investing advice, *buy low and sell high*. Because the average price of the cumulative shares purchased with DCA will always be less than the average price of the security over the same period of time (Whitehead, 1999), DCA can reduce an investor's risk (Malkiel, 2004). Given its proven results, and simplicity to execute, DCA is a popular technique for buying investments, often touted by investment companies (e.g., Fidelity Investments) and investment gurus (e.g., Jane Bryant Quinn and the Motley Fools).

Previous research has largely focused entirely on building wealth using DCA. Very little research has examined the withdrawal of funds, such as during one's retirement years. Although DCA is a proven method for building wealth, is it also an effective tool for selling investments? This research examines DCA from the perspective of withdrawing funds. DCA may be a common application used by retirees to sell funds during their golden years, yet little research exists to support its performance. In fact, one hypothesis is that the appeal of DCA for investing, is a detriment for withdrawals. That is, using DCA to withdraw funds would result in selling more shares when prices are low, and selling fewer shares when prices are high. One would prefer exactly the opposite, to sell more shares when prices are *high*.

This study fills the gap that currently exists in this area of research and advances this body of knowledge in three important ways. One, it examines DCA, a technique for building wealth, and applies it to the withdrawal of funds. Two, it compares two controllable factors for DCA withdrawals, *interval length* and *timing of withdrawals*. Three, it uses recent data that are comprehensive of the overall market. Results of this study indicate that both interval length and timing of withdrawals impact the performance of DCA as a withdrawal strategy. It is also found that, contrary to intuitive thinking, the performance of DCA is relatively good.

Introduction

As defined contribution retirement plans, rather than defined benefit retirement plans, become the norm, the number of people investing for retirement continues to grow. From 1975 to 1998, there was an increase of 42 million Americans enrolled in non-Social Security retirement programs, from 44 million to 86 million. In 1975, the predominant plan was defined benefit with 32 million Americans participating in 103,000 different defined benefit

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plans. In contrast, 10 million Americans were participating in 208,000 different defined contribution plans. By 1998, the dominate plan had switched. Forty-six million were defined contribution plans and 40 million defined benefit plans (Migration News). The trend is clearly away from defined benefit plans and to defined contribution plans. Even financially healthy companies, such as IBM, Hewlett Packard, and Motorola have frozen their traditional pension plans and replaced them with 401(k)s (Donlan, 2006).

Another pivotal factor that may increase individually managed retirement plans is the looming possible overhaul of the current Social Security system. Whether or not Social Security is currently in crisis is debatable. However, it is evident that Social Security faces a deficit. Demographics are forcing the need to revisit Social Security as it currently exists. In the next two decades the number of people over the age of 65 will nearly double from what it is today (Schwadron, 2006). In 1950, there were 16 workers to support every one beneficiary of Social Security. Today, there are only 3.3 workers supporting every Social Security beneficiary. It is projected that in 45 years, there will be only 2 workers supporting each beneficiary (Rohrich, 2005). In response to the current Social Security situation, one proposed solution is personal Social Security accounts. These personal accounts would function very similarly to defined contribution retirement accounts where individuals will periodically invest into mutual funds. Though support for this proposal has considerable detractors it also has advocates, most notably is Alan Greenspan, former chairman of the Federal Reserve (Andrews, 2005). Should personal Social Security accounts become a reality, it will instigate millions of investors to be more involved in retirement investing.

Because of this shift from traditional defined benefit plans to self-managed defined contribution plans, an increasing number of people, even those with little, or no, finance and investing expertise, are being forced to make financial investing decisions for retirement. Unfortunately, according to the nonprofit group Jump$tart Coalition for Personal Financial Literacy, too many people are financially illiterate. According to the organization's 2006 survey, high school seniors were able to correctly answer only 52.4 percent of questions about personal finance and economics (Jump$tart). Federal Reserve Chairman Ben Bernanke recently told Congress that "Sharpening Americans' financial know-how and skills is crucial to consumers' ability to make smart money choices and is also good for the overall economy" (Aversa).

Without knowledge or strategy, DCA is often used for investing and withdrawing funds from personally managed retirement accounts. One alternative to DCA is market timing, where one attempts to withdraw funds (i.e., sell) when the market is high. However, the efficient market hypothesis implies that market timing is but a game of chance. This sentiment is strongly echoed, and extensively explained, in the highly acclaimed book *A Random Walk Down Wall Street* (Malkiel, 2004). Therefore, it is useful to examine DCA, a passive strategy that does not attempt to time the market. This study will provide much needed insight into the implementation and implications of DCA as a strategy for withdrawals.

Prior Research

Though there is very little research pertaining to the withdrawal of funds (e.g., during retirement), DCA has been extensively researched as a tool for investing and growing wealth. It

is worthwhile to understand this research as a foundation for this study. In general, there are two scenarios where an investment strategy of DCA is applicable. First, there is the situation when one receives a lump sum amount, such as an inheritance or severance payout. In this instance, one has the option of either investing the entire lump sum at once, or periodically investing an equal portion of the lump sum amount during periodic fixed intervals. This is commonly termed as a decision between lump sum investing or DCA. Research has largely indicated that a lump sum investment, rather than DCA, is superior (Constantinides, 1979). Rozeff (1994) indicates that, if the stock market has a positive expected risk premium, a lump sum investment strategy is superior to DCA. Atra and Mann (2001), however, show that results of lump sum and DCA are heavily dependent on the seasonality of the equity returns. More recently, Abeysekera and Rosenbloom (2000) have challenged the precept that DCA is consistently inferior to a lump sum investment. Their simulation study indicates that the superiority of lump sum or DCA is dependent on many factors, including the expected rate of return on the stock and opportunity cost of capital represented by the risk-free rate.

The second, and much more common, scenario of DCA is the ongoing investment of periodic cash flows, such as with contributions to a defined contribution retirement plan. Austin (1995) performed a simulation study of DCA that invested in an S&P 500 fund over a 19 year period. The simulation examined two key factors, timing relative to market cycles, and periodic cash flow frequency. Results indicate that timing does matter. DCA works best when initiated and terminated at periods when market prices are high relative to interim prices. It was also found that shorter investment frequencies, such as weekly or monthly, are superior to longer frequencies, such as quarterly or annually. Johnson and Krueger (2004) determined that DCA is a good strategy, and trying to time the market is not recommended.

Factors Examined

A simulation study has been completed that examines two unique factors regarding DCA as a withdrawal strategy: (1) interval length between withdrawals, and (2) timing of the interval. In total, 72 different simulations were performed, 60 of which examined these two factors. In addition, for comparison purposes, 12 additional simulations were performed.

For the first factor examined, *interval length between withdrawals,* three different interval lengths were studied that utilized a pure DCA strategy. The interval lengths studied were *yearly, monthly*, and *weekly*. The second factor researched, *timing of the interval*, is dependent upon the interval length. For example, a *weekly* interval length has five possible *timings*, one for each day of the week—*Monday*, *Tuesday*, *Wednesday*, *Thursday*, or *Friday*. A monthly interval length has 31 possible timings, one for each possible day of a month—the 1st day of the month, the 2nd day of the month, the 3rd day of the month, and so forth. In total, 60 different DCA simulations were performed. A summary of the 60 different interval and timing combinations is provided in Table I. In certain circumstances, when a particular timing interval was not always feasible, a default was selected. For example, the heuristic to "sell on the 31st of each month" is not possible in five months of the year (February, April, June, September, and November). Instead, in these five months, withdrawals occurred on the last day of the month. Similarly, if the heuristic was to "sell on Mondays" and a particular Monday was a holiday (i.e., the markets were closed), the withdraw occurred on the next business day (e.g., Tuesday).

For comparison purposes, in addition to the 60 DCA simulations, six *market timing* simulations were also performed. Unlike with DCA, the interval lengths for the market timing simulations are not constant. Rather than selling shares (i.e., withdrawals) at a specified time (e.g., 1st of each month or every Tuesday), as with DCA, a *market timing* strategy attempts to sell shares at opportune times, such as when shares are selling at a high price. The obvious difficulty with market timing is that the future is unpredictable. That is, it is not possible to know, at any given point in time, if the current selling price of a security is lower or higher than will be the security's selling price tomorrow, next week, or one month from now. For the six market timing intervals examined in this simulation, a predefined heuristic was used to trigger withdrawals when a certain market condition was met. For example, one heuristic used was to sell if the S&P 500 Index is greater than the previous day. A second heuristic was to sell if the S&P 500 Index is less than the previous day. This heuristic was repeated for two day and three day intervals. That is, sell if the S&P Index is greater (or less) than the two (three) previous days.

Finally, again for comparison purposes, six additional simulations were performed that employed fictitious/hindsight withdrawal strategies. For example, one simulation sold investments on the exact day the S&P 500 Index was at the highest point for the year. This is an optimal yearly withdrawal strategy. In contrast, a second fictitious/hindsight simulation made yearly withdrawals on the exact day the S&P 500 Index was at the lowest point for the year. The ending values associated with these best and worst possible withdrawal strategies provide upper and lower bounds for comparison purposes. The other four fictitious/hindsight simulations followed similar withdrawal strategies but on a weekly and monthly basis. A summary of the six different market timing simulations and the six fictitious/hindsight simulations is provided in Table II.

The Simulation Model

The research simulated withdrawal strategies for the 20 year period from January 3, 1983 through December 31, 2002. It was assumed that on January 1, 1983 the beginning saving balance was $1,000,000. This amount is an approximated cumulative savings of an investor at the point of retirement. A fixed amount was withdrawn from this investment according to the DCA strategy employed (e.g., *withdraw fixed amount of money on 1st day of each month*). The amount withdrawn from the account varied depending on the DCA strategy and what amount would result in a zero balance on December 31, 2002. That is, subsequent to the final withdrawal in 2002, there was $0 remaining in the account. To reflect inflation and cost of living, the amount of withdrawal increased by 4% at the end of each calendar year. For example, in the simulation with the heuristic *yearly withdrawals on January 1 of each year* , the first withdrawal on January 1, 1983 was $95,859.15. The second withdrawal on January 1, 1984 was $99,693.52 (i.e., $95,859.15 * 1.04). The final withdrawal on January 1, 2002 was $201,960.78 (i.e., $95,859.15 * 1.04^{19}). Further, after the withdrawal on January 1, 2002, the balance in the account was $0. Therefore, each withdrawal had effectively an equal *real dollar amount* or *buying power.*

To approximate a representative benchmark of a diversified higher-risk investment portfolio, the simulation invested money in the S&P 500 index. The S&P 500 Index represents approximately 70% of all United States publicly traded companies (Fool.com). Those stocks

included in the S&P 500 are selected based on market size, liquidity, and sector representation. As such, it is highly diverse. Further, the S&P 500 Index accurately reflects the investment choice of a large percentage of investors. Evidence of this is the fact that the Vanguard S&P 500 Index Fund (VFINX) is the largest mutual fund in the world with assets of over 103.4 billion dollars (money.cnn.com, 2005). A diversified mutual fund, such as an S&P Index fund, is also representative of a typical investment choice that would be available to millions of additional investors should personal Social Security accounts become a reality. Therefore, the simulation used daily closing price data for the S&P 500 Index for the 20 year period from January 3, 1983 through December 31, 2002. The assumption was that funds were invested in a no-load mutual fund, thus transaction costs were not considered. Dividends were excluded, which is consistent with prior simulation studies (Johnson and Krueger, 2005).

Simulation Results

The key measurement examined in all 72 simulations was the dollar amount withdrawn, which can be measured each period or in total over the 20 years form January 3, 1983 through December 31, 2002. The total dollar value for the withdrawals for each of the 72 simulations is given in Tables III through VIII.

Several observations can be made regarding the simulation results. Overall, concurring with research by Austin (1995) in regards to DCA as an investment strategy, interval length does impact results for withdrawals. However, in contrast to investing, where shorter interval frequencies are superior to longer frequencies, the reverse is true for withdrawals. For the 20 year period, from January 1, 1983 to December 31, 2002, the S&P Index experienced upward movement. In markets that go up, waiting to withdraw money for as long as possible yields better returns. For example, medians of the total withdrawals for different intervals are as follows: weekly \$3,047,816 (Table VI), monthly \$3,052,682 (Table III), yearly on the 1st \$3,091,915 (Table IV), and yearly on the 15th \$3,096,286 (Table V). In each instance, waiting longer to withdraw funds increases the total amount to be withdrawn. Even waiting 14 days, making withdrawals on the 15th rather than the 1st, increases the total amount, though only slightly. A larger difference of \$48,470 is seen in comparing weekly withdrawals with yearly withdrawals.

For yearly withdrawals (Tables IV and V), in general, the later in the year that withdrawals are made, the better the performance. However, there are exceptions, particularly with the third quarter being a very good period to sell. For withdrawals made on the 1st of the month, September is the best performing month, followed by July and December. For withdrawals made on the 15th, December is the best month and August is the second best month. This is an interesting finding, because it refutes the so-called *Halloween effect* and the adage, *sell in May and go away*. Investors should avoid selling in January, with the 1st of January (i.e., the first trading day after the New Year) being by far the lowest. When comparing withdrawals within the same month, in all instances, except two months, the 15th is superior to the 1st. Only in July and September is it better to make withdrawals on the 1st rather than the 15th.

When looking at monthly withdrawals (Table III), it is evident that allowing the funds to grow, by making withdrawals later in the month, is preferable. Waiting until the 27th, or later, is

particularly beneficial. However, the 16th is also a very good day to make withdrawals. The total amount withdrawn is $3,057,057 and is the fifth best day of the month to make withdrawals, even better than the following ten days that are later in the month (i.e., 17th through the 26th).

When comparing weekly withdrawals (Table VI), there is only a small difference between the performances of the days of the week. However, in contrast to yearly and monthly intervals, waiting is not the best strategy. Tuesday is the best day to make withdrawals, followed closely by Wednesday. Withdrawing money at the earliest opportunity (i.e., Monday) is the worst performing day.

DCA, as a withdrawal strategy, performs adequately compared with the market timing strategies simulated in this research. Table VII indicates that timing can improve results, but not greatly. Further, it is difficult to determine what differentiates the performance of the timing strategies. Ironically, the best performing strategy is *sell if S&P 500 is up for two days*, with a total withdrawal of $3,064,069 and the worst performing timing strategy is *sell if S&P 500 is up for three days*, with a total withdrawal of $3,051,477. In comparison, DCA on a monthly interval is extremely competitive with a median ending value of $3,052,682 (Table III). Of course, there are other market timing strategies that were not examined in this research that may have performed better or worse.

