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THE ASSET CLASS OF BITCOIN AND ITS CONTRIBUTIONS TO INVESTMENT PORTFOLIOS

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ABSTRACT

This study investigates the asset class and portfolio contributions of Bitcoin, using monthly returns for eight years after it had matured into an investable asset. Bitcoin displays a unique return distribution and offers a distinctive risk-return profile compared to five other major asset classes. Bitcoin delivered by far the highest returns with the greatest volatility, and its Sharpe ratio was lower only than stocks. Although Bitcoin had the most extreme returns, it was the only asset with highly positively skewed returns. It provided the highest Sortino and upside potential ratios, reflecting its high risk-premiums and average upside returns relative to downside risk. Bitcoin's uniqueness as an asset was substantiated by its low correlations with other assets, which had very little explanatory power for its returns. Bitcoin's uniqueness as an asset was substantiated by its low correlations with other assets, which had very little explanatory power for its returns. Not surprisingly, Bitcoin played a valuable role in enhancing the risk-return tradeoffs of investment portfolios. A modest Bitcoin allocation boosted the Sharpe ratio of a stock portfolio far more than much larger allocations of gold or bonds. Optimizing a portfolio of stocks and bonds with a small Bitcoin weight considerably increased the Sharpe ratio, whereas an optimization with gold barely affected the Sharpe ratio. Stock and stock-bond portfolios optimized with Bitcoin also provided higher risk-premiums and average upside returns compared to downside risk, producing higher Sortino and upside potential ratios, than portfolios optimized with gold.

Keywords: Cryptocurrency; Bitcoin; Return distribution; Risk-return tradeoff; Optimal portfolio.

INTRODUCTION

A pseudonymous paper by Nakamoto (2008) described a process for making online payments directly to peers without any financial intermediation. These payments are made with cryptocurrencies, which are electronic currencies produced by cryptography. The cryptocurrency transactions are verified by a decentralized consensus proof-of-work mechanism and documented in a blockchain. The entity that successfully validates the longest block of transactions

first earns new cryptocurrencies. Increase and enhancements in computing power are balanced by making the mining process increasingly more difficult, ensuring a gradual increase in the supply of cryptocurrencies. For the original cryptocurrency, Bitcoin, the mining remuneration is cut in half every time 210,000 blocks are verified, which occurs in cycles of about four years. The mining reward was set at 50 Bitcoins per block when Bitcoin was launched in January 2009; it was subsequently halved to 25 in November 2012, 12.25 in July 2016, and 6.25 in May 2020. A total of 19 million Bitcoins had been mined by early March 2022 and there is a maximum limit of 21 million Bitcoins which is expected to be reached in 2140.

A detailed analysis of Bitcoin transactions by Tasca et al. (2018) revealed three stages in the evolution of the Bitcoin economy: test transactions of the early prototype starting in January 2009, giving way to early adopters, primarily gambling services and black marketers, from April 2012, before maturing into legitimate business activities from November 2013. Cryptocurrencies have gained growing acceptance in recent years. Major firms, such as Home Depot, Microsoft, PayPal, Starbucks, and Whole Foods, accept Bitcoin payments, which do not incur the transaction fees charged for credit card payments. Coin ATM Radar reports that 71 countries have 20,000 crypto ATMs, 90% of them in the United States of America (U.S.A.). El Salvador recently conferred legal tender status on Bitcoin. A unique function of cryptocurrencies is to swiftly transfer large amounts with negligible costs. Wright (2020) reported a striking instance of $1.1 billion of Bitcoins being transferred in ten minutes for a transaction fee of $0.68. Kim (2017) found that bid-ask spreads are 2% narrower and exchange rates are 5% better in Bitcoin markets compared to retail foreign exchange markets.

Several U.S. government agencies have provided directions on cryptocurrencies, recognizing their increasing use. In March 2014, the Internal Revenue Service declared that virtual currencies are taxed as property. The Commodity Futures Trading Commission classified Bitcoin as a commodity in September 2015. In July 2017, the Securities and Exchange Commission noted that initial coin offerings may be securities, subject to federal securities laws. In July 2020, the Office of the Comptroller of the Currency permitted national banks to provide cryptocurrency custody services to customers and reiterated that they may offer banking services to cryptocurrency businesses.

The number and value of cryptocurrencies have surged in the decade since their creation. CoinMarketCap listed more than 9,500 cryptocurrencies with total market capitalization over $1.8 trillion in early March 2022. Bitcoin was the leading cryptocurrency, with market capitalization of $802 billion, which was well over double the market value of $329 billion for Ethereum, the second-most valuable cryptocurrency. The Chicago Board Options Exchange and Chicago Mercantile Exchange initiated Bitcoin futures trading contracts in December 2017. Grayscale offers several closed-end mutual funds investing in the leading cryptocurrencies, such as Bitcoin, Ethereum, and Litecoin.

The durability and soaring market values of cryptocurrencies have attracted the attention of investors. Large endowments of prestigious universities, including Harvard, Yale, and Brown, have invested in cryptocurrencies. Gemini Crypto Exchange reported in April 2021 that 14% of Americans owned cryptocurrencies and 13% of those surveyed intended to purchase cryptocurrencies in the next twelve months. In a recent survey by Intertrust, chief financial officers at 100 global hedge funds indicated that they expected to hold an average of 7.2% of their assets in cryptocurrencies by 2026. The increasing investor interest in cryptocurrencies provides a compelling motivation for identifying the characteristics of this emerging asset and determining its potential contributions to investment portfolios.

Some researchers have presented evidence of the features and investment function of the oldest and most valuable cryptocurrency: Bitcoin. Dyhrberg (2016a) observed that Bitcoin resembles gold in having volatile prices and value attributable to limited supply which is not determined by any government. Dyhrberg (2016b) showed that Bitcoin shares traits of both gold and the U.S. dollar, indicating that it is a store of value as well as a medium of exchange. Dwyer (2015), however, found that monthly returns are far more volatile for Bitcoin compared to gold and U.S. dollar exchange rates of foreign currencies. Glaser et al. (2014) suggested that Bitcoin is regarded as an alternative investment. Brière et al. (2015) indicated that Bitcoin resembles both traditional and alternative assets. Meiklejohn et al. (2013) reported that the holding period of Bitcoins usually exceeded a year. Alfieri et al. (2019) argued that Bitcoin resembles common stock in offering ownership interest in an intangible asset and human capital. Several researchers (Bouoiyour and Selmi, 2015; Harwick, 2016; Baur et al., 2018) have indicated that Bitcoin is a speculative asset. Kristoufek (2015), however, found that Bitcoin's prices are influenced by fundamental factors, such as trade use, money supply, and price level. Mukherji (2019) reported that Bitcoin's return distribution is very different from major financial assets, and its returns are only weakly positively correlated with two other asset classes: stocks and commodities.

Since Bitcoin started trading in 2010, empirical evidence of its investment performance is based on returns for only a few years. Based on weekly returns from July 2010-December 2013, Brière et al. (2015) found that adding small proportions of Bitcoin considerably improved the risk-return characteristics of diversified portfolios. Bouri et al. (2017) studied daily and weekly returns during July 2011-December 2015 and showed that Bitcoin provided diversification benefits for U.S. stocks and bonds, international stocks, U.S. dollars, and commodities. Analysis of daily returns of 17 assets in the July 2010-June 2015 period by Baur et al. (2018) indicated that Bitcoin delivered the highest returns with the greatest volatility, and it had very high negative skewness and kurtosis, distinguishing it from gold. A study of monthly returns from May 2013-April 2018 by Mukherji (2019) demonstrated that small allocations to Bitcoin improved the Sharpe ratio of stock and bond portfolios.

This paper extends the scanty evidence on the nature and portfolio impact of Bitcoin in several ways. The earlier studies were generally based on daily or weekly returns for a few years, primarily drawn from the early prototype and early adopter stages of the Bitcoin economy, when Bitcoin's price rose from very low levels. This study uses monthly Bitcoin returns from a recent eight-year period, mainly reflecting the mature stage of the Bitcoin economy when Bitcoin had attained investable status. To investigate whether Bitcoin resembles any existing asset classes, its return distribution and investment performance are compared to major financial asset classes, and the relations between the returns of Bitcoin and the other assets are determined by examining correlations and regression results. The characterization of Bitcoin as digital gold (Popper, 2015) is evaluated by comparing the results of optimizing stock portfolios and portfolios of stocks and bonds with Bitcoin and gold. Since the monthly returns of several assets, including Bitcoin, are not normally distributed, this study also determines the tradeoffs of the risk premiums and average upside returns with the downside risk of the assets and optimal portfolios.

The rest of this paper is organized in the following manner. Section 2 describes the data and analytical methods. Section 3 presents and discusses the empirical results. Section 4 provides concluding remarks.

DATA AND ANALYTICAL METHODS

Daily Bitcoin (BTC) prices were obtained from CoinMarketCap, which reports the volume-weighted average price from all markets trading BTC. Although cryptocurrencies trade continuously, CoinMarketCap follows the norm of providing daily prices at Coordinated Universal Time, coinciding with 8 p.m. U.S. Eastern Standard Time (EST). The potential impact of the four-hour lag between the daily prices of BTC and other U.S. financial assets, whose market closes at 4 p.m. EST, is much greater for earlier studies based on daily or weekly returns than for this study using monthly returns. CoinMarketCap reports daily BTC prices from April 28, 2013, so this study uses 96 monthly returns for the period May 2013 to April 2021. The study period excludes the extremely high returns reflecting Bitcoin's price rising from its first trade at 4.951 cents in 2010; Bitcoin's price at the beginning of the study period was $139.00. Daily prices of the following sixteen large exchange-traded funds (ETFs) representing five major asset classes, adjusted for dividends and stock splits, were obtained from Yahoo! Finance, which provides the data from Intercontinental Exchange:

<u>Currencies</u>
CEW: WisdomTree Emerging currency strategy: emerging markets money market securities
UUP: Invesco Deutsche Bank U.S. dollar index bullish: long positions in U.S. dollar index futures

Bonds
BOND: PIMCO active bond: diversified portfolio of fixed-income instruments
IBND: SPDR Bloomberg Barclays international bond: global ex-U.S. dollar corporate bond index > $1B
HYG: iShares iBoxx $ high yield corporate bond: U.S. dollar liquid high-yield index
ZROZ: PIMCO 25+ year zero coupon U.S. Treasury: long U.S. Treasury principal STRIPS index
Stocks
ACWI: iSHARES MSCI: large- and mid-capitalization developed and emerging market equities
QQQ: Invesco QQQ trust: NASDAQ 100 index
SCHF: Schwab international equity: FTSE developed ex-U.S. index
SPY: SPDR S&P 500 trust: S&P 500 index
Commodities
DBC: Invesco Deutsche Bank commodity tracking: D.B.I.Q. optimum yield diversified commodity index
GLD: SPDR gold shares - gold bullion
USCI: U.S. commodities: SummerHaven dynamic commodity index total return
USO: U.S. oil: benchmark short-term oil futures contract
Alternatives
PSP: Invesco global listed private equity: Red Rocks global listed private equity index
QAI: I.Q. hedge multi-strategy tracker: I.Q. hedge multi-strategy index fund of funds

Since BTC trades continuously, the monthly returns of BTC and the ETFs were based on the last trading days for which each month's closing price was available for the ETFs, so that the returns were computed over similar periods for all the assets. The asset class of BTC was investigated by comparing its return distribution to the distributions of the ETF returns, determining correlations of BTC returns with returns of the ETFs, and examining the significance and power of the ETF returns for explaining BTC returns. The Jarque-Bera (JB) test statistic was used to test for significant differences of the skewness and kurtosis of the asset distributions from the normal distribution:

$$\text{JB statistic} = n/6\ (\text{skewness}^2 + \text{excess kurtosis}^2/4) \quad (1)$$