A final observation is that DCA performs moderately in comparison with the fictitious/hindsight strategies (Table VIII). This is evident when comparing the results of DCA with the best and worst case strategies. Table VIII summarizes the greatest and lowest possible ending values (i.e., upper and lower bounds) for yearly, monthly, and weekly withdrawal intervals. For yearly withdrawals, the upper and lower bounds for total amounts are $3,463,930 and $2,676,627 (the midpoint is $3,070,279). On average, the ending value for yearly DCA (Tables IV and V) is superior to the midpoint. For monthly withdrawals, the upper and lower bounds for total amounts are $3,139,919 and $2,964,479 (the midpoint is $3,052,199). On average, the ending value for monthly DCA (Table III) is almost equal to this midpoint. For weekly withdrawals, the upper and lower bounds for total amounts are $3,082,523 and $3,022,191 (the midpoint is $3,052,357). On average, the ending value for weekly DCA (Table VI) is slightly inferior to this midpoint. Relative to best and worst possible ending values, the results of DCA are adequate.

Conclusion

As the predominant retirement plan increasingly becomes defined contribution, rather than defined benefit, the usage of DCA as an investing strategy continues to grow. DCA is also a method for withdrawing funds, such as during retirement years. Previous research has largely focused on investing and growing wealth with DCA, but scarcely little research has examined the withdrawal of funds. This research has examined DCA as a withdrawal strategy. Results indicate that waiting longer to make withdrawals can improve performance. Also, longer intervals, on average, are better than shorter intervals. With yearly withdrawals, the third quarter (i.e., July through September) is a very favorable period in which to make withdrawals. For monthly withdrawals, the 16th of the month is competitive with later days of the month. When

withdrawals are made weekly, Tuesday is the best day and Monday is the worst. Overall, the returns on DCA perform adequately compared with timing and best/worst case possibilities.

Summary of 72 Simulation Combinations: Interval Length & Timing, Market Timing, and Fictitious Hindsight

Table I
Base Case: Dollar Cost Averaging Withdrawal Simulations

Interval Length and Timing	Examples of Withdrawal Dates	Quantity of Simulations
Yearly on the 1st of the month	Jan 1st, Feb 1st, Mar 1st,...Dec 1st	12
Yearly on the 15th of the month	Jan 15th, Feb 15th, Mar 15th,...Dec 15th	12
Monthly	1st, 2nd, 3rd, 4th, 5th,...31st	31
Weekly	Mon, Tue, Wed, Thu, Fri	5

Table II
Comparisons: Market Timing and Fictitious Withdrawal Simulations

Market Timing or Fictitious/Hindsight	Withdrawal Strategy: Sell if...
Market Timing	Lower than previous day
Market Timing	higher than previous day
Market Timing	Lower than previous two days
Market Timing	higher than previous two days
Market Timing	Lower than previous day three days
Market Timing	higher than previous day three days
Fictitious/Hindsight	highest value of week
Fictitious/Hindsight	lowest value of week
Fictitious/Hindsight	highest value of month
Fictitious/Hindsight	lowest value of month
Fictitious/Hindsight	highest value of month
Fictitious/Hindsight	lowest value of month

Summary of Simulation Results: Monthly

Table III
Monthly Withdrawals: Dollar Value

Day of Month	Year 1983	Year 2002	All 20 Years
1	$102,153	$215,221	$3,041,918
2	$102,267	$215,460	$3,045,304
3	$102,307	$215,546	$3,046,518
4	$102,216	$215,354	$3,043,799
5	$102,290	$215,510	$3,046,004
6	$102,342	$215,619	$3,047,550
7	$102,288	$215,506	$3,045,941
8	$102,319	$215,571	$3,046,864
9	$102,301	$215,532	$3,046,311
10	$102,334	$215,603	$3,047,316
11	$102,319	$215,571	$3,046,863
12	$102,427	$215,798	$3,050,070
13	$102,464	$215,875	$3,051,168
14	$102,553	$216,064	$3,053,835
15	$102,581	$216,123	$3,054,669
16	$102,661	$216,292	$3,057,057
17	$102,514	$215,982	$3,052,682
18	$102,508	$215,970	$3,052,501
19	$102,508	$215,970	$3,052,501
20	$102,555	$216,069	$3,053,901
21	$102,581	$216,123	$3,054,669
22	$102,537	$216,030	$3,053,352
23	$102,543	$216,042	$3,053,519
24	$102,575	$216,110	$3,054,490
25	$102,566	$216,091	$3,054,227
26	$102,612	$216,188	$3,055,595
27	$102,665	$216,300	$3,057,171
28	$102,740	$216,458	$3,059,403
29	$102,777	$216,535	$3,060,486
30	$102,831	$216,649	$3,062,108
31	$102,922	$216,841	$3,064,811
Mean	$102,492	$215,936	$3,052,019
Median	$102,514	$215,982	$3,052,682
High	$102,922	$216,841	$3,064,811
Low	$102,153	$215,221	$3,041,918

Summary of Simulation Results: Yearly on 1st of Month and Yearly on 15th of Month

Table IV

Yearly Withdrawals on 1st of Month:			Dollar Value
Month	Year 1983	Year 2002	All 20 Years
Jan	$ 95,859	$201,961	$2,854,501
Feb	$ 98,483	$207,489	$2,932,641
Mar	$ 99,934	$210,546	$2,975,844
Apr	$100,478	$211,692	$2,992,038
May	$102,030	$214,962	$3,038,259
Jun	$103,691	$218,463	$3,087,741
Jul	$104,616	$220,410	$3,115,257
Aug	$104,459	$220,079	$3,110,580
Sep	$104,636	$220,452	$3,115,861
Oct	$103,972	$219,054	$3,096,088
Nov	$104,090	$219,303	$3,099,606
Dec	$104,526	$220,221	$3,112,588
Mean	$102,231	$215,386	$3,044,250
Median	$103,832	$218,759	$3,091,915
High	$104,636	$220,452	$3,115,861
Low	$ 95,859	$201,961	$2,854,501

Table V

Yearly Withdrawals on 15th of Month:			Dollar Value
Month	Year 1983	Year 2002	All 20 Years
Jan	$ 97,012	$204,389	$2,888,824
Feb	$ 99,628	$209,901	$2,966,734
Mar	$100,537	$211,816	$2,993,800
Apr	$101,231	$213,278	$3,014,458
May	$102,501	$215,954	$3,052,276
Jun	$103,826	$218,746	$3,091,741
Jul	$104,328	$219,803	$3,106,682
Aug	$104,957	$221,128	$3,125,411
Sep	$104,131	$219,389	$3,100,830
Oct	$104,215	$219,566	$3,103,331
Nov	$104,245	$219,629	$3,104,229
Dec	$105,061	$221,348	$3,128,516
Mean	$102,639	$216,246	$3,056,403
Median	$103,979	$219,068	$3,096,286
High	$105,061	$221,348	$3,128,516
Low	$ 97,012	$204,389	$2,888,824

Summary of Simulation Results: Weekly, Market Timing, and Fictitious Hindsight

Table VI
Weekly Withdrawals: Dollar Values

Day	All 20 Years	Yearly Average
Mon	$3,042,322	$152,116
Tue	$3,052,441	$152,622
Wed	$3,051,585	$152,579
Thu	$3,046,606	$152,330
Fri	$3,047,816	$152,391
Mean	$3,048,154	$152,408
Median	$3,047,816	$152,391
High	$3,052,441	$152,622
Low	$3,042,322	$152,116

Table VII
Market Timing Withdrawals

Rule: Sell if S&P is…	All 20 Years	Yearly Average
Up 1 day	$3,055,578	$152,779
Down 1 day	$3,053,807	$152,690
Up 2 day	$3,064,069	$153,203
Down 2 day	$3,057,353	$152,868
Up 3 day	$3,051,477	$152,574
Down 3 day	$3,056,336	$152,817
Mean	$3,056,437	$152,822
Median	$3,055,957	$152,798
High	$3,064,069	$153,203
Low	$3,051,477	$152,574

Table VIII
Fictitious/Hindsight Withdrawals

Rule: Sell if S&P is…	All 20 Years	Yearly Average
High of Week	$3,082,523	$154,126
Low of Week	$3,022,191	$151,110
High of Month	$3,139,919	$156,996
Low of Month	$2,964,479	$148,224
High Year	$3,463,930	$173,197
Low Year	$2,676,624	$133,831
Mean	$3,058,278	$152,914
Median	$3,052,357	$152,618
High	$3,463,930	$173,197
Low	$2,676,624	$133,831

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Long-Term Performance of ESOPs and Optimal Managerial Control

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Introduction

Our paper examines the interaction between managerial control and ownership in firms with employee stock ownership plans (ESOPs) to determine whether there is evidence of entrenchment in such firms. An increase in executive ownership in a firm gives managers greater control over the firm, but makes them significant shareholders, so their incentives are more aligned with other shareholders. However, a compensation plan that provides executive effective control over a large block of shares without the counterbalancing executive ownership could permit executives to entrench themselves at the cost of the other shareholders. ESOPs are plans like this, and they allow for separation between ownership and control by enabling the board to influence the distribution of unallocated shares from the ESOP. Such a separation could lead to managerial entrenchment.

As noted by the National Center for Employee Ownership, the use of ESOPs in both publicly traded and privately held firms has grown dramatically over the past three decades, with a total of about $400 billion in assets under management as of 2002. Privately held firms operate the majority of ESOPs, presumably with a tax-motivated intent of transferring shares from the original owners to employees (Bailey 2002). There are over 10,000 plans, but the large majority of these are in private or small firms. We focus on a smaller number of publicly traded ESOPs.

An ESOP allocates shares of stock to a pool at initiation. Over time, these shares are distributed to employees of the firm as a form of incentive pay. Unlike many other plans, the shares are not targeted primarily at executives but rather are allocated more broadly. Because of this structure, managers of firms with ESOPs effectively control more shares than they own since management and the Board (the executives) choose who will direct the ESOP. Because managers have significant influence on the voting behavior of the firm managing unallocated ESOP shares, a wedge is driven between the number of shares owned by a firm's managers and the number of shares those managers control. Managers are able to own a smaller number of shares personally, so that their interests are not as well aligned with shareholders. At the same time, due to the shares that they control through the ESOP, the managers are able to entrench themselves at the expense of shareholders. Some authors (Dhillon and Ramirez 1994) have examined the size of the ESOP wedge. However they ignore its interaction with prior managerial ownership. Managers owning a significant portion of the firm's equity are unlikely to entrench regardless of the ESOP size. We extend their analysis of managerial ownership and the ESOP wedge, allowing for a clearer picture of the issues involved in ESOP performance.

While theory suggests that ESOPs could lead to greater agency costs in the firm, others argue that an ESOP should create shareholder value. Some literature (Gordon and Pound 1990; Dhillon and Ramirez 1994) suggests that the primary source of shareholder value results from the increased managerial control accompanying an ESOP. Managers increase control by

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retaining the voting rights of the ESOP shares until the vestment period is expired, which is typically seven years.[1] Pugh, Oswalf, and Jahera (2000) used 183 firms' data to exam eight financial ratios. Their study found the strong relations between managers and employees led to greater shareholder value. According to this theory, the increased managerial control enables managers to focus their attention on creating value for shareholders. If ESOPs create shareholder value, employees benefit directly, simply because they own shares in their firms. In a related manner, other papers (Iqbal and Hamid 2000) find that the operating performance of an ESOP firm improves subsequent to a large stock price increase. Given the two conflicting theories of ESOPs, and the mixed results to date, there remain important questions about the overall benefit of ESOPs for employees and/or shareholders.

In order to evaluate the actual performance of the firms that use ESOPs, we analyze the long-term stock performance of ESOPs and its relation to managerial control. It is useful to examine ESOPs, not only because many public firms still use and/or initiate ESOPs, but also because ESOPs create a separation between ownership and control for executives.

We use a careful analysis of firm stock performance over five years following the ESOP compared to managerial control of the firm. By decomposing the levels of managerial ownership and control, we are able to determine whether an optimal level of managerial ownership exists which maximizes shareholder value. While our results are mixed, we generally find that the use of an ESOP by firms has no impact on the long-run performance of those firms.

Prior Research

Presumably, a firm should need to justify to shareholders shifting a significant proportion of its equity to its employees. A typical justification for ESOPs is that they increase employee productivity, because employees are also then owners. Two measures of productivity (performance) have been used in the ESOP literature as indicators of corporate performance.

One productivity measure, as employed by (Dunbar and Kumbhakar 1992; Beatty 1995), uses production functions like Cobb-Douglas to explain output based on the labor and capital inputs. Production not explained by the level of labor or capital is assumed to result from increased productivity. Unfortunately, other exogenous factors also fall into the residual of the production function, making the use of the residual problematic.

The other approach for measuring productivity is to consider the stock price reaction to ESOP announcement. Although the reaction describes the wealth effects of the ESOP, it does not provide a clear measure of employee productivity (Beatty 1995). It is possible that any particular ESOP is being used for all cited reasons (tax, entrenchment, and incentive), yet the stock price can only provide an aggregate effect. For example, Gordon and Pound (1990) and Park and Song (1995), find a negative effect from using an ESOP as an anti-takeover device.

[1] Mangers maintain some control over employees even after the vestment period, because of the threat of termination. This threat is presumably greater for employees in ESOP firms than non-ESOP firms, because their human capital is less diversified and they risk losing the future value of the ESOP shares. Note that we do not take into account the presumed negative impact on employees' ability to diversify their portfolios.

The stock price reaction also does not provide information about the timing of efficiency. A positive stock price reaction could indicate a relatively large initial impact of an ESOP with benefits tapering off over time, or it could indicate a steady, constant increase in productivity over time. There may be a delay (Jones and Kato 1995) in increased productivity of 2–3 years after an ESOP is adopted. ESOP data from Japan suggests that productivity decreases immediately around the ESOP introduction. The productivity measures do not become significantly positive until about three years after the ESOP is enacted. Their evidence suggests that examining the timing of the benefits to ESOPs in the United States may be informative.

Surveys of the literature on ESOPs (Rosen 1990; Scholes and Wolfson 1990) during the 1980s when more public firms initiated ESOPs also examined these productivity measures. They also report mixed evidence for ESOPs improving the performance of the firm.