The relative value of BTC for mean-variance optimization of diversified portfolios was evaluated by examining the weights and risk-return characteristics of optimal portfolios which maximized the Sharpe ratio by adding GLD, BOND, and BTC to SPY, as well as by combining GLD and BTC with a balanced portfolio of 60% SPY and 40% BOND. SPY is a diversified stock portfolio which might be suitable for young investors, while the SPY-BOND portfolio represents a common allocation of stocks and bonds that is more appropriate for middle-aged investors. All the optimal portfolios were subjected to two constraints: they had to be fully

invested in optimal proportions of the assets considered and the optimal asset allocations could not be negative. The mean-variance risk-return tradeoffs of the assets and portfolios were assessed with the Sharpe (1966) ratio, the risk-free return being represented by returns of the iShares Short Treasury Bond ETF (SHV), consisting of U.S. treasury bonds maturing within a year:

Sharpe ratio = (mean return – mean risk-free return)/
standard deviation of returns (2)

Since monthly returns of stocks, bonds, and Bitcoin are not normally distributed, the risk-return tradeoffs based on downside deviations were also examined with the Sortino ratio (Sortino and Meer, 1991), and the upside potential ratio (Sortino et al., 1999):

Sortino ratio = (mean return – mean risk-free return)/
downside deviation of returns below the risk-free return (3)

Upside potential ratio = average upside return/downside deviation of returns below the risk-free return (4)

The Sortino ratio generally calculates the risk premium relative to the minimum acceptable return in the numerator. This study uses the risk-free return as the minimum acceptable return to make all the three ratios comparable. The downside deviation of returns below the risk-free return is the standard deviation of the differences between the returns and the risk-free return, for returns below the risk-free return, treating the differences as zero for returns above the risk-free return. The average upside return is the average of the differences between the returns and the risk-free return, for returns exceeding the risk-free return, considering the differences to be zero for returns below the risk-free return.

EMPIRICAL RESULTS AND DISCUSSION

The monthly return distributions of BTC and the sixteen ETFs representing five asset classes are portrayed in Table 1. BTC provided by far the highest mean return of 11.91%, more than six times the second-highest mean return of 1.83% for QQQ. BTC also had the highest standard deviation (SD) of 51.59%, exceeding four times the second-highest SD of 12.01% for USO. By comparison, although BTC had the greatest systematic risk, using SPY as the market portfolio, its beta of 2.03 was only 62% higher than the second-highest beta of 1.25 for PSP, indicating its relatively low correlation with the market portfolio. BTC returns displayed high positiveness skewness of 6.80, with a mean return that was more than twice the median return. By contrast, only two of the ETFs showed modest positive skewness: ZROZ (0.50) and GLD (0.23). BTC also exhibited very high excess kurtosis (EK) of 57.99, more than seven times the second-highest EK of 7.68 for HYG. The JB statistic of BTC was highly significant and much larger than the JB statistics of all the ETFs. Notably, the nine ETFs with JB statistics significant at the 1% level all had negative skewness, ranging from -0.32 to -1.25, and EK of

1.79 to 7.68, whereas the large JB statistic of BTC reflected extremely high positive skewness and EK.

Table 1
Descriptive statistics of Bitcoin and 16 exchange-traded funds based on 96 monthly returns from May 2013 to April 2021. ** and * indicate Jarque-Bera statistics significant at the 1% and 5% levels, respectively.

Asset	Mean (%)	Median (%)	Std. dev. (%)	Beta	Skew	Excess kurtosis	Jarque-Bera statistic
BTC	11.91	4.97	51.59	2.03	6.80	57.99	14193.56**
Currencies							
CEW	-0.10	0.08	2.19	0.29	-0.15	0.38	0.91
UUP	0.16	0.35	1.80	-0.13	-0.05	-0.26	0.31
Bonds							
BOND	0.27	0.23	1.12	0.07	-0.54	3.08	42.68**
IBND	0.11	0.00	2.30	0.30	-0.05	1.02	4.20
HYG	0.37	0.41	1.96	0.38	-1.25	7.68	260.81**
ZROZ	0.57	0.51	5.45	-0.36	0.50	0.66	5.68
Stocks							
ACWI	0.93	1.34	3.88	0.95	-0.47	1.80	16.47**
QQQ	1.83	2.14	4.57	1.06	-0.07	0.28	0.39
SCHF	0.60	0.81	4.04	0.89	-0.32	2.12	19.56**
SPY	1.25	1.78	3.94	1.00	-0.44	1.79	15.92**
Commodities							
DBC	-0.25	-0.08	4.94	0.65	-0.47	0.81	6.17*
GLD	0.25	-0.33	4.36	0.02	0.23	-0.05	0.89
USCI	-0.28	-0.18	3.94	0.48	-0.59	3.20	46.51**
USO	-1.02	-0.38	12.01	1.21	-1.13	5.31	133.40**
Alternatives							
PSP	1.05	1.31	5.53	1.25	-1.25	6.96	218.73**
QAI	0.22	0.26	1.39	0.30	-0.60	2.61	32.87**

Table 2 presents the risk-return profiles of BTC and the ETFs. Four of the ETFs had negative coefficients of variation (CVs) owing to negative mean returns; of the twelve ETFs with positive CVs, only one bond ETF (BOND) and three stock ETFs (ACWI, QQQ, and SPY) had lower CVs than BTC. BTC provided the largest risk premium of 11.85%, almost seven times the second-highest risk premium of 1.77% for QQQ. Despite its large SD, shown in Table 1, BTC had the third-highest Sharpe ratio of 0.23; only two stocks ETFs (QQQ and SPY) produced higher Sharpe ratios. Compared to the ETFs, BTC generated far more upside than downside relative to the risk-free return. The average upside return of 17.87% for BTC was almost five times USO's second-highest average upside return of 3.64%. By contrast, BTC's downside deviation of 11.23% was only 14% higher than USO's second-highest downside deviation of 9.84%. As a result, BTC had the

highest Sortino ratio of 1.05, which was 42% higher than QQQ's second-highest Sortino ratio of 0.74. BTC also had the highest upside potential ratio of 1.59, which was 34% greater than QQQ's second-highest upside potential ratio of 1.19.

The return distributions and risk-return characteristics in Tables 1 and 2 clearly indicate that BTC does not belong to any of the five asset classes represented by the ETFs. It provided much higher returns than the other assets and it was the only asset with highly positively skewed returns. Although it had far more volatile returns than the other assets, it offered a very high risk-premium, producing a fairly high Sharpe ratio that was inferior only to that of stocks. BTC also had far more extreme returns than the other assets, but it offered higher risk premiums and greater upside returns than downside risk compared to the other assets. As a result, BTC delivered the highest Sortino and upside potential ratios.

Table 2
Risk-return profiles of Bitcoin and 16 exchange-traded funds based on 96 monthly returns: May 2013-April 2021.

Asset	Coeff. of var-iation	Risk prem-ium (%)	Sharpe ratio	Avg. upside return (%)	Down-side dev. (%)	Sort-ino ratio	Upside pot-ential ratio
BTC	4.33	11.85	0.23	17.87	11.23	1.05	1.59
Currencies							
CEW	-21.85	-0.16	-0.07	0.79	1.67	-010	0.48
UUP	11.64	0.09	0.05	0.78	1.24	0.08	0.63
Bonds							
BOND	4.13	0.21	0.19	0.52	0.73	0.29	0.72
IBND	20.79	0.05	0.02	0.89	1.59	0.03	0.56
HYG	5.34	0.30	0.16	0.84	1.35	0.23	0.62
ZROZ	9.63	0.50	0.09	2.33	3.30	0.15	0.71
Stocks							
ACWI	4.19	0.87	0.22	1.94	2.49	0.35	0.78
QQQ	2.50	1.77	0.39	2.85	2.39	0.74	1.19
SCHF	6.77	0.53	0.13	1.83	2.69	0.20	0.68
SPY	3.16	1.18	0.30	2.16	2.41	0.49	0.90
Commodities							
DBC	-20.15	-0.31	-0.06	1.76	3.83	-0.08	0.46
GLD	17.55	0.19	0.04	1.79	2.82	0.07	0.64
USCI	-13.92	-0.34	-0.09	1.25	3.07	-0.11	0.41
USO	-11.74	-1.09	-0.09	3.64	9.84	-0.11	0.37
Alternatives							
PSP	5.29	0.98	0.18	2.48	3.83	0.26	0.65
QAI	6.19	0.16	0.12	0.60	0.94	0.17	0.64

Table 3
Correlations of log monthly returns of Bitcoin and 16 exchange-traded funds during May 2013 to April 2021.

	BTC	CEW	UUP	BOND	HYG	IBND	ZROZ
Currencies							
CEW	0.13						
UUP	-0.10	-0.64					
Bonds							
BOND	0.12	0.36	-0.12				
HYG	0.23	0.62	-0.34	0.54			
IBND	0.22	0.70	-0.86	0.42	0.59		
ZROZ	-0.08	-0.09	0.07	0.64	-0.03	0.05	
Stocks							
ACWI	0.22	0.66	-0.41	0.32	0.81	0.60	-0.24
QQQ	0.21	0.42	-0.29	0.26	0.63	0.47	-0.18
SCHF	0.21	0.71	-0.47	0.34	0.78	0.63	-0.23
SPY	0.23	0.52	-0.29	0.25	0.77	0.50	-0.26
Commodities							
DBC	0.18	0.54	-0.46	0.07	0.61	0.47	-0.40
GLD	0.02	0.32	-0.38	0.47	0.31	0.41	0.45
USCI	0.23	0.53	-0.50	0.13	0.57	0.53	-0.32
USO	0.08	0.42	-0.28	0.05	0.52	0.32	-0.37
Alternatives							
PSP	0.21	0.59	-0.37	0.37	0.82	0.59	-0.27
QAI	0.24	0.66	-0.45	0.46	0.82	0.66	-0.11
	ACWI	QQQ	SCHF	DBC	GLD	USCI	USO
Stocks							
ACWI				0.60	0.07	0.57	0.47
QQQ	0.89			0.41	0.05	0.38	0.28
SCHF	0.96	0.80		0.62	0.06	0.57	0.52
SPY	0.97	0.91	0.87	0.52	0.01	0.49	0.39
	DBC	GLD	USCI	PSP	QAI		
Commodities							
DBC				0.61	0.59		
GLD	0.14			0.04	0.20		
USCI	0.87	0.23		0.58	0.58		
USO	0.82	-0.06	0.69	0.55	0.45		
	ACWI	QQQ	SCHF	SPY	PSP		
Alternatives							
PSP	0.93	0.78	0.92	0.89			
QAI	0.90	0.80	0.88	0.86	0.86		

Since the JB statistics in Table 1 showed that monthly returns of most of the assets, particularly BTC, are not normally distributed, continuously compounded returns

were used to investigate linear relationships among BTC and the other assets. Table 3 indicates that BTC had significant but weak positive correlations with nine ETFs; it had correlations of 0.22 to 0.23 with two bond ETFs, 0.21 to 0.23 with the four stock ETFs, 0.23 with a commodity ETF, and 0.21 to 0.24 with the two alternative ETFs. The highest correlation of 0.24 for BTC was with the hedge fund ETF (QAI). Not surprisingly, the U.S. dollar ETF (UUP) was moderately negatively correlated with most of the other ETFs, and it had strong correlations of -0.86 with IBND and -0.64 with emerging market currencies (CEW). The four stock ETFs had strong correlations of 0.80 to 0.97 among themselves and 0.78 to 0.93 with the two alternative ETFs. The only strong correlation among bonds was between BOND and ZROZ. HYG had moderate correlations of 0.54 to 0.59 with two bond ETFs; it had stronger correlations of 0.63 to 0.81 with the four stock ETFs and 0.82 with the two alternative ETFs. GLD was not strongly correlated with any of the ETFs, including the other three commodity ETFs, which had strong correlations of 0.69 to 0.87 with each other. The highest correlations of GLD were 0.47 with BOND and 0.45 with ZROZ; its correlations with BTC and the four stock ETFs were all close to zero. These results suggest that BTC and GLD can play substantial and distinctive roles in diversifying stock portfolios.

Table 4
Univariate regressions of log monthly returns of Bitcoin on 16 exchange-traded funds. * indicates intercepts and coefficients significant at the 5% level.

	Intercept	T-stat.	Coefficient	T-stat.	Adjusted R-square
Currencies					
CEW	0.06*	2.28	1.68	1.29	0.70%
UUP	0.06*	2.27	-1.49	-0.94	-0.13%
Bonds					
BOND	0.05	1.87	3.09	1.21	0.49%
IBND	0.06*	2.16	2.70*	2.21	3.94%
HYG	0.05	1.82	3.18*	2.24	4.05%
ZROZ	0.06*	2.25	-0.40	-0.75	-0.46%
Stocks					
ACWI	0.05	1.73	1.55*	2.15	3.66%
QQQ	0.04	1.35	1.30*	2.07	3.35%
SCHF	0.06	1.96	1.47*	2.11	3.50%
SPY	0.04	1.51	1.60*	2.25	4.10%
Commodities					
DBC	0.07*	2.35	1.02	1.81	2.34%
GLD	0.06*	2.18	0.15	0.23	-1.01%
USCI	0.07*	2.45	1.62*	2.31	4.38%
USO	0.07*	2.28	0.16	0.75	-0.47%
Alternatives					
PSP	0.05	1.90	1.02*	2.08	3.37%
QAI	0.05	1.86	4.91*	2.44	4.98%

Table 4 depicts the results of regressing continuously compounded returns of BTC against each of the sixteen ETFs. The nine ETFs which showed weak positive correlations with BTF in Table 3 all have positive coefficients that are significant at 5% level, but their explanatory powers for BTC returns are only 3% to 5%. The hedge fund ETF (QAI) has the highest adjusted R-square of 4.98%, followed by 4.38% for the U.S. commodity ETF (USCI).

Table 5
Multivariate regression of log monthly returns of Bitcoin on 9 exchange-traded Funds. * indicates significance at the 5% level.

	Coefficient	T-statistic
Intercept	0.05	1.53
Bonds		
IBND	2.11	1.17
HYG	1.75	0.61
Stocks		
ACWI	-22.92*	-2.31
QQQ	1.09	0.64
SCHF	9.75	1.98
SPY	12.11*	2.21
Commodities		
USCI	1.41	1.49
Alternatives		
PSP	-1.23	-0.80
QAI	3.51	0.65
F-statistic	1.50	
R-square	13.59%	
Adjusted R-square	4.54%	

Table 5 shows the results of a multivariate regression of continuously compounded returns of BTC against the nine ETFs that had significant coefficients in the univariate regressions in Table 4. Only two of the stock ETFs (ACWI and SPY) have coefficients that are significant at 5% level, and the sign of the coefficient of ACWI switches from positive in the univariate regression to negative in the multivariate model, because it is strongly correlated with all of the other ETFs. The adjusted R-square of 4.54% for the multivariate model is lower than the adjusted R-square of 4.98% for QAI in the univariate regression, and the F-statistic of the multivariate regression is not significant at 5% level.

Tables 1 and 2 indicated that BTC had a very different return distribution and risk-return characteristics than the other assets studied. Consistent with those results, the correlations and regressions in Tables 3 through 5 showed that none of the other assets studied was strongly related to BTC, and their returns had very little power to explain variations in BTC returns. These findings suggest that BTC may

have considerable potential to enhance the performance of diversified portfolios of traditional assets.

Table 6
Weights and risk-return characteristics of stock portfolios maximizing the Sharpe ratio with gold, bonds, and Bitcoin. ** indicates Jarque-Bera statistics significant at the 1% levels.

	Portfolio 1	Portfolio 2	Portfolio 3	Portfolio 4
	SPY, GLD	SPY, BOND	SPY, BTC	SPY, BTC
Weights				
SPY	89.60%	39.23%	94.99%	97.85%
GLD	10.40%			
BOND		60.77%		
BTC			5.01%	2.15%
Characteristics				
Mean return	1.14%	0.65%	1.78%	1.48%
Median return	1.37%	0.83%	1.71%	1.75%
Standard deviation	3.57%	1.84%	4.87%	4.17%
Coeff. of variation	3.12	2.81	2.73	2.83
Skewness	-0.30	-0.49	0.95	-0.22
Excess kurtosis	1.75	4.58	6.11	1.79
Jarque-Bera statistic	13.75**	87.56**	163.54**	13.54**
Sharpe ratio	0.30	0.32	0.35	0.34
Avg. upside return	1.96%	1.01%	2.69%	2.38%
Downside deviation	2.13%	1.10%	2.41%	2.40%
Sortino ratio	0.51	0.54	0.71	0.59
Upside potential ratio	0.92	0.92	1.11	0.99

Table 6 shows the asset allocations and risk-return profiles of optimal portfolios maximizing the Sharpe ratio of stock portfolios diversified with gold, bonds, and Bitcoin. Portfolio 1 allocates 10.40% to GLD and 89.60% to SPY, increasing the Sharpe ratio of SPY marginally from 0.3006 to 0.3031. Portfolio 2 invests 60.77% in BOND and 39.23% in SPY, raising the Sharpe ratio to 0.32. Portfolio 3 boosts the Sharpe ratio to 0.35 by allocating 5.01% to BTC with 94.99% in SPY. These three portfolios have very different risk-return characteristics. Owing to its large BOND weight, portfolio 2 has the lowest mean return of 0.65% and standard deviation of 1.84%. Portfolio 1 has a higher mean return of 1.14% and standard deviation of 3.57%. Portfolio 3, with only 5.01% allocated to BTC, produces the highest mean return of 1.78% and standard deviation of 4.87%. Portfolio 3 is the only one with positive skewness (0.95); portfolios 1 and 2 have skewness of -0.30 and -0.49, respectively. Portfolio 3 also has the highest EK of 6.11, compared to 1.75 for portfolio 2 and 4.58 for portfolio 3. However, the extreme returns of portfolio 3 reflect relatively more upside returns than downside risk, and it delivers the highest Sortino ratio of 0.71 as well as the highest upside potential ratio of 1.11.

Notably, while the SPY-BTC portfolio's Sharpe ratio is only 9% higher, its upside potential ratio is 21% higher and its Sortino ratio is 31% higher, compared to the SPY-BOND portfolio.

These results demonstrate that a modest allocation to Bitcoin enhances the risk-return characteristics of stock portfolios far more than much larger allocations to gold or bonds. Since the more extreme returns of the SPY-BTC portfolio might concern some investors, although they represent more upside returns than downside risk, portfolio 4 illustrates the results of maximizing the Sharpe ratio with an additional constraint that the EK cannot exceed SPY's EK of 1.79 (reported in Table 1). This portfolio allocates only 2.15% to BTC, reducing the Sharpe ratio slightly to 0.34 from 0.35 for portfolio 3, because the mean return falls by 17% whereas the standard deviation decreases by 14%. While the lower BTC allocation in portfolio 4 reduces the EK to 1.79, compared to 6.11 for portfolio 3, the skewness deteriorates from 0.95 to -0.22, and the average upside return falls from 2.69% to 2.38% while the downside deviation remains similar (2.40% compared to 2.41%). Since the lower BTC weight in portfolio 4 reduces the risk premium and upside returns more than it decreases downside risk, the Sortino ratio declines from 0.71 to 0.59 and the upside potential ratio falls from 1.11 to 0.99. Even so, portfolio 4 provides higher Sharpe, Sortino, and upside potential ratios than the optimal SPY-GLD and SPY-BOND portfolios.

Table 7 portrays the characteristics of a diversified portfolio comprising 60% stocks and 40% bonds, along with optimal portfolios maximizing the Sharpe ratio by adding gold and Bitcoin to this traditional portfolio. The SPY-BOND portfolio has a higher Sharpe ratio of 0.32, compared to 0.30 for SPY (Table 2), because its standard deviation is 36% lower, while its mean return is 31% lower, than SPY (Table 1). Portfolio 2 allocates 2.13% to GLD and adjusts the weights of the other components to 57.18% SPY and 38.12% BOND, to maintain their 60%-40% proportions. This portfolio nudges the Sharpe ratio of SPY-BOND up fractionally from 0.3161 to 0.3163 and also has virtually no effect on the Sortino and upside potential ratios. Portfolio 3 assigns a 3.05% weight to BTC, with 58.17% in SPY and 38.78% in BOND, delivering the highest Sharpe ratio of 0.37 among all the portfolios. This portfolio has a mean return of 1.19%, which is 38% higher, and standard deviation of 3.10%, which is 24% higher, than the SPY-BOND portfolio. The optimal SPY-BOND, BTC portfolio has positive skewness of 0.72, compared to skewness of -0.42 for SPY-BOND, although its EK of 5.54% is also higher than the EK of 3.01% for SPY-BOND. The Sortino and upside potential ratios of Portfolio 3 are 38% and 22% higher, respectively, than the SPY-BOND and optimal SPY-BOND, GLD portfolios.

These findings show that, unlike the optimal allocation of 2.13% to gold, the optimal weight of 3.05% to Bitcoin substantially enhances the risk-return tradeoff of a diversified stock-bond portfolio. Since the BTC allocation results in a higher EK, portfolio 4 maximizes the Sharpe ratio without exceeding the EK of the SPY-

BOND portfolio. This portfolio invests just 1.85% in BTC, lowering the Sharpe ratio by 3%, as the mean return falls by 11% and the standard deviation declines by 10%, compared to portfolio 3. The EK of 3.01 for portfolio 4 is 46% lower compared to the optimal SPY-BOND, BTC portfolio. However, the skewness falls from 0.72 to -0.04, and the Sortino ratio is 10% lower, while the upside potential ratio is 6% lower, for portfolio 4 compared to portfolio 3. Still, portfolio 4 has a Sortino ratio that is 25% higher, and an upside potential ratio that is 14% higher, compared to the SPY-BOND and optimal SPY-BOND, GLD portfolios.

Table 7
Weights and risk-return characteristics of diversified 60% stock and 40% bond portfolios maximizing the Sharpe ratio with gold and Bitcoin. ** indicates Jarque-Bera statistics significant at the 1% level.