ESOPs may also indirectly motivate employees by giving them a stake in the financial health of the firm. Theory suggests that corporations adopting salary-deferral programs for employees do so to align the interests of employees and shareholders. Aligning interests, in turn, will reduce agency costs in the corporation and may lead to more efficient use of resources. However, empirical results to date suggest that the strength of the alignment is minimal and is subject to free-rider problems. Conte and Kruse (1991) find that each worker gains only 2.2 cents for an additional dollar of return per employee, presumably not enough for motivation.

In addition to employee motivation, both managerial entrenchment and tax effects have been advanced as reasons for the use of ESOPs. Chaplinsky and Niehaus (1994) discuss the impact of voting rules on an ESOP. If shares have been allocated in a publicly traded corporation, employees must be able to vote their shares. However, all other shares (as well as employee shares without voting directions) are typically voted by the ESOP trustee. Although the trustee is theoretically independent, the practice is rather different. As Chang and Mayers (1992) note, the trustee is typically appointed by management to run an ESOP. This might allow managers to wield the power to vote these shares to entrench.

Given the problems of these performance measures, we use a third measure of corporate performance, the long-term stock price performance after adoption of the ESOP. Long-term stock price performance can be measured over time and be used as a measure of productivity. Indeed, this measure of productivity is at least intuitive as an economic production function and is the most relevant measure of performance for shareholders, including the employees who participate in the ESOP.

The long-term stock price performance, naturally, does not measure employee productivity perfectly either. It is an ex-post realization and therefore subject to exogenous shifts and noise. And it combines the actual information about increases in performance with market expectations of future performance. However, we pair the sample corporations with control firms. This matching technique limits potential problems with the ex-post realizations. Also, innovations in market expectations should be correlated with changes in performance; so long-term stock prices can alleviate the problem of the uncertainty of the time pattern of the impact.

The prior literature using long-term stock returns is somewhat less common, but has also provided mixed results. Although some papers (Park and Song 1995) find some support for long-term gains to the firms that adopt ESOPs, others (Robinson 1997) argue that ESOP firms suffer from severe long-term underperformance. Indeed, using the bootstrap technique Ikenberry, Lakonishok and Vermaelen (1995), find that the mean three-year buy-and-hold return for the ESOP sample is significantly negative.

Methodology – Data

Our sample consists of ESOP announcements by publicly traded firms between 1985 and 1995.[2] To compile the sample, we search for all ESOP-related announcements beginning in 1985. The final sample includes all announcements that satisfy the following criteria:

1. The announcing firm was publicly traded at the time of the announcement, and has daily stock returns available from the Center for Research on Security Prices (CRSP) Daily Returns File for at least 255 trading days preceding the ESOP announcement date. Further, no more than five observations can be missing in the 20 day event window
2. The announcement was cited in the ***Dow Jones News Retrieval*** or in ***Lexis-Nexis*** and there were no conflicting news announcements for the day preceding through the day following the ESOP announcement.
3. Financial information for the firm is available from COMPUSTAT for the fiscal year of the announcement and managerial ownership information is available from Proxy statements for at least one year following the ESOP announcement.
4. The ESOP firms can be matched, (Barber and Lyon 1997), to non-ESOP firms that also have the requisite data. There must be no more than 60 days per year missing for at least three years after the event period.
5. The firm can have no other ESOP announcement within one year of the initial announcement to allow for calculation of long-term returns.
6. Financial and regulated firms were removed.

ESOP announcements for 236 firms were identified during the sample period. Applying the above criteria reduces the final sample to 62 ESOPs, along with 61 matching firms.[3]

We use a (Barber and Lyon 1997) matching methodology to estimate long-run abnormal returns, and then regress these returns on the managerial control variables. This should provide a picture of whether ESOP ownership or control levels lead to managerial entrenchment, greater or increased shareholder value. We compare the difference in holding period returns between our sample firms and a set of matched firms. The matching is one-to-one and proceeds by selecting the firm with the closest book–to–market (B/M) ratio from a set of non-ESOP firms within a 70–130% range of the sample firm's size (SIZE), calculated as stock price/share multiplied by shares outstanding.

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[2] The search for ESOPS is terminated in the mid-1990s because we require at least three years of post-announcement financial data and because there are relatively few ESOP announcements following 1995.

[3] One firm announced ESOP initiations twice during the sample period. While this number of firms yields a relatively small sample size, it is consistent with other studies of ESOP firms. Iqbal and Hamid (2000), for instance, have a sample size of 76 ESOP firms.

Barber and Lyon (1997) use holding period abnormal yields (HPYs) calculated as buy and hold returns to the sample firm over the long-term period chosen, net of similar buy and hold returns to a control firm. Control firms are chosen by matching firms by size and book–to–market. The framework exploits the (Fama and French 1992) results that size and book–to–market are strongly associated with common stock returns. In effect, instead of using the "standard" measure of risk such as beta for benchmarking comparative firm performance, the matching procedure compares firms with similar characteristics at a point in time and then calculates differences in the buy-and-hold stock returns to a specified later date. Since size and the book–to–market ratio serve as the measure of firm risk, these returns are automatically adjusted on a firm-by-firm basis for risk.

Results – Descriptive Statistics

Descriptive statistics for the 61 firms initiating 62 ESOP announcements from 1986 to 1995 are presented in Table I, Panel A. The average size of the firms during the issue year approaches $5 Billion, with the median slightly below $2 Billion, indicating that the sample firms are in the mid-cap range. The average (median) book–to–market ratio (B/M) of 0.66 (0.62) indicates that the ESOP firms tend to be growth firms, given the interpretation of Smith and Watts (1992) that high MV/BV proxies for growth (investment) opportunities. Corporate executives own 7.7% of the firm's shares on average, although median ownership is only 2.1%.

Institutional ownership averages 8.7%, but median institutional ownership approaches 0%. Finally, the ESOPs own 5.4% of the firm's common shares on average during the initial year of the ESOP, though the median ownership is 0%. The maximum holding period yields may appear inflated (e.g., a maximum five-year cumulative holding period return of 924% for the ESOP firms). However these high returns are due to one firm, Home Depot, experiencing extraordinarily good performance. The related firm characteristics for the match non-ESOP firms are presented in Panel B for purposes of comparison. The high standard deviations of holding period returns reported in Table I ensure that mean cumulative yields are not significantly different across the two sets of firms. Median tests also cannot detect significant differences between the holding period yields of the ESOP firms and the non-ESOP control firms listed in Table 1 above.

Results – Long-Run Holding Period Yields (HPYs)

One important question for investors examining a firm is whether ESOPs "pay off" over the longer run? And if they do, does the level of managerial ownership play a role?

We examine the benefits to shareholders, the ultimate test of corporate decision-making in modern finance. In order to examine shareholder gains, we match the ESOP firms in our sample to non-ESOP firms by size and the book–to–market ratio (Barber and Lyon 1997). The general hypothesis is that firms adopting ESOPs outperform the non-ESOP firms. But we are also interested in knowing whether any potential long run "abnormal/excess" returns for ESOP firms are associated with an optimal level of managerial control. The abnormal returns in this case equal the holding period yield (HPY) of the ESOP firm minus the HPY of the matched non-ESOP firm. The intuition is that, for example, if a midrange level of ownership (between 10-

15%) provides an optimal level of managerial control, then those firms within this level of ownership would outperform their matches (the non-ESOP firms). This result would be confirmed by positive and statistically significant estimates for the midrange ownership levels.

In order to examine these HPYs, we perform regressions of one–, three– and five–year holding period yields (HPY) on managerial control and the Cumulative abnormal returns (CARs). The return variable (CARs) is included in order to determine whether the initial market response is associated with long-term firm performance. We use as managerial control variable three different control measures. The first measure is the size of the ESOP or proportion of the firm's shares allocated to the ESOP. This ESOP size should be an indicator of the relative ability of managers to entrench. The next measure is executive control of shares before the ESOP. It includes all shares reported as beneficially owned by senior executives and board members. This measures the wealth the executives have at risk in the firm. Greater levels of share ownership would tend to alleviate any agency costs by forcing executives to bear a significant proportion of that burden. The third measure is the joint control of managers after the ESOP. It is measured by the size of the ESOP added to the number of shares owned by the managers and indicates the raw voting power controlled by executives.

Table II examines the relation between the size of the ESOP and the long-term performance of the firms and finds no significant evidence that firms with ESOPs outperform non-ESOP firms. There is a marginally significant effect in the 10-15% range for the first year, but that effect disappears over the longer-term. However, if the ESOPs stimulate employee motivation, better performance would be expected over the longer run. As a result, the evidence suggests that ESOPs are either irrelevant, or the positive benefits of an ESOP are balanced out by the negatives. Also, note that there is no significant relation between the short-term performance of an ESOP around its announcement (CAR) and the long-term performance afterwards suggesting there is no over or under reaction.

In Table III, the relation between executive ownership prior to an ESOP and the performance after an ESOP are examined. Consistent with general executive ownership literature, there is an optimal amount of executive ownership at 10-15%, but firm values tend to fall again afterwards. As our numbers are differenced between the ESOP firms and control firms, the significant positive relation suggests that not only might 10-15% be the optimal level of ownership for firms, but that the use of an ESOP is associated with an increase in the gains to such firms. Again there seems to be no relation between the short-term reaction to the ESOP and the long-term performance compared to the control firms.

In Table IV, we combine the shares issued to the ESOP with the executive ownership to develop a measure of the degree of control of the executives after the ESOP initiation. When the ESOP shares are included, the increased performance from an optimal level of executive ownership seems to disappear. It appears that the added ESOP shares tend to wash out any benefits from optimal executive ownership. Further there is some weak evidence for a negative relation between the short-term and long-term performance. Although marginal, this relation suggests that the firm does worse than thought at the time of the ESOP because of the additional ESOP shares controlled by managers

An important question arises as a result of our research. The number of ESOPs announced during the earlier part of the sample period was much larger than announcements in the latter part of the sample period. An obvious question is why there is a decline in the number observations. We randomly selected 50 firms in order to ascertain the percentage of firms which use ESOPs (during 2001 and 2002) through an examination of their 10Ks and Proxy Statements. A total of 8 of the 50 firms use ESOPs. This suggests a 16% use rate of ESOPs by publicly-traded corporations. It appears that many firms still use ESOPs, but because many ESOPs are ongoing plans that are renewed or updated, the announcements of new ESOPs are relatively rare.

Summary and Conclusion

This paper examines the long-term performance of firms around ESOPs and tries to determine the motivation for managers to adopt these plans. While previous studies have examined long-term performance, our paper is unique in that we: (1) use a matching sample method (Barber and Lyon 1997) to control for risk characteristics, (2) analyze separate measures for managerial ownership and managerial control and at differing levels.

We find evidence firms that adopt ESOPs and have a strong executive ownership level will see improved performance relative to non-adopters. However the size of the ESOP itself does not seem to impact firm value, and combining the ESOP size and executive shares tends to wash out the gain. Of course this could be either a function of ESOPs increasing firm value for these firms, or firms with the greatest potential benefit self-selecting ESOPs.

Table I – Descriptive Statistics

Descriptive statistics during the event year for the 62 sample firm announcements are provided below. **SIZE** is the market value of the firm (market value of equity, i.e., the market cap), **Total Assets** is the book-vale of the firm's assets, **Net Sales** is the annual revenue, **Total-Long Term Debt** is the book-value of long-term debt, the **Book–to–Market Value** is the book value of equity scaled by the market cap, **Executive Shares** is the percent of total common shares held by all managers and outside directors, **Institutional Ownership** is the percent of total common shares held by non-executive outside blockholders (primarily institutions), and **% ESOP** is percent of total common shares held in the ESOP. Note that the sum of Executive Shares and ESOP shares equals **Joint Shares**. The **HPY** is the 1, 3, and 5 year Holding Period Yields from the ESOP.

Variable	Mean	Median	Std Dev	MIN	MAX
PANEL A – ESOP Firms					
SIZE ($M)	$4,794	$1,787	$7,130	$5	$24,053
Total Assets ($M)	$11,639	$3,052	$28,585	$16	$180,545
Total Long-Term Debt ($M)	$2,871	$799	$7,314	$0	$49,436
Book–to–Market Value	0.66	0.62	0.49	–1.37	1.68
Executive Shares (%)	7.7%	2.1%	10.9%	0.0%	55.2%
ESOP (%)	5.4%	0.0%	8.2%	0.0%	31.3%
Institutional Ownership (%)	8.7%	0.2%	16.0%	0.0%	92.6%
1 Year HPY	5.9%	7.8%	37.8%	–81.9%	91.5%
3 Year HPY	57.5%	37.0%	115.5%	–94.1%	603.2%
5 Year HPY	103.6%	68.2%	174.4%	–87.3%	923.8%
PANEL B – Non-ESOP Firms					
SIZE ($M)	$4,570	$1,616	$6,854	$5	$28,099
Total Assets ($M)	$6,169	$2,112	$8,904	$6	$34,715
Total Long-Term Debt ($M)	$1,416	$419	$2,152	$0	$7,843
Book–to–Market Value	0.63	0.60	0.45	–0.94	1.79
1 Year HPY	10.9%	7.3%	32.2%	–62.5%	98.6%
3 Year HPY	36.2%	32.6%	64.4%	–83.4%	213.4%
5 Year HPY	61.7%	42.19%	79.7%	–75.0%	258.9%

Table II – Regression of the HPYs on the Size of the ESOP

The regressions are estimated by ordinary least squares. The dependent variables for the regressions are, respectively, the **One**-Year, **Three**-Year and **Five**-Year **Holding Period Yields (HPY)** calculated as the ***difference*** between the sample ESOP HPY and the Control HPY for 62 firms. The explanatory variables for the three regressions are defined as follows: the successive **5% levels of ownership** are dummy variables (equal to 1 if the applicable percentage of shares falls within the level and equal to 0 otherwise) which indicate ownership by the ESOP (the decomposition of ownership proxies for the levels of managerial control); and **CAR** is the cumulative abnormal return, as based upon the corresponding ESOP announcement for the (0,1) window. An * (**) indicates significance at the 10-percent (5-percent) level; *p*-values are in parentheses below the estimates.