	Portfolio 1	Portfolio 2	Portfolio 3	Portfolio 4
	SPY-BOND,	SPY-BOND, GLD	SPY-BOND, BTC	SPY-BOND, BTC
Weights				
SPY	60.00%	58.72%	58.17%	58.89%
GLD		2.13%		
BOND	40.00%	39.15%	38.78%	39.26%
BTC			3.05%	1.85%
Characteristics				
Mean return	0.86%	0.84%	1.19%	1.06%
Median return	1.09%	1.05%	1.39%	1.31%
Standard deviation	2.51%	2.47%	3.10%	2.78%
Coeff. of variation	2.94	2.93	2.59	2.62
Skewness	-0.42	-0.39	0.72	-0.04
Excess kurtosis	3.01	2.98	5.54	3.01
Jarque-Bera stat.	39.05**	38.00**	131.02**	36.19**
Sharpe ratio	0.32	0.32	0.37	0.36
Avg. upside return	1.39%	1.36%	1.73%	1.59%
Downside dev.	1.51%	1.48%	1.54%	1.52%
Sortino ratio	0.53	0.53	0.73	0.66
Upside poten. rat.	0.92	0.92	1.12	1.05

CONCLUDING REMARKS

This paper advances the emerging literature on cryptocurrencies, which are a relatively recent innovation. Unlike most of the earlier papers, which used daily or weekly returns, this study is based on longer-term monthly returns. Further, the returns are analyzed for the longest study period of eight years, primarily covering the mature stage of the Bitcoin economy when it was generally being used for lawful business transactions and Bitcoin had become an investable asset. The findings indicate that, over almost a decade after Bitcoin was devised, its return

distribution and risk-return profile were very different from five other major asset classes studied. Bitcoin delivered much higher returns and, in spite of its far greater volatility, its mean-variance risk-return tradeoff was superior to all assets except stocks. Although Bitcoin provided much more extreme returns than the other assets, it was the only asset with highly positively skewed monthly returns. Consequently, Bitcoin produced the highest Sortino and upside potential ratios, with higher risk premiums and average upside returns relative to downside risk, than the other assets. Reflecting its distinctive nature, Bitcoin's returns had only weak positive correlations of 0.21 to 0.24 with some of the other assets, and their returns explained just 3% to 5% of the variations in Bitcoin's returns.

The characteristics of portfolios optimizing the mean-variance tradeoff demonstrate Bitcoin's value in bolstering the risk-return profiles of investment portfolios, supporting its reputation as digital gold. The Sharpe ratio of a stock portfolio rose 17% with a 5.01% allocation to Bitcoin, compared to a 7% increase with a 60.77% weight to bonds, and a negligible increase with a 10.40% weight to gold. A traditional portfolio with 60% stocks and 40% bonds was optimized by allocating 2.13% to gold, but it left the Sharpe ratio virtually unchanged. By contrast, optimizing this diversified stock-bond portfolio with a 3.05% weight to Bitcoin boosted the Sharpe ratio by 16%. Optimizing stock and stock-bond portfolios with Bitcoin also provided higher risk-premiums and average upside returns relative to downside risk, delivering higher Sortino and upside potential ratios, compared to portfolios optimized with gold.

Some caveats must be acknowledged. Owing to the limited usable trading history of this new asset class, this study focused on the leading cryptocurrency: Bitcoin. Even so, only eight years of data were available, and Bitcoin's future performance may well be very different from its past results. Given the unique nature of this asset, however, it may be expected to maintain its distinctive potential for diversifying investment portfolios. The long-term viability of cryptocurrencies might be a greater concern. Harwick (2016) noted that governments cannot eliminate cryptocurrencies, but they can stop financial intermediaries from stabilizing the value of cryptocurrencies, so that they are too volatile to function as currencies. If investors view cryptocurrencies primarily as speculative assets with diversification potential, they might not be too concerned with their volatility. A major advantage of Bitcoin is its limited supply, which makes it deflationary by design, in contrast to fiat currencies which are inherently inflationary owing to perpetually increasing supply. It may be noted that, in the past hundred years, hyperinflation wiped out the currency values of nine countries: Germany, Hungary, Chile, Argentina, Peru, Angola, Yugoslavia, Belarus, and Zimbabwe. Nevertheless, given the substantial risks of investing in cryptocurrencies, the results of this study are somewhat reassuring: the diversification benefits of Bitcoin required allocating only small proportions to it in investment portfolios.

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INTERNAL AUDITORS: HELPING BUSINESSES PREVENT NEW AND DETER ONGOING EMPLOYEE FRAUDS

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ABSTRACT

Any employee can harbor desperate needs or overzealous desires, and some of these employees may choose to satisfy their needs or desires by stealing from employers. When employee frauds occur, the victimized employer may encounter financial, reputational, employee, or customer losses. While the managers of these victimized businesses are responsible for preventing, deterring, and detecting fraud, they may lack the knowledge and time requirements to perform these duties. Therefore, bringing internal auditors into the workforce may help reduce future frauds, thus limiting losses. Specifically, internal auditors could assess the organization's efficiency and operational effectiveness, identify, and mitigate risks, and ensure management complies with organizational policies and procedures. Then the information developed by the internal auditors could help management develop controls for preventing new and deterring ongoing frauds.

Key Words: Internal auditor, employee fraud, preventing fraud, deterring fraud

INTRODUCTION

The ability of managers and employees to commit fraud can become a significant problem for any business. When employee frauds occur, management has failed to prevent or deter one or more motivated managers or employees from committing fraud. When these frauds occur, the defrauded business may quickly recognize that they underestimated the financial and non-financial damages employees can cause (Klein, 2015). Fortunately, internal auditors can help these businesses by recognizing and correcting weaknesses (Klein, 2015; Kroll, 2012).

The emerging fraud problem often begins when one or more desperate or disgruntled managers or employees choose to misappropriate cash, inventory, or equipment. For the victimized business, the non-financial losses can include a loss of trust, reputation, vendors, and customers. In addition, the non-financial losses may have such a negative effect on the defrauded business that senior management

must reduce salaries, employee benefits, and existing jobs or freeze the hiring of new employees (Peltier-Rivest & Lanoue, 2012). Some defrauded businesses may increase sales prices; however, increasing prices can drive customers to competitors and ultimately reduce sales volume and revenues. If the sales revenues continue to diminish, a change in ownership may result, or worst, the existing business may be forced into bankruptcy (Peltier-Rivest & Lanoue, 2012). As a result of desperate or disgruntled managers or employees, many businesses need help preventing new and deterring ongoing internal frauds. Therefore, the intent of this multiple case study was to help management identify how one or more internal auditors can help businesses prevent new and deter ongoing internal frauds.

LITERATURE REVIEW

When employee frauds occur, they are intentional acts or omissions designed to deceive others and often cause the defrauded businesses to suffer losses while perpetrators commonly achieve gains (COSO, 2016). Preventing or deterring employee fraud requires a risk assessment (Wahlstrom & Chowdhury, 2019). That assessment should help management understand their fraud risks, their exposure to fraud, and if weaknesses exist in the existing internal controls.

Reducing the risk of employee fraud requires the efforts of directors, management, employees, and internal auditors. The board of directors' roles includes establishing a strategic plan, providing oversight, and creating the tone at the top. Management's roles also include providing oversight and setting the tone at the top; plus, they help shape the culture and attitudes that may prevent fraud (Anderson et al. 2017). In addition, management is responsible for comprehensive accounting policies, maintaining adequate internal controls, and making fair representations in the financial statements (Anderson et al., 2017). The employees' focus should include production, services, maintenance, clerical activities, and looking for weaknesses that enable fraud. Fortunately, when honest employees identify control weaknesses, they tend to notify management, become whistleblowers, or confide in an internal auditor (Murdock, 2008).

The board of directors and management should view internal auditing's potential contribution as essential. When necessary, the internal auditing department can help by implementing appropriate controls, risk assessment processes, and by ensuring compliance with applicable laws and regulations (McDonald, 2003). In addition, "internal auditors should have the ability to:

- Identify red flags that indicate fraud may have occurred,

- Understand the characteristics of fraud and the techniques used to commit fraud, and the various fraud schemes and scenarios,
- Evaluate the indicators of fraud and decide whether further action is necessary or whether an investigation should take place, and
- Evaluate the effectiveness of controls to prevent or detect fraud" (IIA, 2019).

If internal auditors have fraud knowledge, training, and experience, they should thoroughly understand why and where fraud risk exists. After identifying fraud risks, the auditors should build an appropriate response into the audit plan (Holzinger, 2010). In addition, internal auditors should become a crucial component in preventing and deterring employee fraud.

METHODOLOGY

This study implemented a qualitative analysis combined with a multiple case study approach to identify how internal auditors can help organizations prevent new and deter ongoing employee fraud. The research included an advanced search within the Academic Search Premier (EBSCO) database to identify articles associated with the key phrases (1) Internal Auditor and (2) Employee Fraud. The search produced 195 articles from 1965 to 2020. Then the search was limited to peer-reviewed articles between 2000 and 2020, which produced 31 articles, of which 23 were acceptable. Then a second search in the Academic Search Premier (EBSCO) using employee fraud as the subject located seven additional articles for this study. Also, information from four professional reports and one auditing textbook provided additional supporting information. The reports and textbook included the 2020 ACFE Report to the Nations, the COSO Fraud Risk Management Guide, the 2019 IIA Foundation textbook, the IIA International Professional Practices Framework, and an IIA Position Paper on Fraud and Internal Audit.

RESEARCH QUESTIONS

The ability of employees to misappropriate assets is a problem that can damage or destroy organizations. Therefore, the central question asks, how can organizations with limited knowledge and resources reduce the ability of motivated employees to perpetrate fraud? In response to the central question, two sub-questions emerged. They included:

RQ #1: How can internal auditors help organizations prevent new employee fraud?

RQ #2: How can internal auditors help organizations deter ongoing employee fraud?

FINDINGS

Organizations have historically failed to prevent or deter fraudulent activities for various reasons. As a result of these failures, the Association of Certified Fraud Examiners (ACFE) estimates that organizations lose 5% of revenues annually to occupational fraud (ACFE, 2020). In the same study, 40% of the detected fraud cases were the product of tips (ACFE, 2020). Furthermore, the tips are a detective or reactive control to fraudulent acts that have already occurred.

Unfortunately, many fraud prevention systems fail to prevent, deter, or detect perpetrators, so the perpetrator often gets to keep the plunder. However, if detected, management may choose to (1) forgive and forget the fraud, (2) demand restitution, (3) terminate the perpetrator, (5) prosecute the perpetrator, or (6) a combination of these actions. Some managers would ardently demand negative consequences for the perpetrator; otherwise, all the employees would quickly realize that if they steal and get caught, all they must do to avoid termination or prosecution is return the stolen items, which is the wrong message to send employees.

In contrast, if the perpetrator is detected, management may only require restitution and termination, or management may require restitution, termination, and prosecution. Unfortunately, the prosecution of alleged perpetrators often creates a fear of negative publicity that tarnishes the business's reputation. Thus, some organizations decline to prosecute to avoid negative publicity. However, managers often demand punishment or penalties for the perpetrator, which may deter other employees from considering fraud as a way to solve their problems. Thus, it appears that detecting the perpetrator can set in motion an abundance of problems within the defrauded organization.

Often a better solution is balancing preventive and deterrence or (proactive) controls with detective (reactive) controls. Preventive and deterrence controls exist to stop fraud before they start or shortly afterward. In addition, implementing these controls can signal to all employees that management is actively looking for fraudulent activities. Thus, fewer frauds should occur!

DISCUSSION

Most employees will not commit fraud until they are motivated, can rationalize the act, and have an opportunity to misappropriate the target items (Wells, 2007). Efforts to reduce opportunities can require organizations to adopt a fraud prevention plan. The emerging plan should embrace fraud training, fraud reporting mechanisms, the desired tone at the top, ethical standards, and other controls that send a strong message to potential perpetrators that management is actively looking for fraudulent activities. Management should also consider using trained and knowledgeable internal auditors to conduct all fraud prevention and deterrence efforts. In many situations, the internal auditors may be part of the team and responsible for providing independent, objective assessments of existing controls (Dwornicki, Preston, Bruner, & Horton, 2007). These auditors may also understand why and where fraud risk might be elevated and can incorporate an appropriate response into the fraud prevention plan (Holinger, 2010). Internal auditors can assist employees, management, and board members by determining if they know what to look for to prevent fraudulent activities (Hall, 2016). They can also assist management by recommending specific improvements or evaluating the organization's controls and commitment to fraud prevention if control weaknesses emerge (Henry, 2016).

Internal auditors can review employment practices, the ethical tone at the top, early warning signals, and procedures for reducing identified weaknesses (Murdoch, 2008). For example, standard employment practices often begin with hiring honest employees (Brody, 2010). However, hiring honest employees should begin by verifying all information on all prospective employees. That information includes personal references, employment history, academic qualifications, civil and criminal records, and social media activity (Brody, 2010). Implementing these practices should reduce losses since management has an improved its ability to detect fraudulent activity (Klein, 2015).

Once in place, internal auditors should recommend controls limiting motivated employees' ability to misappropriate assets. These controls can include increased management oversight and empowering employees to watch for system weaknesses, which is similar to a neighborhood watch group formed to protect residents' homes (Bichang'a, 2007). If unforeseen weaknesses emerge, internal auditing should promptly develop controls to eliminate employee temptations to commit fraud. Internal auditors may also develop controls to watch and listen for disgruntled or desperate employees that, in their minds, must commit fraud to obtain retribution or to satisfy a need.

Internal auditors also understand that unsuspecting employees will commit fraud, given the right circumstances. An example could include likable and friendly people who maintain cordial relationships with colleagues but use their appearances and personalities to cloak fraudulent activities (Chambers & Sullivan, 2018). Alternatively, after detecting fraudulent activities, management may not take the time and effort to remediate the ability of employees to commit fraudulent acts (Kroll, 2012). Thus, internal auditing could assist management by developing new controls to prevent new frauds in the same area.

Internal auditing may also recommend that managers focus on employee behaviors since most perpetrators exhibit at least one behavioral warning signal (Kroll, 2012) before they misappropriate employer assets. Warning signals can include an employee's extreme possession of records, a failure to take vacations, signs of substance abuse, or the harboring of grudges toward fellow employees (Klein, 2015). Then from a more personal perspective, warning signals may include an employee's excess debt, overwhelming medical issues, gambling habits, drug habits, legal problems, or other personal issues. Furthermore, internal auditing should explain to management how warning signals can include inconsistent, evasive, vague, or implausible responses to inquiries (Tschakert, Needles, & Holtzblatt, 2016).

Internal auditors also understand how the existing organizational culture reflects the values, expectations, and practices that guide all personnel at the job site. To help reinforce the culture, internal auditors may assist management in establishing an influential fraud prevention culture (Henry, 2016). The emerging culture should prioritize managers acting with integrity, exercising professional skepticism, and implementing policies and technology to protect business assets (Kroll, 2012). Then from a broader perspective, the culture should actively discourage fraudulent behaviors.

Furthermore, from a narrow perspective, internal auditors could review existing and, if necessary, develop new controls to prevent or deter employee fraud associated with specific job duties. Examples can include controls requiring the reconciliation of travel and expense reports with employee work schedules (McNeal, 2008). New controls could also require internal auditing to verify that employees truly exist by visually inspecting their identification cards, passports, or other documents held in the personnel records (Vetta & Riley, 2012). If identification cards or other documents are missing from the records, the missing records could be a warning sign that ghost employees exist. Internal auditors could also distribute paychecks to employees after they present a valid photo identification form. Also, when documents appear to have insufficient detail, the

omission of detail can signal to auditors that an ongoing fraud may exist (Thompson, 2004).

Fraud may be the motive if an employee chooses to create a false or defer the removal of terminated employees from the list of active employees. If so, the motivated employee's intention can include creating a ghost employee that receives a paycheck. These perpetrators may conceal their efforts by using a deceased individual's social security number, an employee ID number significantly different than real employee numbers (Wells, 2002). To prevent these ghost employee schemes, internal auditors should review the employee's records for missing documents, false documents, false information, and direct deposits into the same account.

Cash is also a common target for motivated employees since it is immediately available to purchase rewards or satisfaction for the perpetrator. So, internal auditors should review the disbursement process to avoid payments made to individuals impersonating executives that call accounting to demand a check be issued or a wire sent to the executive at a distant location. Policies should also exist that do not allow payments to organizations or bank accounts not already in the vendor master file (Beauprie, 2015). Furthermore, internal auditing should verify that a separation of duties exists in receiving cash, recording the receipt, depositing the cash, approving invoices for payment, preparing the payment, signing the check, and reconciling the bank statement.

Employee training can emphasize the importance of preventing fraud, reinforcing company policies, and providing implementation procedures if warning signals emerge (Tscharkert, Needles, & Holtzblatt, 2016). Internal auditors may also provide specialized training to enable employees to identify suspicious activities (Strand, Judd & Lancaster, 2002). That training should emphasize the information needed when a transaction is reviewed and approved (Hall, 2016). It may also enable management to look for unusual transactions and ask why they are unusual (Holzinger, 2010). Once established, training can provide knowledge that enables management to recognize situations that allow or encourage fraudulent activities (Scott, 2016). Training activities can also communicate management's commitment to ethical operations (Strand, Judd & Lancaster, 2002).

Then to reduce the risk of fraud, internal auditors often tap into the wealth of knowledge about ongoing fraud and misconduct by implementing an employee hotline (Childers, 2009). Many employers believe their employees know about fraud, abuse, and waste, so wise managers often use employees' eyes and ears to identify fraudulent activities (Johnson & Wright, 2004). Alternatively, some

organizations believe this type of surveillance is ineffective since co-workers commonly choose not to report ongoing fraud (Kaplan, Pope, & Samuels, 2011). In other words, they choose not to get involved. Other managers may believe social surveillance reduces productivity or increases the chance of being hurt since the employee may not be paying attention to their job duties. In addition, there are other methods of reporting ongoing fraud. Those methods can include listening to employee complaints, customer complaints, or management concerns via the hotline (Belloli, 2007).

Internal auditors should also look for office workers with too much control over records and incoming receipts, which could enable fraudulent activities (Kollar & Williams, 2013). If necessary, the auditors should help supervisors or control employees understand how to review documents for reasonableness, accuracy, completeness, and compliance with policies. More importantly, these document reviews should occur after the fraudulent activity is discovered (Hall, 2016). When fraudulent activities emerge, management should also consider what questions they did not ask that could have prevented the fraud (Howard & Lough, 2019). Alternatively, organizations that ignore the occurrence of fraud or maintain the "it cannot happen here" mindset may find themselves dealing with increasing amounts of fraud-related costs (Henry, 2016)

Internal auditors should seek out insufficient segregation of duties, missing documentation, overly trusting managers, and journal entries without supporting documentation (Kollar & Williams, 2013). If multiple payment systems exist, internal auditors should develop controls that prevent the issuance of multiple payments for a single invoice. Multiple payment systems often include accounts payable checks, wire transfers, and credit card payments (Kollar & Williams, 2013). In addition, internal auditors should watch for suspicious characteristics, which can include high-quality "fake" invoices, inconsistency in the invoice numbers, and amounts due from a specific vendor that are always slightly below the threshold requiring dual signatures (McNeal, 2008). Furthermore, accounts payable clerks should receive training to look for creases in invoices (the folding marks) since they should exist in all documents sent by mail; however, documents without creases could signal the arrival of a hand-delivered document.

Finally, internal auditing could help management determine how inventory or supplies are disappearing by installing surveillance cameras in storage areas (Scott, 2016) or limiting access to storage areas. They should also review employee time logs, especially when they indicate long or unusual work hours, to understand the reasons for the work and who authorized the activities (Kollar & Williams, 2013). The auditors should review conspicuous consumption of

inventories or supplies and watch for routines that do not make sense (Central Ohio Chapter of the IIA, 2002). In addition, internal auditors should inform management that the purpose of some internal controls may not include preventing fraud (Henry, 2016); thus, controls may require modifications to prevent fraud. Finally, if red flags appear, internal auditors must consider whether any signals indicate the need to investigate additional functions or processes (McNeal, 2008).

LIMITATIONS

Employee frauds can reside in three categories: discovered and prosecuted frauds, discovered but not prosecuted frauds, and never discovered frauds (Davia, Coggins, Wideman, & Kastantin, 2000, p. 34). As a result, society does not know the actual dollar losses or the number of frauds that occurred last month, year, or throughout time. For this reason, this study implemented a qualitative study combined with judgmental sampling to identify employee fraud cases and how internal auditors can help prevent new or deter ongoing frauds. Since the chosen cases may not represent the unknown population of employee fraud cases, with internal auditors helping to prevent new or deter ongoing frauds, the results should not be generalized.

CONCLUSION

Without any doubt, any business can become a target for employee fraud. Often the scenario begins with a motivated employee stealing from their employer to obtain retribution, rewards, pleasures, or basic needs. When frauds occur, management may believe punishment will deter future fraud issues. Unfortunately, punishment rarely deters potential perpetrators since they do not believe management will ever detect their misappropriations (Wells, 2008). Fortunately, the presence of internal auditors can communicate to all employees that management is actively looking for fraudulent activities. Internal auditors must simultaneously assist management by developing plans, systems, and controls to uncover new or ongoing frauds. They are out looking for indications of fraud during every audit, and no other department performs this vital role (Holzinger, 2010).

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SMALL BUSINESS OWNERS' AGREEABLENESS AND INFLUENCE ON THE FINANCIAL RISK FACED BY BANKS THROUGH THE APPLICATION OF DISTRIBUTED GRAPH-BASED DATA MINING IN THE UNITED STATES

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ABSTRACT

The primary objective of this experimental research study is to investigate unique small business owners' personality traits, and the influence of their agreeableness on the financial risk faced by banks through the application of distributed graph-based data mining in the United States. We use the parallel coordinators based distributed graphical model to find out the hidden patterns in the input data. Prior studies only found negative significantly correlated agreeableness with the microloans having lower risk measurement. Our studies found both positive significantly correlated agreeableness with the microloans having high risk measurement for the group participants falling within the age range of 36-55 years, and negative significantly correlated agreeableness with the microloans having lower risk measurement for the group participants falling within the age range of 36-55 years. The additional novel findings of our study are that, while we understand that most of the participants to whom we sent the survey did not have the microloans yet, they can function as good stable candidates for the secured microloans per our experimentally unique graphical trends analysis. We discovered that the people who have microloans tend to largely have the following characteristics: usually warm, friendly, and tactful, between 36 and 55 years of age, female, and white. Thus, banks should search for microloan candidates with similar new characteristic to be sure that they improve the quality of bank risk and loans do not fail in their financial asset's portfolio. The distributed graph analytics shows more accuracy with prescriptive analytics when compared to the traditional statistical approach. These findings can contribute to improving bank risk to build more stronger financial assets with lower bank risk for our financial institutions around the World and the modern new data analytics.