Variable	1 Year HPY	3 Year HPY	5 Year HPY
Intercept	–0.085	0.154	0.131
	(0.45)	(0.57)	(0.71)
0-5% Ownership	1.981	–3.209	–2.012
	(0.73)	(0.81)	(0.91)
5-10% Ownership	0.925	3.784	1.557
	(0.73)	(0.56)	(0.87)
10-15% Ownership	2.894*	0.330	–3.938
	(0.09)	(0.94)	(0.46)
15% + Ownership	0.147	0.965	0.146
	(0.94)	(0.82)	(0.98)
CAR	–2.386	–6.435	–2.560
	(0.45)	(0.11)	(0.62)
# Observations	62	62	61
F-statistic	0.78	0.70	0.28
Adjusted R^2	–0.02	–0.02	–0.06

Table III – Regression of the HPYs on Executive Shareholdings

The regressions are estimated by ordinary least squares. The dependent variables for the regressions are, respectively, the **One**-Year, **Three**-Year and **Five**-Year **Holding Period Yields (HPY)** calculated as the ***difference*** between the sample ESOP HPY and the Control HPY for 62 firms. The explanatory variables for the three regressions are defined as follows: the successive **5% levels of ownership** are dummy variables (equal to 1 if the applicable percentage of shares falls within the level and equal to 0 otherwise) which indicate ownership by Executives (the decomposition of ownership proxies for the levels of managerial control); and **CAR** is the cumulative abnormal return, as based upon the corresponding ESOP announcement for the (0,1) window. An * (**) [***] indicates significance at the 10-percent (5-percent) [1-percent] level; *p*-values are in parentheses below the estimates.

Variable	1 Year HPY	3 Year HPY	5 Year HPY
Intercept	–0.025	0.042	–0.020
	(0.79)	(0.84)	(0.95)
0-5% Ownership	–6.512	–11.284	–17.090
	(0.26)	(0.37)	(0.34)
5-10% Ownership	5.349	11.523	8.799
	(0.11)	(0.12)	(0.39)
10-15% Ownership	2.573*	11.221***	9.336*
	(0.09)	(0.001)	(0.05)
15% + Ownership	–1.210	–2.538	–2.335
	(0.70)	(0.71)	(0.81)
CAR	–0.767	–4.302	–1.637
	(0.62)	(0.21)	(0.73)
# Observations	62	62	62
F-statistic	2.13*	4.43***	1.69
Adjusted R^2	0.08	0.22	0.05

Table IV – Regression of the HPYs on the Total Shares Controlled by Management After an ESOP

The regressions are estimated by ordinary least squares. The dependent variables for the regressions are, respectively, the **One**-Year, **Three**-Year and **Five**-Year **Holding Period Yields (HPY)** calculated as the ***difference*** between the sample ESOP HPY and the Control HPY for 62 firms. The explanatory variables for the three regressions are defined as follows: the successive **5% levels of ownership** are dummy variables (equal to 1 if the applicable percentage of shares falls within the level and equal to 0 otherwise) which indicate the total of the ESOP number of shares plus the ownership of the Executives; and **CAR** is the cumulative abnormal return, based upon the corresponding ESOP announcement for the (0,1) window. An * (**) [***] indicates significance at the 10-percent (5-percent) [1-percent] level; *p*-values are in parentheses below the estimates.

Variable	1 Year HPY	3 Year HPY	5 Year HPY
Intercept	0.011	0.303	0.070
	(0.90)	(0.14)	(0.79)
0-5% Ownership	–0.341	–2.587**	–2.284
	(0.52)	(0.03)	(0.15)
5-10% Ownership	–1.207	0.084	3.822
	(0.58)	(0.99)	(0.55)
10-15% Ownership	1.019	0.772	0.960
	(0.50)	(0.82)	(0.83)
15% + Ownership	0.681	5.398	8.541*
	(0.67)	(0.13)	(0.07)
CAR	–1.727	–6.845	–4.749
	(0.30)	(0.07)*	(0.33)
# Observations	62	62	62
F-statistic	0.49	2.05	1.21
Adjusted R^2	–0.04	0.08	0.02

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Long-run Risk-Adjusted Performance of IPOs in the Life Insurance Industry

Lal C. Chugh and Joseph W. Meador

Introduction

The pace of demutualization among major U.S. life insurance companies increased sharply after the mid-1990s. Five of the fifteen largest U.S. life insurers demutualized between 1997 and 2001, and the largest, Metropolitan Life Insurance Company, demutualized in 2000. Ten other major life insurance companies, with total assets in 2003 of $775 billion, demutualized over the same time period. The regulatory and competitive environment in the life insurance industry has changed dramatically in recent years. These changes include: (1) the fact that consumers have shown declining interest in the traditional life insurance products of risk bearing and transfer, while revenues from the wealth management and annuity business have offered new growth opportunities; (2) deregulation of the financial services industry, culminating in passage of the Gramm-Leach-Bliley Act in 1999, which demolished the traditional barriers between commercial banking, insurance, and investment banking; (3) changes in the Internal Revenue Code that eliminated the tax advantages of a mutual insurer; and finally, (4) increasing interest shown by foreign life insurance companies in the U.S. market. Demutualization has been undertaken by many mutual life insurance companies as a strategic response to deal with these numerous changes in the financial services market. This study focuses on the long-run performance of life insurance IPOs issued pursuant to demutualization and compares the performance of these IPOs to the performance of several market indexes.

The Process of Demutualization via IPO

Demutualization is the process of converting a mutual life insurance company, which is owned by its policyholders, into a publicly traded stock company owned by shareholders, pursuant to a plan of conversion approved by policyholders and state regulators.

There are two categories of demutualization: partial and full demutualization. Partial demutualization, commonly called the Iowa method, is accomplished by the formation of a mutual holding company (MHC) which owns at least 50.1% of a newly formed subsidiary stock insurance company. In the Iowa method, policyholder interests are automatically converted into membership interests in the MHC, while the policy contracts are transferred to the stock subsidiary. Policyholders do not receive any distribution of accumulated surplus. Policyholders, regulators and investors generally have not been satisfied with this method of conversion since policyholders lose control of the operating subsidiary and management is not accountable to investors and the capital markets.

A full demutualization can be accomplished in one of two ways – (1) the subscription method (commonly called the Illinois/Pennsylvania method), or (2) the New York method,

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whereby surplus is fully transferred to policyholders. In the Illinois/Pennsylvania method, non-transferable subscription rights are given to the policyholders. These subscription rights allow the policyholders to make cash purchases of stock in the company, but policyholders do not get any compensation from the company in either cash or stock. These rights to purchases are perishable and have no market value. This method does not deplete surplus and allows for accessing cash resources from the existing policyholders. However, this method is controversial and may invite policyholder lawsuits. Only a few states have statutes requiring this method of conversion.

The New York method of full demutualization, the method of conversion required in most states, is where the policyholders receive stock, cash and/or policy credits for their ownership rights in the mutual organization. This method of conversion has been the most widely used in the recent past.

As an example of full demutualization using the New York method, the Prudential Insurance Company, which demutualized in 2001, created and then distributed 454.6 million shares directly to policyholders. In addition, it sold 110 million shares to the public at $27.50 per share. Part of the $3 billion in proceeds was paid to cash-out small policyholders and to other policyholders choosing not to receive shares of stock in the new company.

This study analyzes the stock market performance of IPOs of life insurers which have gone through full demutualization using the New York method. There are several reasons for choosing this population for study: First, under the New York method of demutualization, accumulated surplus is fully transferred to the policyholders through the creation of new, marketable securities. Second, other methods of demutualization are controversial and litigious, and have not received widespread regulatory approval. Finally, in the New York method of full demutualization, management does become accountable to shareholders and the financial markets, and this does not happen in the other methods of demutualization.

Previous Literature

This section firstly reviews the literature regarding performance of IPOs in general. And then, we discuss the performance associated with the different forms of corporate governance in the insurance industry.

Previous Research on IPOs. It is a well-established phenomenon (Ritter and Welch 2002) that IPOs are characterized by three definite patterns: (1) short-run underpricing, (2) hot issue markets, meaning that sometimes IPOs are very hot and therefore outperform the market in the short-run, and (3) long-run underperformance of IPOs compared with market and industry benchmarks. This latter finding generally holds true in the U.S. and across the international financial markets.

The reasons for long-run underperformance of IPOs have been the subject of considerable research by several authors. The various reasons set forth are: constraints on shorting IPOs and the presence of heterogeneous expectations (Miller 1977; Gao, Mao and Zhong 2006), high-volume waves of IPOs saturating the markets (Schultz 2001), institutional

flipping (Kraigman, et. al. 1999), optimistic accounting in the early life of the firm (Teoh, Welch and Wong 1998), and over-confidence of the entrepreneurs and investors in the early stages of the firms (Bermado and Welch 2001; Daniel, Hershleifer and Subrahmanyam 1998).

However, IPOs in some industries and in some cases have provided excess returns over the long-run. For example REITS (Buttimer, Hyland and Sander 2005) and banks in India (Gosh 2005) have provided excess returns. Also, Fernando, Krishnamurthy and Spindt (2004), find a positive signaling effect of share-price level on long-run performance.

It is worth noting that Jain and Kinnai (1994), and Mikkelson, Partch and Shah (1997), find evidence that IPO long-run underperformance is associated with poor financial accounting/operating performance. Also, Chemmanur and Paeglis (2005) set forth evidence that management quality is associated with positive long-run performance. Finally, an aggressive change in management strategy, resulting in measurable improvement in key indicators of operating performance, can result in superior long-run performance (Gosh 2005).

Previous Research on Governance in the Insurance Industry. Most of the previous research has focused on accounting and operating performance in the insurance industry rather than IPO and stock performance. Boose (1990) and Cummins (1999) find that stock life insurance companies demonstrate greater efficiency in operations than mutual insurers. Similarly, demutualized life insurance firms have demonstrated cost efficiency gains when contrasted with their prior operations as mutuals (McNamara and Rhee 1992).

The above studies, in general, have tended to focus on accounting performance and have used older time periods. Additionally, these studies do not distinguish between full and partial demutualizations. Other studies regarding characteristics of demutualizing firms use mixed samples of life and non-life insurance companies (Viswanathan and Cummins 2003).

Meador and Chugh (2006) examine pre- and post-IPO strategic and operating performance of life insurance companies, using a recent time period, and a sample of firms which have gone through full demutualization using the New York Method. They find that the newly stockicized firms implemented thoroughgoing and widespread changes in strategy after demutualization. The new strategy emphasized higher growth, greater cost effectiveness, higher risk in asset management, and a shift in product mix towards wealth and pension funds management businesses and away from traditional life insurance products, resulting in consistently higher rates of profitability.

Sample and Methodology

This paper examines major life insurance firms that have recently demutualized and compares their post-IPO stock performance to the returns of several market indexes. The study identifies eleven dominant U.S. and Canadian life insurance companies that demutualized via IPO between 1997 and 2001. These firms have about 20 percent of the U.S. life insurance revenue market. The names of these companies and their corresponding year of IPO are described in Exhibit 1.

We calculate three-year compounded annual rates of return for each company's stock price, starting from the closing price on the first day of issue. Computations are not based on the offer price; in this way, most of the one-day underpricing that typically exists in IPOs is eliminated. Correspondingly, three-year compounded annual rates of return for various market indexes—S&P 500 index, DJIA and the NASDAQ 75-company Insurance Index— have been calculated.

The study also computes long-run risk adjusted rates of return for the life insurance IPOs and market indexes using the Sharpe and Sortino ratios, as described below. The Sharpe ratio, the standard measure of risk-adjusted performance (Sharpe 1966), computes the excess returns over the risk free rate for the sample period, normalized by the standard deviation of each company for that period. The Sortino ratio, on the other hand, uses only the deviations below the required minimum acceptable rate of return (RMAR), as opposed to the total series standard deviation used in the Sharpe ratio, and thus is a more stringent measure of risk adjusted performance. It calculates riskiness of returns lower than a required minimum acceptable rate of return (RMAR) and does not incorporate returns above the RMAR.

As each company has its own date/month of demutualization, therefore each company has a unique set of 36-months' data and a corresponding set of risk-free rates of return, and a set of rates of return for the market indexes.

The Sharpe ratio is calculated as follows:

$$\text{Sharpe ratio} = R_i - R_i / \sigma_i \qquad \textit{(Equation 1)}$$

where R_i = is the average monthly return (36 observations) on the stock price for company i,
R_f is the average 30-day T-bill rate for each corresponding month,
σ_i is the standard deviation of the series of monthly company returns.

The Sortino Ratio (Sortino and Forsey 1996) is calculated as follows:

$$\text{Sortino Ratio} = (\text{Compound Period Return} - \text{RMAR}) \div \text{DDMAR} \qquad \textit{(Equation 2)}$$

$$\text{DDMAR} = [\,(S(L_I)^2) \div N\,]^{1/2}$$

Where $L = (R_I - \text{RMAR})$ [if $R_I - \text{RMAR} < 0$] or 0 [if $R_I - \text{RMAR} \geq 0$]
R_I = Return for period I
N = Number of Periods
RMAR = Require Minimum Acceptable Rate of Return
DDMAR = Downside Semi-Deviation

The RMAR, or required minimum acceptable rate of return, is set at zero in our study. This standard is considered the most relevant, as life insurance policyholders who become shareholders are likely to be highly risk averse, intolerant of negative returns and more interested in the preservation of principal, rather than maximization of returns.

Discussion of Results

Contrary to a well-established body of literature regarding long-run underperformance of IPOs and portfolios of IPOs, our results demonstrate that there have been superior long-run performance of the IPOs of demutualizing life insurance companies. The results are reported in exhibits two through five in two parts: stock price performance and risk-adjusted returns.

Stock price performance. The study finds that ten of the eleven life insurance IPOs had positive, three-year, compounded annual rates of return, as shown in Exhibit 2. In contrast, the DJIA had six cases of negative returns, and the S&P 500 Index had seven reported cases of negative returns for the corresponding time periods. Secondly, the equally weighted portfolio of the IPO stocks of these firms demonstrated substantial excess returns over the indexes (Exhibit 3). This portfolio had a 144 percent average annual return in excess of DJIA and a 176 percent average annual return over the S&P 500 index. At the same time, this portfolio had average annual excess returns of 35 percent above the industry benchmark, the NASDAQ Insurance Company Index. Thirdly, these excess returns are widespread: nine of the eleven demutualized firms outperformed the S&P 500 Index and eight exceeded the returns of the Dow Jones Industrial Average. Moreover, six of the eleven bested the returns of the industry benchmark, the NASDAQ Insurance Company Index.