Keywords: financial institution, business risk, business behaviors, microfinance

INTRODUCTION

Small businesses play a key role in the advancement of economic frameworks and in improving the social well-being of business owners. However, small business owners continue to face imminent challenges that arise from them having difficulties accessing capital for their businesses. Access to credit from financial institutions have proved to be challenging to small business owners (Krishman, Nandy, & Puri, 2014). Therefore, it is invaluable to understand the challenges faced by small business owners while accessing credit. As such, microfinance institutions take into consideration the personal attributes of a businessperson to determine the suitability of such an individual for obtaining a microloan. The purpose of this study is to evaluate the effects of microloans on the small business owners in the rural United States. This study will contribute to the existing practice and has the potential to facilitate positive social change among small entrepreneurs through the evaluation of the theoretical foundations and assumptions underpinning the study's objective. The unique findings in comparison to that of the prior researches are that, in the group within the age range of 36-55 years, most of the participants did not have microloans, thus, they did not constitute a reliable population for the risk evaluation. We were required to search for bank risk only within the populations that had received the given microloans. The results indicate that agreeableness is significantly correlated, either negatively or positively, with the ability to secure microloans after controlling for age, gender, and ethnicity.

BACKGROUND OF THE STUDY

Mares and Dlaskava (2016) concluded that small businesses are vital to the national economies of all countries. As such, credit exposure determines the success of small and medium size enterprises (Mares & Dlaskava, 2016). However, other factors such as motivation, growth expectancy, access to funds, consultancy, and business obstacles can also affect business success (Mares & Dlaskava, 2016). While various researchers concluded that the success of small business owners lies in their ability to secure capital, entrepreneurs could rely on trust and self-discipline as the pre-conditions to secure capital for their businesses (Amatego & Caesar, 2017). The entrepreneurial personality traits related to business success are high emotional stability, openness to experience, and conscientiousness (Hachara, Berraies, & Ftiti, 2018). Furthermore, while startup capital, agreeableness, and extraversion positively predict entrepreneurial success, neuroticism negatively predicts entrepreneurial success; however, extraversion moderates the relationship between startup capital and entrepreneurial success, highlighting the importance of interpersonal skills in small businesses (Baluku, Kikoomo, & Kibonja, 2016). Personality dimensions—such as self-efficacy, need for achievement, entrepreneurial alertness, and business planning—when combined with financial capital and resources, and entrepreneurial orientation are

highly associated with the creation and success of businesses (Frese & Gielnik, 2014).

Despite there being prior researches that have investigated personality traits as the predictors of success in small businesses (Baluku et al., 2016; Frese & Gielnik, 2014; Mares & Dlaskava, 2016), there is still a gap in the literature regarding the information available on the personality traits of small business owners and their ability to secure microloans (Amegago & Caesar, 2017; Hachara et al., 2018). Hachara et al. (2018) recommended future researchers to use a qualitative study that explores how personality traits can explain the success and failure of entrepreneurial ventures. Additionally, Baluku et al. (2016) call for the need to have future studies that can examine the moderating effect of conscientiousness and neuroticism on the relationship between startup capital and entrepreneurial success. As such, the proposed study will focus on exploring how the personality traits of small business owners relate to the ability to secure microloans for fulfilling their business needs.

PROBLEM STATEMENT

The general problem is that of it not being known why some small business owners are able to secure small loans to finance their small businesses, while others do not. The specific problem is that factors such as perceived negative individual characteristics may precipitate the failure of small business owners in the process of securing microloans. The proposed study will address the gap regarding how personality traits relate to small business owners' ability to secure microloans for fulfilling their business needs. Microfinance loans have been on the rise since the 1970s. By addressing the problem and fulfilling the purpose, the researcher will address the gap regarding how personality traits relate to the ability of small business owners in securing microloans to fulfill their business needs.

PURPOSE OF THE STUDY

The purpose of this quantitative, experimental, and distributed graph-based research design study is to explore how the personality traits of small business owners relate to their ability to secure microloans for fulfilling their business needs. The scope of the study includes the small business owners based in the rural locations of the United States. The data for this study was collected via the use of a survey-based experimental design and was analyzed via the use of a distributed graph-based algorithm.

RESEARCH QUESTIONS AND HYPOTHESES

RQ1. Is there a relationship between the personality traits of small business owner and their agreeableness and ability to secure microloans for fulfilling their business needs?

H_0. The personality traits of small business owners do not significantly correlate to their agreeableness and ability to secure microloans for fulfilling their business needs, controlling the age, gender, and ethnicity of the individual seeking the loan.

H_1. The personality traits of small business owners significantly correlate with their agreeableness and the ability to secure microloans for fulfilling their business needs, controlling the age, gender and ethnicity of the individual seeking the loan.

I defined the independent variables of personality traits as the participants' levels of agreeableness, which was measured using the Big Five Inventory (John & Srivastava, 1999). The dependent variable is whether the participants were able to secure microloans for fulfilling their business needs. The demographic indicators of age, gender, and ethnicity were controlled by me. The personality traits stem from the Big Five traits. Agreeableness characterizes the individuals who are trusting, courteous, cooperative, forgiving, tolerant, and soft-hearted (Hancock, 2016).

THEORETICAL FOUNDATION

This theoretical framework is applicable for the determination of the roles of personality traits when leading to the outcomes and actions of entrepreneurs and financial lenders. Theorists of the five-factor model suggests that there are certain personality traits that are associated with the amount of unsecured debt and financial assets that may be advanced to entities (Dlugosch, Klinger, Frese, & Klehe, 2018). From the perspectives of lenders and financiers, the application of the Big Five allows them to determine if the entrepreneurs in question will be able to have service credits advanced to them. Personality traits such as extraversion and openness to a certain level of experience correlated with personal finances (Eddleston, Ladge, & Mitteness, 2016). Basing on these perspectives, the entrepreneurs who possess these attributes will most likely manage their personal finances better, as opposed to those who do not. The Big Five model provides a general framework for the examination of the effects of personality traits and the potentiality of such individuals to become entrepreneurs (Umadia & Kasztelnik, 2020).

A theoretical analysis of the Big Five personality traits has brought out the rationale behind the entrepreneurs making decisions and their ability to handle

personal finances. In contrast, small business owners faced imminent difficulties in obtaining finances for their microenterprises as many lenders are reluctant to offer loans due to the risk involved (Rostamkalaei & Freel, 2017).

DEFINITIONS

Agreeableness: Agreeableness characterizes the people who are trusting, courteous, cooperative, forgiving, tolerant, and soft-hearted (Hancock, 2016). I will measure this continuous independent variable using the Big Five Inventory (John & Srivastava, 1999).

Creditworthiness: Creditworthiness is the judgment of a creditor on an entity's current and future potential and their inclinations to honor debts as agreed upon by the creditor. Credit history, the character of an entity, and credit rating typically influence creditworthiness (Liang, Lu, Tsai, & Shih, 2016).

SIGNIFICANCE TO PRACTICE

This study will enable business owners to develop a better understanding of the implications of their personal attributes on their ability to secure funding for their microenterprises (Chen, Chang, & Bruton, 2017). In addition, this study will emphasize the individual skills and attributes that are imperative in the success of microenterprises. Furthermore, the study will allow micro enterprises to reevaluate their personal attributes when seeking micro loans with their influence on the financial risk faced by banks.

LITERATURE REVIEW

The specific problem concerning factors such as perceived negative individual characteristics may precipitate the failure of small business owners in securing microloans. The purpose of this quantitative, non-experimental, correlational study is to examine how the personality traits of small business owners are related to their ability to secure microloans for fulfilling their business needs. I defined the independent variables of personality traits as the participants' levels of extroversion and agreeableness as measured by the Big Five Inventory (John & Srivastava, 1999). The dependent variable is whether the participants were able to secure microloans for fulfilling their business needs. The demographic indicators of age, gender, and ethnicity have been controlled in the study.

The theoretical foundation for the present study is the Big Five theory of personality. The Big Five theory indicates the existence of five domains of personality: neuroticism, extroversion, openness, conscientiousness, and

agreeableness. Initially derived from Gordon Allport's (1969) seminal list of 4,000 personality traits, the Big Five was a model created to understand the relationship between personality and academic behaviors. Following its inception, the other researchers started studying the relationships that exist between large numbers of known personality traits. Having used the Big Five theory to assess executives, Goldberg (1981) indicated that the Big Five domains contained the most-known personality traits and represented the basic structure underlying all the personality traits. McCrae and Costa (1987) refined these personality traits to explain the decision-making processes of individuals.

THE BIG FIVE PERSONALITY TRAITS

In psychology, the Big Five personality traits constitute a model of measurement to assist the determination and prediction of behaviors and actions based on a person's characteristics. Suggested subcomponents of the Big Five personality traits are considered as part of an established hierarchy of superordinate factors that are associated with positive versus negative personality traits (Kozubíková, Čepel, & Zlámalová, 2018). All of the five traits are associated with the representation of a single level of hierarchy following the lexical hypothesis (Sackett & Walmsley, 2014).

Each set trait has subdivisions that are collected based on the relationship of facets appearing as a sub-level hierarchical aspect of a person's characteristic traits, and are measured using the Big Five Aspect Scale. Figure 1 provides an example of the sub-traits measured under such and are valuable in determining the success or failure of small business ventures.

Figure 1: Based on the Big Five Scale – Agreeableness

Agreeableness
Compassion
Politeness

Source: Compiled by the author

For the purpose of this study, I will use the Big Five Factor Theory to explore the relationship, if any, between the personality traits of small business owners and their ability to secure microloans for fulfilling their business needs,

controlling the factors of age, gender, and ethnicity. Recent researchers (e.g., Farrington, 2012; Hassan, Akhtar, & Yilmaz, 2016; Mabunda, Kikooma, & Kibanja, 2016) have extended the Big Five traits to their relationship to business. For example, researchers have established that each of the personality traits and their associated sub-traits are related to successful entrepreneurship (Espiritu-Olmos & Sastre-Castillo, 2015). Reviews of each of the personality traits and their relation to business are presented in the following sections, which lay the foundation for the present study.

AGREEABLENESS

Agreeableness refers to being empathetic, kind, cooperative, trusting, gentle, forgiving, and tolerant (Farrington, 2012). Additionally, it is associated with affection, generosity, mildness, self-sufficiency, emotional maturity, and attentiveness to others (Farrington, 2012). These traits can bring both positive and negative outcomes to business owners. For instance, high levels of agreeableness may negatively affect the abilities of business owners to negotiate challenging deals and influence others successfully. However, this personality trait can become a success factor in service-oriented enterprises.

Additionally, business owners with high levels of agreeableness are more likely to have higher social capital, which may prove to be advantageous in obtaining funding from institutions (Mabunda et al., 2016). Quantifiable actions between people (e.g., small community banks and small business owners) determine the social capital of a given community (McCrae & Costa, 1987; Robledo, Aran, Martin-Sanchez, & Molina, 2015). As a result, those who are agreeable might have an easier time building relationships with individuals who provide funding to small banking enterprises.

Ayode Ezekiel et al. (2018) found a relationship between agreeableness, extroversion, neuroticism, and conscientiousness and commitment to business, while openness to experience did not weight the commitment of entrepreneurs. According to these authors, entrepreneurs should identify their personality traits and improve on those traits that tend to have adverse effects on the commitment attributes. Based on the previous research concerning the connection between agreeableness and small business owners' ability to secure microloans, I developed the following hypotheses.

H_0. The personality traits do not significantly correlate with the agreeableness of small business owners and their ability to secure microloans for fulfilling their business needs, controlling the age, gender, and ethnicity of the individuals seeking the loan.

H_1. The personality traits significantly correlate with the agreeableness of small business owners and their ability to secure microloans for fulfilling their business needs, controlling the age, gender, and ethnicity of the individuals seeking the loan.

THE BIG FIVE PERSONALITY TRAITS ASSOCIATED WITH BUSINESS SUCCESS AND FAILURE

Further, the field that the entrepreneurs are entering may be important in understanding the relationship between personality and success. Felder, Burns, Macintosh, and Felder (2018) examined the protocols necessary for having a successful entrepreneurship in the healthcare businesses, and their association with the personality traits that push entrepreneurs towards success. The authors explored a sample population of (N = 42) single proprietorship successful healthcare clinics to determine as to what brought about the success of each business. Each of the clinics have been in the business for more than ten years and have been classified under the DBA of small business enterprise as all of them had less than 25 employees (Felder et al., 2018). The business owners participated in semi-structured interviews for attaining success (Kasztelnik, 2020). A significant number (92%) of the participants claimed that they were aggressive in their business practices and did not ignore the continued need for self-discipline when it came to personal interest and non-patient care. The authors found that the collected data showed those clinics in the sample population which were successful (profitable) and had business owners who had the personality traits of aggressiveness, confidence, enthusiasm, and motivation (Felder et al., 2018).

FACTORS INFLUENCING SMALL BUSINESSES' RECEIPT OF MICROLOANS

Since loans and credits are essential for the success of small businesses, it is important that small business owners are able to procure such funding. Therefore, understanding the factors that influence the receipt of microloans is essential. Some of the factors that the researchers have investigated include gender, environmental factors, and personality.

PERSONAL HISTORY AND PERSONALITY

Lenders have focused on the relationship that exists between the personal attributes of entrepreneurs and their finances (Caliendo, Kunn, & Weibenberger, 2016). Marquita et al. (2016) collected data by conducting semi-structured interviews of the employees of four specific loan entities during the application review. The authors then implemented a regression gap design by measuring the causal impact of receiving a loan. Entrepreneurs were more likely to receive loan funding based on the interaction between themselves and the loan officer with the personality traits that are part of the equation. Similarly, Kariv and Coleman (2015)

determined the perceived motivation of the entrepreneurs to be the basis for them to qualify for the receipt of bank loans and microfinance.

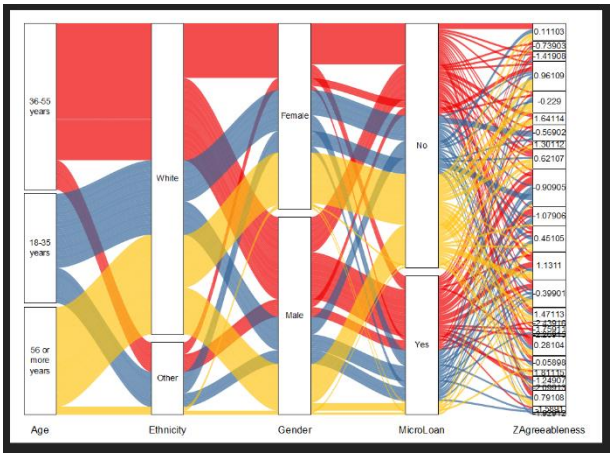
The second phase of Marquita et al.'s (2016) study included the examination of those denied applications. These applications were shown to have a low acceptance score based on three contingencies: credit score, industry of the business, and personality. These three variables were measured through a survey questionnaire that was given to 34 loan officers (Delanoy & Kasztelnik, 2020). The officers were asked to score the questions related to reasons for denial based on a four-point Likert scale, with one being not very likely and four being highly likely (Delanoy & Kasztelnik, 2020). The most common theme established during this phase of data analysis was the combination of a poor credit score and a disagreeable personality perceived by the participants.

Researchers are yet to evaluate the personality factors that are relative to establishing a loan for small business entrepreneurs. Many experts have considered the role of gender to be just as influential in such endeavors (Eddleston et al., 2016; Murugesan & Jayavelu, 2017; Pablo-Marti, Garcia-Tabuenca, & Crespo-Espert, 2014; Robledo, Aran, Martin-Sanchez, & Molina, 2015).

RESEARCH DESIGN AND RESULTS

The topology of the distributed graph is not the objective, even though one may be analyzing the graph's data points. Our parallel coordinates technique is not a graph layout; it is in fact extremely useful in analyzing the unit's data with many attributes that human cannot easily analyze and interpret.

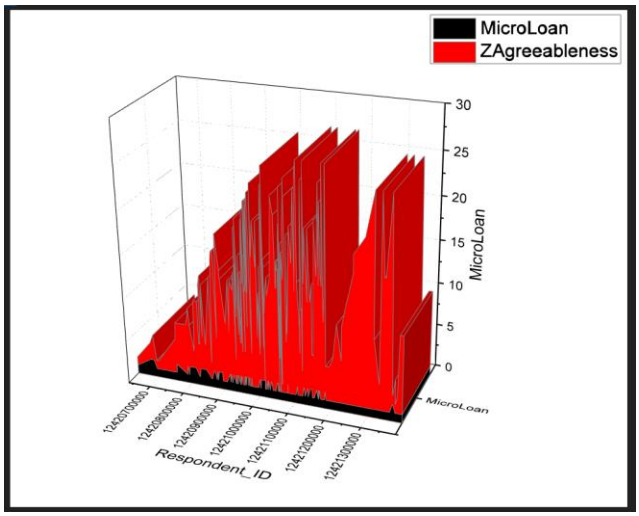
Figure 2: The Parallel Coordinates Graph with Attributes such as Age, Ethnicity, Gender, Microloan, and Z-Agreeableness Score



Source: Compiled by the author

In Figure 2, our sample population data is plotted with the horizontal axes representing age, ethnicity, gender, microloan, and z-agreeableness score. The colored lines zigzagging across represent the individual rows from the collected data, with size indicating our participants' quantity. In the chart, our red lines emanate from most age 36-55 years old, proceed through a few sources such as ethnicity, gender, and microloans, and primarily attach to some target z-agreeableness score, our fourth y "target" source.

Figure 3: 3-D Graph with Attributes such as Participant ID, Microloan, and Z-Agreeableness Score



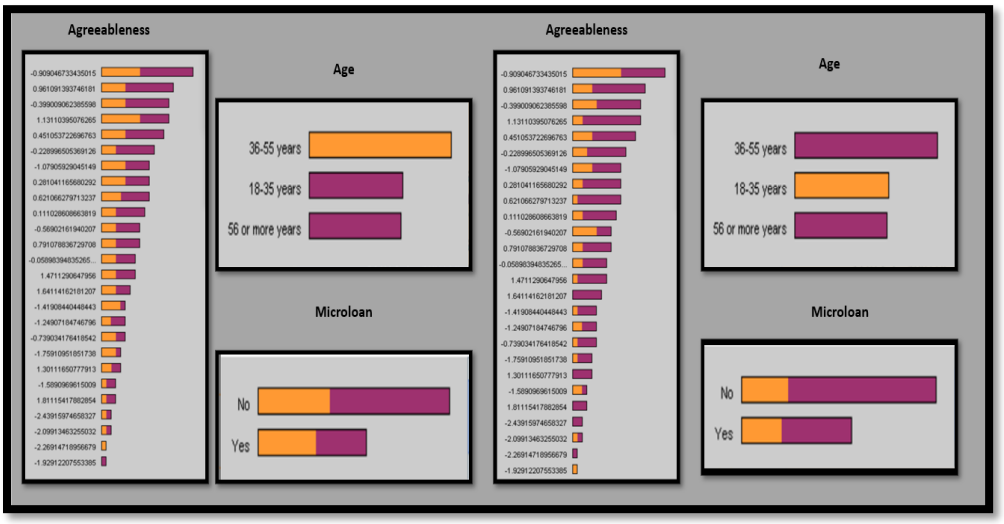
Source: Compiled by the author

We have used the parallel coordinators distributed graphical model to find hidden patterns in the input data. Prior studies found only significantly negative correlated agreeableness with the microloans having lower risk measurement. Our studies found both positive significantly correlated agreeableness with the microloans having high risk measurement for the group participants within the age range of 36-55 years, and significantly negative correlated agreeableness with the microloans having lower risk measurement for the group participants within the age range of 36-55 years. The unique findings of this study in comparison to those of the prior research studies are that, for the group of participants within the age range of 36-55 years, most of the participants did not have microloans. They do not constitute reliable results for the risk evaluation as one is required to search for bank risk only within the populations that were awarded the microloans.

Figure 4: Dashboard with the Parallel Coordinates Visualization of Agreeableness Filtered by

Age and Microloan Status – Part One – Age Range of the Participants Observed:

36-55 years

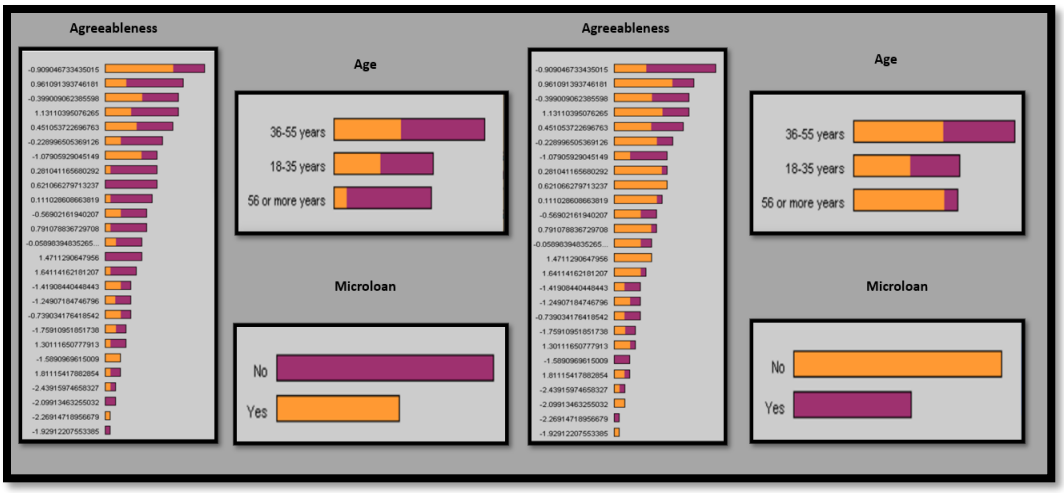


Source: Compiled by the author

The results indicate that agreeableness is significantly correlated, either negatively or positively, with the ability to secure microloans after controlling the factors of age, gender, and ethnicity. The additional novel findings of this study are that we understand that most of the participants to whom we sent the survey questionnaire did not have the microloans yet, but they could be good stable candidates for the secured microloans per our experimentally unique graphical trends analysis.

Figure 5: Dashboard with the Parallel Coordinates Visualization of Agreeableness Filtered by

Age and Microloan Status – Part Two – Observation of All Ages by Microloan Status



Source: Compiled by the author

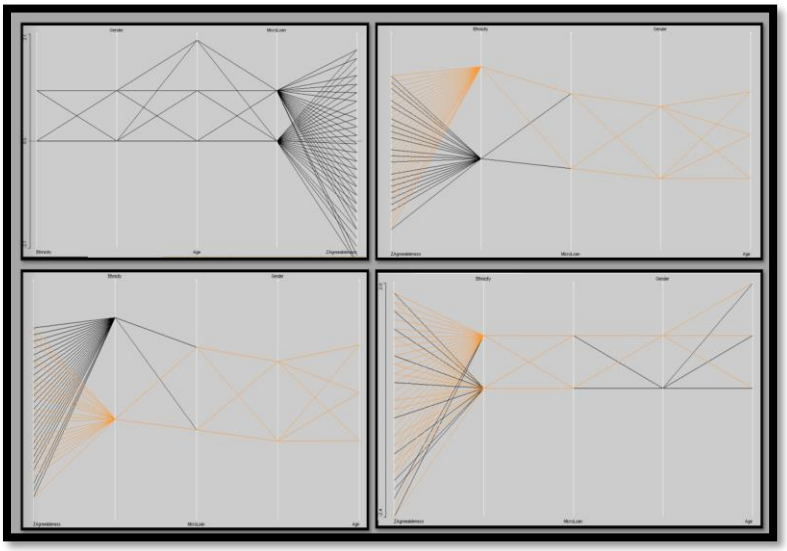
A stacked bar chart displays a part-to-whole breakdown of the quantitative values for different major categories such as age, microloan, and Z-agreeableness categories. The percentage proportion of each categorical dimension is represented by separate bars, distinguished by color, that are sized in accordance to their proportions and then attached to create the whole. The whole is standardized to represent the absolute values. The stacked bard chart shows that the parts are based on ordinal dimensions, which enables the ordering of the parts within the stack and helps in establishing the observation of the overall shape of our collected data. We established the color association to understand the categories that the bards within each stack represent for the research discussion that took place in this article. We derive meaning from the overall balance of color patterns, especially where any of the annotated gridlines help in guiding the value estimation.