Risk-adjusted returns. The study finds that the life insurance IPOs also earned consistently higher risk-adjusted rates of return. First, as reported in Exhibit 4, nine of the eleven life insurance companies had higher Sharpe ratios (Equation 1) than the Sharpe measures for the S&P 500 Index. (Parametric tests of significance for the Sharpe and Sortino ratios do not exist, as was also noted by the anonymous reviewer.) Also, seven of the IPOs had higher Sharpe ratios than those for the NASDAQ Insurance Index. Secondly, as reported in Exhibit 5, nine firms had higher Sortino ratios (Equation 2) than the similar ratios for the S&P 500 Index. Similarly, seven IPOs had higher Sortino ratios than the Sortino ratios of the NASDAQ Insurance Index. Thirdly, the average risk-adjusted returns on equally weighted portfolios of life insurance IPOs exceeded the returns of the S&P 500 Index and the NASDAQ Insurance Company Index, as measured by both the Sharpe and the Sortino ratios (Exhibits 4 and 5).

Summary and Conclusion

The literature documents the general long-run underperformance of IPOs and the reasons for this phenomenon. These reasons are noted above in the literature review section of this paper. It is also documented that IPO underperformance generally is associated with poor financial/operating performance. In contrast, our study demonstrates that the IPOs of life insurance firms using the New York method of full demutualization achieved superior long-run returns, compared with the various market indexes. Similarly risk adjusted returns of these IPOs outperformed those of the market indexes as measured by both the Sharpe and Sortino ratios. This superior performance was widespread and consistent amongst the sample companies. The authors of this paper believe that reasons for the superior performance of these IPOs may be due to changes in strategies related to product composition, markets and operations. A paper by Meador and Chugh (2006), which investigates the pre- and post-IPO operating performance and strategies of demutualizing life insurance companies, finds that the newly stockicized companies

achieved gains in cost efficiency and higher profitability. The growth rates of such companies were higher. The companies shifted product focus toward wealth and pension fund management and away from traditional life insurance products. The management of such companies also was willing to take higher risks in asset and debt management. The authors believe, and this is supported by their conversations with industry executives, that the management in the stockicized life insurance firms becomes more accountable to stockholders and strives for higher stock prices, forsaking past patterns of the expense preference behavior associated with mutuals. The stock form of organization also enhances transparency of operations and adds to the option value of the stock by enabling these firms to engage in follow-on mergers and acquisitions.

Exhibit 1
Companies Included in the Study and Their Year of IPO

Company Name	Year of IPO	Company Name	Year of IPO
AmerUS Life Insurance Company	1997	Phoenix Life Insurance Company	2001
Canada Life Assurance Company	1999	Principal Life Insurance Company	1998
John Hancock Life Insurance Company	2000	Prudential Insurance Company of America	2000
Manufacturers Life Insurance Company	1999	Standard Insurance Company	1999
Metropolitan Life Insurance Company	2000	Sun Life Assurance Company of Canada	2000
MONY Life Insurance Company	1998		

Exhibit 2
Compound Annual Rates of Return Post-Demutualization

Company Name	Month and Year of IPO	Company Returns	Dow Jones Industrial Average	S&P 500 Index	NASDAQ Insurance Company Index
AmerUS	January 1997	6.58	19.06	23.07	9.46
Canada Life	December 2001	3.18	2.37	1.82	12.62
John Hancock	January 2000	16.5	-9.71	-15.00	8.43
Manufacturer's Life	September 1999	21.03	-9.78	-14.02	3.00
Metropolitan	June 2000	10.53	-4.90	-12.50	13.05
MONY	November 1998	0.41	2.62	-0.70	10.42
Phoenix	June 2001	-13.00	-0.21	-2.33	10.46
Principal	October 2001	18.82	3.38	2.19	10.62
Prudential	December 2001	18.31	2.47	1.82	12.61
Standard Insurance	April 1999	34.46	-2.67	-6.05	6.46
Sun Life	March 2000	20.21	-9.89	-17.28	4.92

Exhibit 3
Compound Annual Excess Rates of Return

Company Name	Excess Returns over DJIA	Excess Returns over S&P 500 Index	Excess Returns over NASDAQ Insurance Company Index
AmerUS	-12.48	-16.49	-2.88
Canada Life	0.81	1.36	-9.44
John Hancock	26.21	31.50	8.07
Manufacturer's Life	30.81	35.05	18.03
Metropolitan	15.43	23.03	-2.52
MONY	-2.21	1.11	-10.01
Phoenix	-12.79	-10.67	-23.46
Principal	15.44	16.63	8.20
Prudential	15.84	16.49	5.70
Standard Insurance	37.13	40.51	28.00
Sun Life	30.10	37.49	15.29
Total Excess Return	**144.29**	**176.01**	**34.98**

Exhibit 4
Risk-adjusted Measures of Performance:
Sharpe Ratio

Company Name	Company Sharpe Ratio	S&P 500 Sharpe Ratio	NASDAQ Insurance Company Index —Sharpe Ratio
AmerUS	0.009	0.268	0.056
Canada Life	0.220	-0.280	0.106
John Hancock	0.156	-0.277	0.106
Manufacturer's Life	0.179	-0.272	0.007
Metropolitan	0.114	-0.223	0.215
MONY	0.011	-0.066	0.107
Phoenix	-0.062	-0.043	0.238
Principal	0.308	0.037	0.245
Prudential	0.307	0.030	0.281
Standard Insurance	0.306	-0.172	0.057
Sun Life	0.170	-0.337	0.052
Average	0.156	-0.121	0.134

Exhibit 5
Sortino (semi-deviation) Risk-adjusted Measures of Performance:
RMAR Equals 0

Company Name	Company Ratio	S&P Ratio	Insurance Index Ratio
AmerUS	0.095	0.614	0.229
Canada Life	0.779	-0.361	0.330
John Hancock	0.437	-0.361	0.330
Manufacturer's Life	0.514	-0.332	0.141
Metropolitan	0.292	-0.283	0.509
MONY	0.086	0.023	0.393
Phoenix	-0.081	-0.028	0.532
Principal	0.651	0.100	0.528
Prudential	0.700	0.088	0.619
Standard Insurance	0.703	-0.172	0.254
Sun Life	0.410	-0.431	0.207
Average	**0.417**	**-0.104**	**0.370**

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An Examination of the Super Bowl Anomaly: Is it Spurious or Real?

Charles Rayhorn and James Drosen

Introduction

New England has won the Super Bowl in three of the last four years (2005, 2004, and 2002). If Leonard Koppett, the man who "discovered" the Super Bowl/stock market phenomenon, was correct, the stock market should have had down years in 2002, 2004 and 2005. The S&P 500 was down only in 2002. This is hardly the accurate predictor of yore. Koppett's Super Bowl phenomenon states that when the winner of the Super Bowl is a team that belonged to the old American Football League (AFL) before it merged into the National Football League, the market will be lower at the end of the year than at the beginning. The opposite is true when the winner of the Super Bowl is a team that belonged to the old National Football League (NFL), the market will be higher at the end of the year than at the beginning. (For this article, "AFL" refers to teams that belonged to the old AFL before it merged into the NFL, and "NFL" refers to pre-merger NFL teams).

Dyl and Schatzberg in their 1989 article found that in 14 of 15 up-market years, an NFL team won the Super Bowl; that in six of seven down-market years, an AFL team won the Super Bowl; and that the probability that the results occurred by chance is roughly one out of 1,780. They also found that a comparison of the two periods before and after 1978 (the year of Koppett's discovery) shows that the market's short-term reaction has been more pronounced since 1978. Dyl and Schatzberg's results are corroborated by many stories in the press, including a Barron's piece from the 1/23/95 issue in which the author finds that since 1967 the Super Bowl as a stock market predictor has been 85.7% to 89.3% accurate in calling the market. Dyl and Schatzberg, however, concluded that the correlation between stock market returns and the result of who wins the Super Bowl must be a statistical coincidence.

Krueger and Kennedy (1990) using a different methodology (and the same time period) than Dyl and Schatzberg found similar results and their conclusion was the same—a statistical coincidence.

Rayhorn and Guenther in 2000 also found similar results. Besides looking at the Super Bowl they also looked to see if the Super Bowl anomaly was a proxy for a large NFL market effect. They found large market team wins tended to be associated with up years and small market teams tended to correlate with down years. These correlations were much weaker than who won the Super Bowl. They rejected the idea that Koppett's Super Bowl anomaly is a proxy for of a large vs. small market effect. Given no credible explanation why who wins the Super Bowl would determine which way the market moves, they also concluded this correlation must be spurious.

The purpose of this study is to update the Rayhorn and Guenther (2000); Dyl and Schatzberg (1989); and Krueger and Kennedy (1990) papers. In their paper Krueger and

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Kennedy (1990) coined the phrase 'SBSMP' the Super Bowl Stock Market Predictor. SBSMP will be used throughout the rest of this paper.

Data, Methodology, and Results

The SBSMP states that when the winner of the Super Bowl is a team that belonged to the old American Football League (AFL) before it merged into the National Football League, the market will be lower at the end of the year than at the beginning. The opposite is true when the winner of the Super Bowl is a team that belonged to the old National Football League (NFL), the market will be higher at the end of the year than at the beginning. (For this article, "AFL" refers to teams that belonged to the old AFL before it merged into the NFL, and "NFL" refers to pre-merger NFL teams). The NFL and AFL merger began in 1966. The first Super Bowl was played in January of 1967 as part of this merger. By 1970 there were a total of 26 franchises. The NFC had 13 teams all from the original NFL. The AFC had 13 teams, 10 were from the original AFL and 3 from the original NFL teams. Since 1970 three expansion teams have been added to each conference. 1971, 1975, 1976, 1979, 1980, and 2001 saw both teams in the Super Bowl from the old NFL. These are counted as wins for teams from the old NFL. In 2003 an expansion team won the Super Bowl. The Super Bowl rule doesn't offer a market forecast for an expansion team win from either conference.

The data used in our study are 91-day T-bill bond equivalent yields and capital gains. Capital gains are calculated using the closing prices of the two indexes in this study, the Dow Jones Industrial Average (DJIA) and the S&P 500. The index prices (daily) and the 91-day T-bill yields are from Yahoo finance. These price indexes do not include dividends. The various tests will be explained along with the discussion of the results listed in the Tables.

Table 1 looks at the accuracy of the Super Bowl for the 1967-2005 time period. The average return when an old NFL won was 13.39% for the DJIA and 13.48% for the S&P 500. The average when an old AFL won was much lower at -5.00% and -3.61% for the Dow and 500 respectively. The accuracy of the Super Bowl forecast is 78.95% and 73.68% for the Dow and 500 respectively. These numbers (in absolute terms) are lower than results reported in Krueger and Kennedy (1990). Our time period covers 17 more Super Bowls and yearly returns. Has predictive power changed by decade? Panels a, b, c, and d of Table 2, address this issue.

Table 2 reports the mean, standard deviation, and accuracy of the SBSMP by decade. The accuracy of the Super Bowl forecast declines markedly beginning in 1990. The last five years have exhibited less than 50% accuracy, the amount one would expect by pure chance alone. The Dyl and Schatzberg (1989); and Krueger and Kennedy (1990) articles covered the years where the Super Bowl predictions were at their peak accuracy. The Rayhorn and Guenther (2000) article's time period included the 90's when the accuracy was reduced. They didn't see the decline in accuracy.

Table 3 reports the statistical significance of one week returns after the Super Bowl. This Table looks at whether the Super Bowl phenomenon had strengthened since its discovery; not because investors believe that the Super Bowl has anything to do with stock prices, but because the outcome may affect other investors' behavior (the Keynesian idea that the stock market is a

beauty contest). Thus, if investors have been using the outcome of the Super Bowl in their decision-making process, the reaction would be more conspicuous after 1978. If this 'Beauty Contest or the Greater Fool Theory' suggested in the Dyl and Schatzberg (1989) paper is working, we would expect the AFL group to show more negative or smaller returns after 1978 and the NFL group more positive returns . There is little or no evidence of this phenomenon in our data. Dyl and Schatzberg (1989); and Krueger and Kennedy (1990) found highly significant results! Why the difference? Their data didn't include the decade of the 90's and the first 5 years of the 21st century. As Table 2a, b, c, and d indicate, there seems to be little support for the SBSMP.

Table 4 presents the up/down markets for the DJIA, and the S&P 500 in NFL and AFL winning years for the last 38 years (there are 39 years but an expansion team won the super bowl in 2003 and Koppett's rule is silent regarding expansion team wins). An up market has a positive yearly return while a down market has a negative return.

T-tests (one tail—the null hypothesis is no difference while the alternative hypothesis is the super bowl anomaly is correct) reveal that there is a statistical difference in mean values between returns for the NFL and the AFL for the Dow and 500 at an alpha level of less than 1%. The gap between the average return for NFL and AFL win years is about the same as it was in Dyl and Schatzberg (1989) and in Rayhorn and Guenther (2000).

The standard statistical test of independence is the Chi-Squared Test (who wins the super bowl and market returns are assumed independent for the null hypothesis). This test is appropriate when the expected frequency in each cell is at least five. In our situation, many times this is not the case because of the small sample sizes and the preponderance of NFL wins.

An alternative test developed by Fisher is known as Fisher's Exact Test (www.unc.edu/~preacher.fisher/fisher.htm). It is based on the hyper-geometric distribution, and calculates a p-value which is equal to the conditional probability of getting a result as extreme or more extreme than that observed, given the current row and column sums. By more extreme we mean farther from what you would expect under independence, given the row and column sums. For example, suppose we observe the following (see Exhibit I):

Under independence, with these row and column sums, we would expect to see 9 and 6 in the first row and 6 and 4 in the second. We observe larger counts on the diagonal and smaller counts off the diagonal. More extreme results with the same row and column sums would be (14, 1, 1, 9) and (15, 0, 0, and 10). Adding up the conditional probabilities of these three configurations given the row and column sums gives us:

.00144550227 + .000045888 + .0000003059 = .00149....

The (one tailed) p-value is considerably less than 1%, so we feel comfortable rejecting the null hypothesis that Up and NFL are statistically independent.

The Super Bowl phenomenon has been observed in 30 (22+8) of the last 38 years for the DJIA. For the S&P 500 the Super Bowl phenomenon has been observed in 28 (22+6) of the last 38 years. The p-values for the Fisher's Exact tests are 0.0030 for the Dow and 0.03393 for the

S&P 500. Statistically it appears that the Super Bowl Anomaly occurring by chance is quite small for the 38 years.

As was noted in Table 2 the SBSMP seems to have lost its predictive power as measured by the simple accuracy measure. To ensure an appropriate number of observations for Fishers Exact Test the sample was broken into two periods—1967-1986 and 1987-2005.

Table 5 shows that while the SBSMP had statistically significant predictive ability in the earlier period (67 through 86); none exists in the last 18 years.

Table 6 presents' simulated results for a buy and hold strategy vs. a Super Bowl strategy. Panel 6a compares the terminal value of $1.00 invested in January 1967 through 2005. Panel 6b compares the terminal value of $1.00 invested in January 1967 through 1986. Panel 6c compares the terminal value of $1.00 invested in January 1987 through 2005. Each panel shows the FVIF when a client is entirely invested in the two indices, in T-Bills, or a combination of the two indices and T-Bills. The rules are:

- 100% in the Market: Fully invested
- Super Bowl Rule: Always in the market for January, once the outcome of the Super Bowl is known stay in the market if an old NFL team wins, get into T-bills if an old AFL team wins.

It is interesting to note that in the first and second panels of Table 6 the Super Bowl Stock Market Predictor overwhelms the buy and hold strategy. Panel c shows a different result. For the last 19 years, the buy and hold strategy beat the SBSMP for the S&P 500, but not for the DJIA.

Conclusions

Is there any logical explanation of the Super Bowl phenomenon (anomaly)? In Koppett's own words: "What does all this mean? Absolutely nothing on any rational level—and that's exactly the point. Just because two sets of numbers coincide in some way, don't leap to the conclusion that one set 'causes' the other...Statistics, always, are the starting point of an investigation, not the conclusion." The results tend to support Koppett's conclusion that the Super Bowl Stock Market Predictor was just spurious correlation after all. While it had a great run from 1967-1989 it fell apart in the last 15 years. One might speculate that once the phenomenon was documented it became a self-fulfilling prophesy. The three studies cited earlier in this work seem to support such a notion. But even if this was true there is no support for it now. Table 3 is similar to Table II in Kruger and Kennedy (1990); and Dyl and Shatzberg's (1989). While they found very significant differences in the returns before and after 1978 this is clearly not the case for the longer time period in this study. The p-values in Table 5 (Fishers Exact Test) also indicate that whatever, if anything, was causing the predictive power it has diminished over time.

Well, as I write this, 2006 is into its fourth month; the Super Bowl was won by an old NFL team, and the Dow and 500 are solidly up. Hmmmmmmm. Koppett's 'theory' forecasts an up year. Should investors use the Super Bowl, or combination rule? In 2000 I would have ended this study with "Probably not but....." But this isn't 2000. It appears that the Super Bowl Anomaly was just spurious correlation and is no longer evident. Or is it?

Table 1
Super Bowl Outcomes and Stock Market Behavior

Super Bowl outcomes (+ or -) and annual changes (%) in the Dow Jones Industrial Average and the S & P 500 for the period 1967-2005. The accuracy for each index is simply if who won the Super Bowl correctly forecast the directional change in the two indices used in this study. The Super Bowl was won by an expansion team in 2003. The returns were not included in the mean, standard deviation or accuracy calculations.

Year	Old NFL	Old AFL	Prediction	DJIA	S&P 500
2005	Philadelphia Eagles	***New England Patriots***	-	-0.61%	3.00%
2004	Expansion	***New England Patriots***	-	3.15%	8.99%
2003	Expansion-won	Oakland Raiders	*N/A*	25.32%	26.38%
2002	St. Louis Rams	***New England Patriots***	-	-16.76%	-23.37%
2001	New York Giants vs. ***Baltimore Ravens***		+	-7.10%	-13.04%
2000	***St. Louis Rams***	Tennessee Titans	+	-6.17%	-10.14%
1999	Atlanta Falcons	***Denver Broncos***	-	22.85%	19.53%
1998	Green Bay	***Denver Broncos***	-	16.10%	26.67%
1997	***Green Bay***	New England Patriots	+	22.64%	31.01%
1996	***Dallas Cowboys***	Pitt Steelers	+	26.01%	20.26%
1995	***SF 49'ers***	San Diego Chargers	+	33.45%	34.11%
1994	***Dallas Cowboys***	Buffalo Bills	+	2.14%	-1.54%
1993	***Dallas Cowboys***	Buffalo Bills	+	13.72%	7.06%
1992	***Washington Redskins***	Buffalo Bills	+	4.17%	4.46%
1991	***New York Giants***	Buffalo Bills	+	20.32%	26.31%
1990	***SF 49'ers***	Denver Broncos	+	-4.34%	-6.56%
1989	***SF 49'ers***	Cincinnati Bengals	+	26.96%	27.25%
1988	***Washington Redskins***	Denver Broncos	+	11.85%	12.40%
1987	***New York Giants***	Denver Broncos	+	2.26%	2.03%
1986	***Chicago Bears***	New England Patriots	+	22.58%	14.62%
1985	***SF 49'ers***	Miami Dolphins	+	27.66%	26.33%
1984	Washington Redskins	***LA Raiders***	-	-3.74%	1.40%
1983	***Washington Redskins***	Miami Dolphins	+	20.27%	17.27%
1982	***SF 49'ers***	Cincinnati Bengals	+	19.60%	14.76%
1981	Philadelphia Eagles	***Oakland Raiders***	-	-9.23%	-9.73%
1980	LA Rams vs. ***Pitt Steelers***		+	14.93%	25.77%
1979	Dallas Cowboys vs. ***Pitt Steelers***		+	4.19%	12.31%
1978	***Dallas Cowboys***	Denver Broncos	+	-3.15%	1.06%
1977	Minn Vikings	***Oakland Raiders***	-	-17.27%	-11.50%
1976	Dallas Cowboys vs. ***Pitt Steelers***		+	17.86%	19.15%
1975	Minn Vikings vs. ***Pitt Steelers***		+	38.32%	31.55%
1974	Minn Vikings	***Miami Dolphins***	-	-27.57%	-29.72%
1973	Washington Redskins	***Miami Dolphins***	-	-16.58%	-17.37%
1972	***Dallas Cowboys***	Miami Dolphins	+	14.58%	15.63%
1971	***Balt Colts*** vs. Dallas Cowboys		+	6.11%	10.79%
1970	Minn Vikings	***KC Chiefs***	-	4.82%	0.10%
1969	Balt Colts	***NY Jets***	-	-15.19%	-11.36%
1968	***Green Bay***	Oakland Raiders	+	4.27%	7.66%
1967	***Green Bay***	KC Chiefs	+	15.10%	20.09%
	Mean Annual Return When Old National League Team Won 38 years			**13.39%**	**13.48%**
	Standard Deviation When Old National League Team Won 38 years			**12.15%**	**12.73%**
	Mean Annual Return When Old American League Team Won 38 years			**-5.00%**	**-3.61%**
	Standard Deviation When Old American League Team Won 38 years			**14.31%**	**16.11%**
	Accuracy 38 years			**78.95%**	**73.68%**

Table 2a
Super Bowl Outcomes and Stock Market Behavior 2000-05

Super Bowl outcomes (+ or -) and annual changes (%) in the Dow Jones Industrial Average and the S & P 500. The accuracy for each index is simply if who won the Super Bowl correctly forecast the directional change in the two indices used in this study. The Super Bowl was won by an expansion team in 2003. The returns were not included in the mean, standard deviation or accuracy calculations.

Year	Old NFL	Old AFL	Prediction	DJIA	S&P 500
2005	Philadelphia Eagles	***New England Patriots***	-	-0.61%	3.00%
2004	Expansion	***New England Patriots***	-	3.15%	8.99%
2003	Expansion-won	Oakland Raiders	*N/A*	25.32%	26.38%
2002	St. Louis Rams	***New England Patriots***	-	-16.76%	-23.37%
2001	New York Giants vs. ***Baltimore Ravens***		+	-7.10%	-13.04%
2000	***St. Louis Rams***	Tennessee Titans	+	-6.17%	-10.14%
Mean Annual Return When Old National League Team Won 2000-2005				-6.64%	-11.59%
Standard Deviation When Old National League Team Won 2000-2005				0.47%	1.45%
Mean Annual Return When Old American League Team Won 2000-2005				-4.74%	-3.79%
Standard Deviation When Old American League Team Won 2000-2005				8.64%	14.06%
Accuracy 2000-2005				40.00%	20.00%

Table 2b
Super Bowl Outcomes and Stock Market Behavior 1990-1999

Super Bowl outcomes (+ or -) and annual changes (%) in the Dow Jones Industrial Average and the S & P 500. The accuracy for each index is simply if who won the Super Bowl correctly forecast the directional change in the two indices used in this study.

Year	Old NFL	***Old AFL***	***Prediction***	DJIA	S&P 500
1999	Atlanta Falcons	***Denver Broncos***	-	22.85%	19.53%
1998	Green Bay	***Denver Broncos***	-	16.10%	26.67%
1997	***Green Boy***	New England Patriots	+	22.64%	31.01%
1996	***Dallas Cowboys***	Pitt Steelers	+	26.01%	20.26%
1995	***SF 49'ers***	San Diego Chargers	+	33.45%	34.11%
1994	***Dallas Cowboys***	Buffalo Bills	+	2.14%	-1.54%
1993	***Dallas Cowboys***	Buffalo Bills	+	13.72%	7.06%
1992	***Washington Redskins***	Buffalo Bills	+	4.17%	4.46%
1991	***New York Giants***	Buffalo Bills	+	20.32%	26.31%
1990	***SF 49'ers***	Denver Broncos	+	-4.34%	-6.56%
Mean Annual Return When Old National League Team Won 1990-1999				14.77%	14.39%
Standard Deviation When Old National League Team Won 1990-1999				12.28%	14.52%
Mean Annual Return When Old American League Team Won 1990-1999				19.47%	23.10%
Standard Deviation When Old American League Team Won 1990-1999				3.37%	3.57%
Accuracy 1990-1999				70.00%	60.00%

Table 2c
Super Bowl Outcomes and Stock Market Behavior 1980-1989

Super Bowl outcomes (+ or -) and annual changes (%) in the Dow Jones Industrial Average and the S & P 500. The accuracy for each index is simply if who won the Super Bowl correctly forecast the directional change in the two indices used in this study.

Year	Old NFL	Old AFL	Prediction	DJIA	S&P 500
1989	***SF 49'ers***	Cincinnati Bengals	+	26.96%	27.25%
1988	***Washington Redskins***	Denver Broncos	+	11.85%	12.40%
1987	***New York Giants***	Denver Broncos	+	2.26%	2.03%
1986	***Chicago Bears***	New England Patriots	+	22.58%	14.62%
1985	***SF 49'ers***	Miami Dolphins	+	27.66%	26.33%
1984	Washington Redskins	***LA Raiders***	-	-3.74%	1.40%
1983	***Washington Redskins***	Miami Dolphins	+	20.27%	17.27%
1982	***SF 49'ers***	Cincinnati Bengals	+	19.60%	14.76%
1981	Philadelphia Eagles	***Oakland Raiders***	-	-9.23%	-9.73%
1980	LA Rams vs. ***Pitt Steelers***		+	14.93%	25.77%
Mean Annual Return When Old National League Team Won 1980-1989				18.26%	17.55%
Standard Deviation When Old National League Team Won 1980-1989				7.88%	8.08%
Mean Annual Return When Old American League Team Won 1980-1989				-6.49%	-4.16%
Standard Deviation When Old American League Team Won 1980-1989				2.75%	5.57%
Accuracy 1980-1989				100.00%	90.00%

Table 2d
Super Bowl Outcomes and Stock Market Behavior 1967-1979

Super Bowl outcomes (+ or -) and annual changes (%) in the Dow Jones Industrial Average and the S & P 500. The accuracy for each index is simply if who won the Super Bowl correctly forecast the directional change in the two indices used in this study.

Year	Old NFL	Old AFL	Prediction	DJIA	S&P 500
1979	Dallas Cowboys vs. ***Pitt Steelers***		+	4.19%	12.31%
1978	***Dallas Cowboys***	Denver Broncos	+	-3.15%	1.06%
1977	Minn Vikings	***Oakland Raiders***	-	-17.27%	-11.50%
1976	Dallas Cowboys vs. ***Pitt Steelers***		+	17.86%	19.15%
1975	Minn Vikings vs. ***Pitt Steelers***		+	38.32%	31.55%
1974	Minn Vikings	***Miami Dolphins***	-	-27.57%	-29.72%
1973	Washington Redskins	***Miami Dolphins***	-	-16.58%	-17.37%
1972	***Dallas Cowboys***	Miami Dolphins	+	14.58%	15.63%
1971	***Balt Colts*** vs. Dallas Cowboys		+	6.11%	10.79%
1970	Minn Vikings	***KC Chiefs***	-	4.82%	0.10%
1969	Balt Colts	***NY Jets***	-	-15.19%	-11.36%
1968	***Green Bay***	Oakland Raiders	+	4.27%	7.66%
1967	***Green Bay***	KC Chiefs	+	15.10%	20.09%
Mean Annual Return When Old National League Team Won 1967-1979				12.16%	14.78%
Standard Deviation When Old National League Team Won 1967-1979				11.88%	8.59%
Mean Annual Return When Old American League Team Won 1967-1979				-14.36%	-13.97%
Standard Deviation When Old American League Team Won 1967-1979				10.55%	9.70%
Accuracy 1967-1979				84.62%	92.31%

Table 3
Mean Stock Returns the Week Following the Super Bowl.
The returns are pre and post 1978—the year the SBSMP was discovered. The t-tests look at pre and post means (DJIA and the S & P 500) for significance.

		# of Years	DJIA	S&P 500
AFL win	Before 78	5	-0.32%	0.026%
	After 78	7	0.09%	-0.537%
NFL win	Before 78	6	***0.247%***	0.26%
	After 78	19	***1.819%***	1.60%

The t-test is significant at the *7%* level for the NFL and DOW

Table 4
Two By Two Comparisons: Who Won the Super Bowl and Up Vs. Down Market
The sixth column lists p-values for one tailed t-tests. The seventh column gives the p-value for the Fishers Exact Test.

Index	Years	Up	Down	Avg.	t-test	FET
DJIA	67-05 (38*yrs)	26	12	7.58%		
	NFL Win	22	4	13.39%	0.0003	0.0029
	AFL Win	4	8	-5.40%		
S & P 500	67-05 (38*yrs)	28	10	8.09%		
	NFL Win	22	4	13.48%	0.0015	0.0339
	AFL Win	6	6	-3.61%		

Exhibit I
Example of test

	Up	Not Up (down)	*Row sum*
NFL	13	2	*15*
Not NFL (AFL)	2	8	*10*
Column sum	*15*	*10*	

Table 5a
Two By Two Comparisons: Who Won the Super Bowl and Up Vs. Down Market 1967-1986

The sixth column lists p-values for one tailed t-tests. The seventh column gives the p-value for the Fishers Exact Test.

Index	Years	Up	Down	Avg.	t-test	FET
DJIA	67-86 (20 yrs)	13	7	5.88%		
	NFL Win	12	1	15.56%	0.00005	0.0012
	AFL Win	1	6	-12.11%		
S & P 500	67-86 (20 yrs)	15	5	6.94%		
	NFL Win	13	0	16.69%	0.00006	0.0013
	AFL Win	2	5	-11.17%		

Table 5b
Two By Two Comparisons: Who Won the Super Bowl and Up Vs. Down Market 1987-2005

The sixth column lists p-values for one tailed t-tests. The seventh column gives the p-value for the Fishers Exact Test.

Index	Years	Up	Down	Avg.	t-test	FET
DJIA	87-05 (18*yrs)	13	5	9.48%		
	NFL Win	10	3	11.22%	0.22582	0.4325
	AFL Win	3	2	4.94%		
S & P 500	87-05 (18*yrs)	13	5	9.36%		
	NFL Win	9	4	10.28%	0.37240	0.5675
	AFL Win	4	1	6.96%		

Table 6a

FVIF

Future Value Interest Factors for the 39 years in this study. Column one names the investment rule. Columns 2-4 are the FVIF's.

Rule	Dow	S&P 500	T-Bill
100% in Market	13.6	15.5	4.9
Super Bowl	43.8	35.9	N/A

Table 6b

FVIF

Future Value Interest Factors for the period 1967- 1986. Column one names the investment rule. Columns 2-4 are the FVIF's.

Rule	Dow	S&P 500	T-Bill
100% in Market	2.41	3.01	3.81
Super Bowl	8.63	9.67	N/A

Table 6c

FVIF

Future Value Interest Factors for the period 1987- 2005. Column one names the investment rule. Columns 2-4 are the FVIF's.

Rule	Dow	S&P 500	T-Bill
100% in Market	4.43	4.08	2.16
Super Bowl	5.08	3.71	N/A

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Social Security Privatization: Has Its Time Arrived?

Ricardo M. Ulivi and Ms. Arleen Burnham

Introduction

The debate over Social Security's future has been a topic of discussion over the years. Americans want to know what's in store for social security in the future, such as will it still be around for people of my generation. Currently, social security is not looking so good for future retirees. One of the many solutions to the social security problem is privatization. Privatization will allow workers to have money put away in a private account that will accumulate interest from investing in securities. Though plenty of people are against privatization, there are benefits to privatizing social security.

"The most important arguments for Social Security privatization are moral, not economic...A privatized Social Security System gives individuals more freedom to run their lives, is fairer, provides more security, and creates less antagonism between generations, fostering a greater sense of community" (Shapiro, 1998). It makes sense for a worker to want privatization because they have a little more control of how much they invest in their private account. The investment into a private account gives a higher chance of increasing their investment. People take great pride in knowing they have control over their finances. People tend to be more careful over their finances because they know that they are accountable for their future. For example, a person who cares about the future of their well-being will invest more time and money into their private accounts because they want their future outcome to be good. They want to have secure financial stability in their retirement years.

Retirement is one of the most important decisions a person has to make in their life. "Retirement decisions depend upon one's occupation, one's trade-off between work and leisure, one's time preference, the extent to which concern for the future guides one's present plans and goals, and so forth...and all of these are intimately involved with one's self-definition, one's ambitions, and one's goals." (Shapiro, 1998). It means that a person's end result of retirement savings depends on the sacrifices they make in their life as well as opportunities offered to them. These decisions greatly affect whether or not a person will have a financially secure retirement.

Pay-As-You-Go vs. Privatization

To understand the effects of the current Pay-as-you-go system, you would have to compare the intergenerational and intragenerational effects. Intergenerational is relationships between generations and intragenerational is relationships among members of the same generation. Intergenerational effects reflect how workers from the older generations had better benefits than today's workers. When social security started, payroll taxes were low and the rate of return on taxes was higher than the market. This provided better benefits than what is being offered today. What made the benefits better back then was the higher worker to retiree ratio

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because of population growth. Also, the life expectancy was shorter for retirees. Today there is medicine to help people expand their lifespan along with diet and exercise. These days the pay-as-you-go system is going downhill because the opposite is happening. Payroll taxes are higher and the lack of population growth to help stimulate the economy. With the reduced population growth, the worker to retiree ratio has gone down. It started out as 16:1, but eventually it will reach 2:1. If social security were to go towards privatization, then workers are responsible for themselves. They don't have to worry about if they'll get full benefits like they should. Basically, it would be every man for him.

The intragenerational effect is the difference amongst classes. The workers with lower income get more of their taxes taken out than workers with higher income. Also, higher income workers tend to enter the workforce later, so they contribute less to the system. Not only that, the higher income workers live longer during retirement and receive all the benefits since the lower income workers tend to die before age 65. (Shapiro, 1998). It is better for the lower class workers to get private accounts because there isn't a division amongst the classes. It is true that the higher class can contribute more to their accounts, but in the end it doesn't really matter because the market gives a higher return than the pay-as-you-go system. Workers would just be better off taking the risk of the market. It just isn't fair for the low income workers to have all their hard earned money taken away so that the high income workers can live luxuriously in their retirement years.

The children of today are going to be the ones to pay for the social security problem. If something is not done about social security soon, nearly one-fifth of workers income (today's children will be the workers) will go to paying for the retirement of baby boomers. On top of paying the taxes for workers income, they will have to pay hundreds of billions of dollars for income taxes just to help social security.

If social security were to privatize, then the young generation could be part of a defined contribution system, "...thus tightening the link between contributions and benefits and thereby improving work incentives". (Shapiro, 1998) Social security is expected to be fine until 2030, but that is only a prediction. Nobody knows what will happen in the future. Social security may dissolve before 2030 or it may not. Surpluses are expected to happen until 2018 and then social security will have to rely on government bonds. Since surpluses are to be invested in treasury bonds, a security of the U.S. government, any money contributed is available for spending. The bonds purchased are "...mixed with general revenue and then spent on the government's annual general operating expenses". (Tanner, 2005) The interest from the bonds is paid out in bonds. When the government has to pay back the bonds, they use the money from general revenue to pay it back. It is believed that social security is a safe system when in reality it is not.

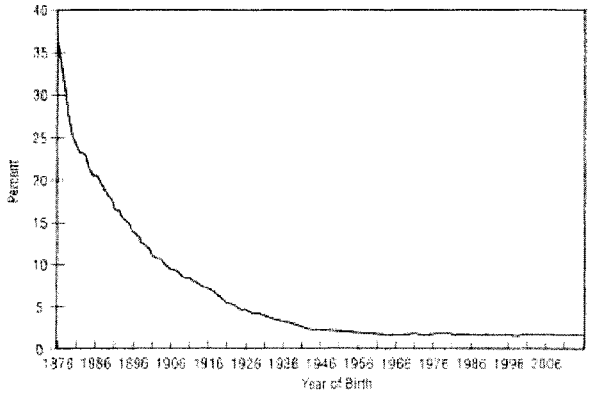
Social security should be used for exactly what it's meant to be used for. The government should not spend it for anything they like. Retired people expect to get back the money they put into the system in the form of benefits. They don't want to be told that the funds in the social security system are almost gone because of excessive spending. It's better to privatize because "...the need to reduce benefits or increase contributions will drive the net return to social security even lower, possibly even negative. Simply put, the existing public

PAYGO pension system is a bad deal for both current and future workers". (Altig and Gokhale, 1997).

The following is a graph of how real interest rates are taking a rapid decline.

Real Internal Rates of Return For OASDI

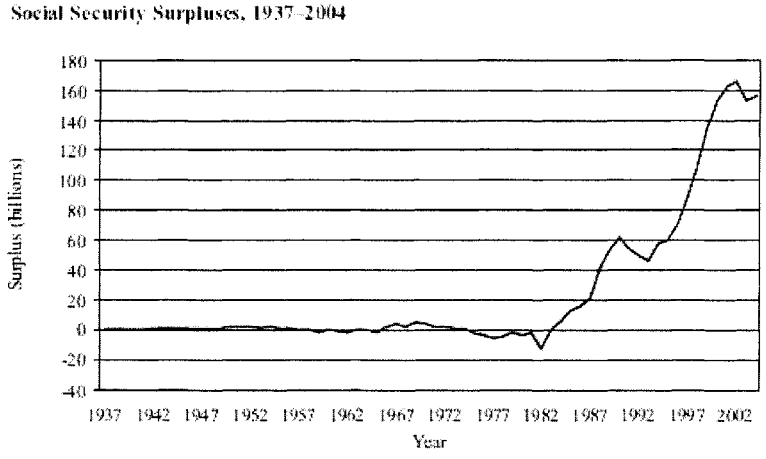
Source: (Altig and Gokhale, 1997)



The following is a graph of the social security surpluses from 1937 – 2004 (Tanner, 2005).

Social Security Surpluses, 1937-2004

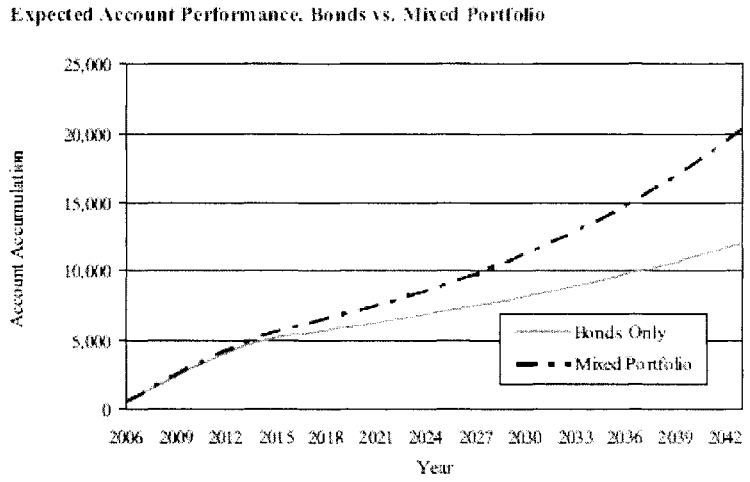
Source: (Tanner, 2005)



The pay-as-you-go system does not guarantee workers their benefits. Since the benefits are not guaranteed, then they can be taken away at any time. There isn't a safety net to keep you safe. People like to feel that they're safe and taken care of. If workers feel that they're not receiving the security they deserve, they'll go elsewhere. Since the pay-as-you-go system is the only social security system in the U.S., people don't really have a choice. When another idea for a social security system comes along, such as privatization, people will most likely view it as an escape. Privatization looks especially appealing when the current social security system is not working so well. The benefits are not inheritable. It means that if a retiree were to die, then he/she cannot pass their benefits to a spouse or child. People feel that they worked hard and should be able to do whatever they please with their benefits. As stated earlier, the current system provides returns less than what the market offers. It doesn't make any sense to contribute money to a system that doesn't guarantee anything. The market doesn't guarantee anything either, but at least there's a chance of getting a good return.

The following is a graph comparing expected account performance for bonds and mixed portfolios. (Tanner, 2005)

Expected Account Performance, Bonds vs. Mixed Portfolio
Source: (Tanner, 2005)



As you can see, if one were to invest in a mixed portfolio, then there would be a greater return.

The U.S. should look to other countries, such as Chile, that have privatized. Chile replaced their old pay-as-you- go system with privatization in 1981. The private accounts have yielded a 10.9 percent rate of return. In order to keep the current social security system in place, "...the United States will have to raise taxes, cut benefits, increase the retirement age or dip into other federal money to meet future obligations".(Strope, 2001)

Conclusion

Privatization may increase the chance of poor people having a better standard of living. If the retiree should die early, the money not spent can be passed on to their beneficiary (next of kin). Workers under a certain age will contribute part of their social security tax to a privately owned account, while "the remainder of the payroll tax would continue to be paid into the current system to finance benefits to current beneficiaries and those above the cutoff age". (Altig and Gokhale, 1997)

The plan to privatize includes current and future workers. Those who are above the cutoff age will remain in the old system. It's a process that will take time. It should gradually shift to privatization. There should be a deadline to have all of social security privatized. For example, privatization could be fully functional after the last of the baby boomers has retired. Privatization is just another way for American workers to save for retirement. It's not the worst idea in the world. It's just going to take a lot of time and money to change our current social security system to privatization. It's a matter of who will get together to implement privatization. Is privatization what America wants? Perhaps social security should be split between the current pay-as-you-go system and privatization. If one system goes wrong, then perhaps the other will do well.

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Teaching Case Study to Finance Majors: A Class Room Experience

Raj K. Kohli

In recent years, case study has become an extremely important component of the class room teaching. The employers are looking at the prospective employee's capability of handling a situation that arises during a real practical problem (case study) in the work place.

PART I

This project is continuation of my work at Indiana University South Bend that exposes finance majors to the corporate finance case study and integrates the case analysis to the technology. This course, called, *Applications in Financial Management*, has become a CAPSTONE course at our school and is taught in a computer lab.

This is a non structured class that does not consist of any lectures. Finance students solve and present Corporate Finance Cases on many topics throughout the semester. Number of students graduating with finance degree from IUSB fluctuates from fifteen to twenty each year, so this course is taught only during Spring Semester. Students work in a group of two, three or four students (depending on the class size) for each case. In order to make sure that student can work with different people (team working), students are assigned to different groups for each round of case presentation in the beginning of the semester. Once the groups are formed, they are assigned the cases to be presented during the entire semester. In general, each group presents about five cases during the semester.

To start the ball rolling, professor presents the very first case of the semester. Starting from scratch, the professor solves a case using spreadsheet and power point presentation (in the class) taking about two weeks. This helps the students in understanding and knowing the expectations from the presentation.

A group of students is responsible for completely solving the case and presenting it to the class on scheduled dates in the semester. The students are required to solve a Corporate Finance case using their knowledge of various concepts in finance from other courses, such as Investments, Financial Management, and Money & Banking. Some of the topics case topics are as follows: Cash Flow Estimation, Risk and Rate of Return, Risk Adjusted Cost of Capital and Divisional Hurdle Rates, Financial Forecasting, Working Capital Policy and Financing, Lease Analysis, Bond Refunding, Mergers and Acquisition, and valuing a New Venture. In general, two to three cases are covered from each topic.

Although students are given guidelines and clues, but they actually work themselves in solving the assigned case from a finance point of view. And, more importantly, they have to prepare a comprehensive spreadsheet showing solution to all numerical questions of a case. The spreadsheet includes various worksheets interlinked. Students are allowed to enter any input variable only one time in the spreadsheet. One of the important cases is completing a capital budgeting case.

PART II

This is the most important part in integrating the computers in an Upper-Level Finance Course. Students have gathered all the knowledge required to solve the case in part I. Now, they are required to prepare an extensive, detailed and accurate spreadsheets model to solve the case._

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The spreadsheet model is graded according to the thoroughness, completeness, and its accuracy. Students are instructed to prepare the spreadsheet models so that any information is entered only once in the model. In order to explain it further, let us examples from three different types of Corporate Finance Cases. Please note that students complete identical work as shown in the following three cases as an example.

A) Capital Budgeting Case

This is a complete budgeting case that requires estimation of cash flows, NPV, IRR, MIRR, and Payback Period computation. I have picked selected questions from this case to show the importance of the spreadsheet in class room.

Question 5

Estimate the project's operating cash flows. (Hint: Again, use Table A[1] as a guide.) What are the project's NPV, IRR, modified IRR (MIRR), and payback? Should the project be undertaken? [Remember: The MIRR is found in three steps: (1) compound all cash flows forward to the terminal year at the cost of capital, (2) sum the compounded cash inflows to obtain the terminal value of the inflows, and (3) find the discount rate which forces the present value of the terminal value to equal to the present value of the net investment outlays. This discount rate is defined as the MIRR.]

Question 8

Now assume that the sales price will increase by the 5 percent inflation rate beginning after Year 0. However, assume that cash operating costs will increase by only 2 percent annually from the initial cost estimate, because over half of the costs are fixed by long-term contracts. For simplicity, assume that no other cash flows (net externality costs, salvage value, or net working capital) are affected by inflation. What are project's NPV, IRR, MIRR, and payback with inflation taken into account? (Hint: The Year 1 cash flows, as well as succeeding cash flows, must be adjusted for inflation because the original estimates were in Year 0 dollars.)

As you may see that the only difference in questions five and eight is the inflation rates for price and cost. Therefore, we see that spreadsheet solution in table I (for question 5) and in table II (for question 8) are almost identical. The spreadsheet answers to these two questions reinforce the importance of using computers in solving financial cases. Once students have accurately prepared spreadsheet model for question five, the model can be modified to answer the question eight within less than a minute.

Table I and Table II below show the complete spreadsheet models for questions 5 and 8 respectively.

[1]Table A is in the case and is an incomplete version of Table 1.

Table I
Capital Budgeting Case (Question 5)
Input Variables Are Shown in the Shaded Area

	A	B	C	D	E	F	G	H	I
1									
2									
3	Net Invetsment		Dep. Basis			End of year BV			
4	Price	$500,000		MACRS %	Dep. Expense	$570,000			
5	Freight	$20,000	Year 1	33.00%	$188,100	$381,900			
6	Installation	$50,000	Year 2	45.00%	$256,500	$125,400			
7	Change in NWC	$10,000	Year 3	15.00%	$85,500	$39,900			
8			Year 4	7.00%	$39,900	$0			
9	Unit Sales	425,000							
10	Unit Price	$2.00							
11	Oper. costs	$1.50							
12	Other Project effects	$20,000							
13	Tax rate	40.00%							
14	Salvage value	$100,000							
15	cost of capital	10.00%							
16	Price Inflation	0.00%							
17	Cost Inflation	0.00%							
18									
19	Cash Flow Statements:								
20		Year 0	Year 1	Year 2	Year 3	Year 4			
21	Unit Price		$2.00	$2.00	$2.00	$2.00			
22	Unit Sales		425,000	425,000	425,000	425,000			
23	Revenues		850,000	850,000	850,000	850,000			
24	Opr. Costs		1.50	1.50	1.50	1.50			
25	Operating costs		637,500	637,500	637,500	637,500			
26	depreciation		188,100	256,500	85,500	39,900			
27	Other Project effects		20,000	20,000	20,000	20,000			
28	BT Income		4,400	(64,000)	107,000	152,600			
29	Taxes		1,760	(25,600)	42,800	61,040			
30	Net Income		2,640	(38,400)	64,200	91,560			
31	Add back depreciation		188,100	256,500	85,500	39,900			
32	Net Op.cash flows		190,740	218,100	149,700	131,460			
33	Salvage value					$100,000			
34	SV tax					$40,000			
35	Recovery of NWC					$10,000			
36	Termination cash flows					$70,000			
37	Project's NCF	($580,000)	$190,740	$218,100	$149,700	$201,460			
38	Cumulative Cash Flows	($580,000)	($389,260)	($171,160)	($21,460)	$180,000			
39									
40									
41	NPV	$23,719.65							
42	IRR	11.90%							
43	MIRR	11.11%							
44	Payback period=	3.10652							

Note:+Sum(b6:b9)
Note: +f6-e7
Note: +d5*d7
+b11
Note: +f23*f24
Note:+c26*(1=b19)^4
Note: +f24*f26
Note: +e10 transposed
Note:+b14
Note:+f25-sum(f27:f29)
Note:+f30*b15
Note: +f30-f31
Note:+f27
+f32+f33
+b16
+(f35-f10)*b15
+b9
+f35-f36+f37
+f34+f38
+e40+f39
Note: +b12*(1+b18)
+npv(b17,c39:f39)+b39
+irr(b39:f39)
+mirr(b9:f39,b17,b17)

Table II
Capital Budgeting Case (Question 8)
Input Variables Are Shown in the Shaded Area

	A	B	C	D	E	F	G	H	I
1									
2									
3	Net Invetsment		Dep. Basis			End of year BV			
4	Price	$500,000		MACRS %	Dep. Expense	$570,000			
5	Freight	$20,000	Year 1	33.00%	$188,100	$381,900			
6	Installation	$50,000	Year 2	45.00%	$256,500	$125,400			
7	Change in NWC	$10,000	Year 3	15.00%	$85,500	$39,900			
8			Year 4	7.00%	$39,900	$0			
9	Unit Sales	425,000							
10	Unit Price	$2.00							
11	Oper. costs	$1.50							
12	Other Project effects	$20,000							
13	Tax rate	40.00%							
14	Salvage value	$100,000							
15	cost of capital	10.00%							
16	Price Inflation	5.00%							
17	Cost Inflation	2.00%							
18									
19	Cash Flow Statements:								
20		Year 0	Year 1	Year 2	Year 3	Year 4			
21	Unit Price		$2.10	$2.21	$2.32	$2.43			
22	Unit Sales		425,000	425,000	425,000	425,000			
23	Revenues		892,500	937,125	983,981	1,033,180			
24	Opr. Costs		1.53	1.56	1.59	1.62			
25	Operating costs		650,250	663,255	676,520	690,051			
26	depreciation		188,100	256,500	85,500	39,900			
27	Other Project effects		20,000	20,000	20,000	20,000			
28	BT Income		34,150	(2,630)	201,961	283,230			
29	Taxes		13,660	(1,052)	80,784	113,292			
30	Net Income		20,490	(1,578)	121,177	169,938			
31	Add back depreciation		188,100	256,500	85,500	39,900			
32	Net Op.cash flows		208,590	254,922	206,677	209,838			
33	Salvage value					$100,000			
34	SV tax					$40,000			
35	Recovery of NWC					$10,000			
36	Termination cash flows					$70,000			
37	Project's NCF	($580,000)	$208,590	$254,922	$206,677	$279,838			
38	Cumulative Cash Flows	($580,000)	($371,410)	($116,488)	$90,189	$370,027			
39									
40									
41	NPV	$166,718.91							
42	IRR	22.21%							
43	MIRR	17.17%							
44	Payback period=	2.56362							

Note:+Sum(b6:b9)
Note: +f6-e7
Note: +d5*d7
Note: +b12*(1+b18)
+b11
Note: +f23*f24
Note:+c26*(1=b19)^4
Note: +f24*f26
Note: +e10 transposed
Note:+b14
Note:+f25-sum(f27:f29)
Note:+f30*b15
Note: +f30-f31
Note:+f27
+f32+f33
+b16
+(f35-f10)*b15
+b9
+f35-f36+f37
+f34+f38
+e40+f39
+npv(b17,c39:f39)+b39
+irr(b39:f39)
+mirr(b9:f39,b17,b17)

B) Valuation Case

Another simple case is bond and stock valuation. Here again students first solve the case and then create a spreadsheet template to show their analytical work. Again, I have picked selected questions from this case.

Question 1: (Bond Question) Suppose you buy 5 years, 10-years and 15-years bonds at par with 10 percent coupon payment, what happens to the bonds prices when interest rates go up to 13 percent? Use semi-annual compounding.

Question 2: (Preferred Sock Question) Suppose Series F with a $1,000 par value preferred stock and a 9.75 percent cumulative dividend, has a mandatory sinking fund provision. 60,000 of 300,000 shares outstanding must be redeemed annually at par beginning at the end of next year. If the nominal required rate of return is 8 percent, what is the current value per share?

Question3: (Supernormal Growth Stock Question) Suppose Don Johnson Company will pay a dividend of $1.80 next year and is going through tough periods so will have 6 percent supernormal growth period for 5 years after which it will return to 7.5 percent growth rate for ever. If the required rate of return is 13.5 percent, what is the value of a share as of today?

Table III shows a complete spreadsheet model for the selected questions from this case.

Table III
Valuation Case
Input Variables Are Shown in the Shaded Area

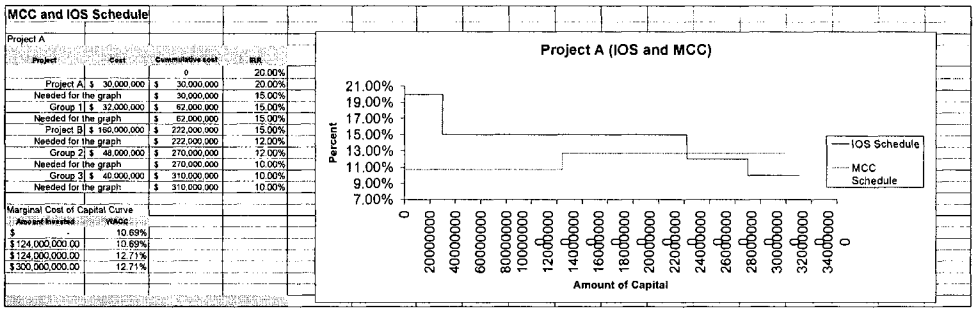
	A	B	C	D	E	F	G
1	Bond Question						
2							
3	Input Area						
4	Semi Annual Coupon payments		$50				
5	Years to Maturity		5	15	25		
6	New Interset rates		13.00%				
7	Old Interset rates		10.00%				
8	Par Value		$1,000				
9							
10	Output Area New Bond Prices						
11	5 Year	($892.17)					
12	15 Year	($804.12)					
13	25 Year	($779.13)					
14							
15	Preferred Stock Question						
16							
17	Shares to be redeemed	300000					
18	Called a year	60000					
19	Par	100					
20	Annual Dividend	$9.75					
21	Nominal Rate	8.00%					
22	Number of years to call	5					
23							
24	Output Area						
25	Quartrly Dividend	$2.44					
26	Nominal Qrt Rate	2.00%					
27	Percentage called	20.00%					
28							
29	Average Holding Period	3					
30		($104.63)					
31							
32	Common Stock Question						
33	Input Variables						
34	supernormal growth rate	0.06					
35	normal growth rate	0.075					
36	k (Required return)	0.135					
37	D_1	1.8					
38							
39	Output Area						
40	dividends or Stock Price	value		PV			
41	D1	1.8000		1.5859			
42	D2	1.9080		1.4811			
43	D3	2.0225		1.3832			
44	D4	2.1438		1.2918			
45	D5	2.2725		1.2065			
46	D6	2.4429					
47	P5	40.71488196		21.6159			
48				28.5645			
49							
50							
51							

Note:+c10/2,c9*2,c8,c12)
Note:+c10/2,d9*2,c8,c12)
Note: +c10/2,e9*2,c18,c12)
Note: +b20/4
Note: +b21/4
Note: +b17/b18
Note:+pv(b21,b24*4,b19,b17,0)
Note:+b37*(1+b30)
Note:+b38(1+b30)
Note:+b41*(1+b31)
Note: +b37/(1+b32)
Note:+b38/(1+b32)^2
Note:+b43/(1+b32)^5
Note: +sum(d37:d43)
Note: +b42/(b32-b31)

C) Cost of Capital Case

Table IV shows graph representing Marginal Cost of Capital (MCC) and Investment Opportunity Schedule (IOS) drawn using spreadsheet.

Table IV: MCC and IOS Graph



MCC and IOS Schedule

Project A

Project	Cost	Cummulative cost	IRR
		0	20.00%
Project A	$ 30,000,000	$ 30,000,000	20.00%
Needed for the graph		$ 30,000,000	15.00%
Group 1	$ 32,000,000	$ 62,000,000	15.00%
Needed for the graph		$ 62,000,000	15.00%
Project B	$ 160,000,000	$ 222,000,000	15.00%
Needed for the graph		$ 222,000,000	12.00%
Group 2	$ 48,000,000	$ 270,000,000	12.00%
Needed for the graph		$ 270,000,000	10.00%
Group 3	$ 40,000,000	$ 310,000,000	10.00%
Needed for the graph		$ 310,000,000	10.00%

Marginal Cost of Capital Curve

Amount Invested	WACC
$ -	10.69%
$ 124,000,000.00	10.69%
$ 124,000,000.00	12.71%
$ 300,000,000.00	12.71%

PART III

After finishing the first two parts of this project, students are required to present the case solution to the class in a professional manner. It is mandatory that they must answer all the conceptual questions in a Power Point Presentation. The spreadsheet models in the Part II must be used as a hyper link in their power point presentations.

All together, when students present a case successfully, the entire process as explained in Parts I-III is as intense as the requirements of a Financial Information System (FIS) Course. However, at IUSB, we do not offer a Financial Information System Course. But, this course has emerged as a CAPSTONE COURSE at our school.

In conclusion, while Part I of this project is intended to help students to successfully apply their knowledge of various concepts in finance to solve the Corporate Finance Cases. Part II of this project is extremely (and probably the most beneficial) to students as they integrate the concepts of finance in spreadsheet models. Part III helps them in increasing their presentation skills.

Although these exercises are more time consuming and sometimes very perplexing, but the ultimate result is the students' satisfaction and their learning.