RESEARCH DISCUSSION

The regression coefficient for agreeableness was significant (B = -1.04, p = .014). This indicates that agreeableness was significantly correlated with the ability to secure microloans negatively following the controlling of the factors of age, gender, and ethnicity. The odds ratio (OR) suggests that, for every one-point increase in agreeableness score, the participants were 0.35 times as likely (i.e., 65% less likely) to secure a microloan. The null hypothesis ($H_0$5) was rejected.

With regard to Research Question 1, the results indicated that agreeableness was significantly correlated with the ability to secure microloans negatively following the controlling of the factors of age, gender, and ethnicity. The null hypothesis ($H_0$5) was rejected.

Figure 6: The Parallel Coordinates Visualization of Agreeableness Filtered by Age and Microloan Status – Part Two – Observation of All Ages by Microloan Status, with Additional Charts Providing More Deeper Analysis



Source: Compiled by the author

In Figure 6, the chart shows how the participants in larger population are composed proportionally and are in their connections. It shows how all the selected attributes that have changed over time could just be displayed using a parallel coordinators chart. The diagram shows the influenced based on the quantity and range or all the values that have been plotted, as well as the number of different attributes presented.

The final personality trait of agreeableness was examined with regard to small business owners' ability to secure microloans as the fifth research question. Agreeableness was the only personality trait that was found to be significantly related to the ability to obtain financing. In spite of research that suggested that agreeableness was a positive trait for the success of businesses (e.g., Ayoade et al., 2018; Baluku et al., 2016), the present findings indicated agreeableness to negatively predict small business owners' receipt of loans. More commonly, researchers have determined that agreeableness is deemed non-significant for entrepreneurial success (Farrington, 2012; Hachana et al., 2018; Zhao et al., 2010)

and for the technological developments that take place in businesses (Antoncic, 2009).

The findings were partially consistent with those of Baluku et al. (2016), who observed that agreeableness was a significant predictor of entrepreneurial success in those individuals who are high in agreeableness, who were determined to possibly not be suitable for large businesses. Whereas, in the case of microenterprises, a decent level of agreeableness was found to be beneficial in developing meaningful customer relationships. The findings of the present study affirm that individuals who are more empathetic, trusting, forgiving, and tolerant may be less likely to secure financing for their small businesses; therefore, these findings indicate that this negative association between agreeableness and fitness to run businesses may extend to the lenders' decision-making processes related to small businesses.

RECOMMENDATIONS

Personality traits other than those that fall under the Big Five model, such as self-efficacy and focus, could also function as independent variables in studies that are examining the ability of microenterprise owners to secure loans for their businesses as the dependent variable. Further, control variables such as the type of a microenterprise (start-up or family-owned business) and the commodity of the enterprise in this context might provide insights on how the business-related aspects and the personalities of owners influence the ability to secure financial aid. Future researchers in the area of Big Five research should also consistently include control variables in their models to account for whether and how demographics relate to and influence the personality traits' relationship to entrepreneurial success and opportunities.

IMPLICATIONS FOR PRACTICE

The findings of the present study demonstrated that the personality traits related to agreeableness, such as being trusting, forgiving, empathetic, and tolerant, were negatively associated with the ability of individuals to secure business financing; individuals with a high level of agreeableness may be less likely to obtain financial aid for their businesses. Although the personality traits associated with agreeableness generally have a positive connotation, for the business owners who are attempting to secure loans, agreeableness may be associated with the

inability to be stoic in the face of entrepreneurial challenges. The findings of this study imply that, in order to secure loans, small business owners might have to be in a better position if they are forbearing, cautious, and disciplined.

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APPLICATIONS AND SOFTWARE BEING USED TO INCLUDE DATA ANALYTICS IN THE ACCOUNTING CURRICULUM: AN EXPLORATORY SURVEY

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Abstract

The inclusion of data analytics in the accounting curriculum is an important task that has been recommended by professional and academic accounting bodies as well as accrediting agencies. This research paper is part of a survey which investigated how data analytics is being included in the accounting curriculum. This paper is an exploratory survey of the applications and software instructors are using in various accounting courses. The survey was sent by email to approximately 4,800 accounting instructors in the United States.

Keywords: Data analytics, Integration, Survey, Accounting curricula, Accreditation, Software

1. INTRODUCTION

Increased inclusion of data analytics in the curricula of university accounting departments is likely to have a significant impact on teaching and learning in accounting (Tietz, 2019). The use and importance of data analytics in the field of accounting have increased tremendously, as they have in all areas of business (AICPA 2019). Carefully thought-out integration of data analytics into accounting curricula has the potential to enhance students' educational and professional outcomes (PWC 2015).

2. LITERATURE REVIEW AND RESEARCH QUESTIONS

Survey of applications/software used in different courses

Ernst and Young Foundation (2020) and PwC (2015) identify skills important for accounting students, including being able to analyze and interpret data. There are many software choices for data analysis. These include tools for visualizing data as well as statistical and analytical tools (Ernst & Young Foundation, 2020; IMA, 2019). Dzuranin (2018) asked faculty to rank various software tools overall, but not on a course-by-course basis. Respondents ranked Microsoft Excel at the top of

the list, followed by data visualization packages, audit analytical packages, database software, statistical packages, and other programming languages. Andiola et al. (2020) survey chairpersons regarding technology used and taught in their program overall but again not on a course-by-course basis. They come up with spreadsheets at the top followed by business intelligence technologies, accounting and tax research software, audit software, database management software, enterprise resource planning, programming languages, XBRL, and other. Thus, there is a variety of applications and software being used.

Research Question: Which applications and software are used in teaching data analytics in different courses?

3. METHODS

The present study offers the results of a survey of accounting instructors in the United States conducted to determine how data analytics was being included in accounting curricula. The survey asked instructors to specify the applications and software they were using to include data analytics in the accounting curriculum.

The survey was sent to accounting faculty members across all specialties. The survey was designed using Qualtrics and was sent out to accounting educators selected from the Hasselback Directory of Accounting Faculty. Faculty teaching at foreign universities or at foreign locations were excluded from the survey, as we desired to study the inclusion of data analytics in accounting curricula in the United States. Retired faculty were removed from the list because they might not have been involved with the inclusion of data analytics in current accounting curricula. The survey was sent out to 4,885 faculty by email on October 20, 2019. There were three follow-up emails sent 12, 26, and 136 days after the original email. There were 692 emails that were either undeliverable or duplicates. Thus, the final number of email recipients were 4,193. Out of these, 260 responses were received, giving an initial 6.2% response rate. However, 46 incomplete responses had to be eliminated because the respondents opened the survey but did not answer any questions. Thus, the final number of surveys was 214, representing a 5.1% response rate.

4. RESULTS

The survey asked about the types of applications faculty use for data analysis instruction in various courses, as well as the software taught in various courses. The results of this exploratory survey are presented in Table 1 to 9 below. The survey on applications and software used in various courses was an exploratory survey to get an idea of the different kinds of applications and software being taught in various courses. It was desired to give as many choices as possible to the respondents for both applications and software used in various courses. There is a degree of overlap in the various applications and software in the survey. But this

was done so as not to overlook any possible applications and software that respondents may be using.

Top Ten Applications and Software Used in Different Courses

The following tables 1 to 9 show the results of the survey of faculty who teach various courses about the applications and software that they teach in their courses. The question about a particular course was only made available in the questionnaire to faculty who indicated that they taught that course. Respondents were given a list of applications and software that they could choose from. Some of the applications may have overlap with one another, as may the software. However, we desired to elicit as much useful information as possible and not leave out anything, even if there was overlap in the applications and software. Respondents were asked to choose all the different applications and software they used. Tables 1 to 9 are meant to be an exploratory study of applications and software used in different courses and may be useful for accounting instructors.

Table 1. Top 10 Applications and Software in Financial Accounting

Application (n = 91)			Software/Programming language (n = 88)		
Rank	Name of application	Count (%)	Rank	Name of software	Count (%)
1	Data Analytics for Financial Reporting and Analysis	25 (27.5%)	1	Excel	29 (33%)
2	Data Visualization including Charts, Dashboards and Advanced Visualization techniques	14 (15.4%)	2	Excel Pivot Tables, Filtering, Macros	15 (17%)
3	Descriptive Analytics/Models for Decision Making	6 (6.6%)	3	Excel Solver/Data Tables/Scenario Manager/ Goal Seek	8 (9.1%)
3	Diagnostic Analytics/Causes of Past Results	6 (6.6%)	4	Tableau	7 (8%)
3	Predictive Analytics/Regressions/Clustering/Classification/Simulation/Automate Decisions	6 (6.6%)	5	PowerPoint	5 (5.7%)
3	Analytics for Strategic Decision Making	6 (6.6%)	6	Microsoft BI	4 (4.5%)
4	Analytics for Generating Key Performance Indicators (KPI)	4 (4.4%)	6	Other	4 (4.5%)
4	Data Mining	4 (4.4%)	7	Alteryx	2 (2.3%)
5	Fraud Detection using Analytics	3 (3.3%)	7	Blockchain	2 (2.3%)
6	Analytics for Risk Assessment	2 (2.2%)			

6	ETL (Extraction, Transformation and Loading of Data)	2 (2.2%)
6	Probability and Statistical Techniques/Statistical Computing	2 (2.2%)
6	Audit Analytics (Descriptive, Diagnostic, Predictive, Prescriptive)	2 (2.2%)
6	Analytics for Testing Transactions/Client Processes	2 (2.2%)
7	Data Storage/Warehousing	1 (1.1%)
7	Databases/Building/Scripting/ Querying	1 (1.1%)
7	Data Measurement and Variability/Profiling/Cleansing	1 (1.1%)
7	Text Mining	1 (1.1%)
7	Programming Languages	1 (1.1%)
7	Analytics for Tax Rates and Tax Compliance	1 (1.1%)
7	Other	1 (1.1%)
7	Microsoft Access	2 (2.3%)
8	Open Source Tools	2 (2.3%)
8	ACL	1 (1.1%)
8	ERP (Enterprise Resource Planning)	1 (1.1%)
8	IDEA	1 (1.1%)
8	Java	1 (1.1%)
8	Machine learning	1 (1.1%)
8	Python	1 (1.1%)

The total number of responses (n) includes responses beyond the 10th rank and therefore may exceed the sum of counts for applications listed in the table above.

Table 2. *Top 10 Applications and Software in Managerial Accounting*

Application (n = 58)			Software/Programming language (n = 41)		
Rank	Name of application	Count (%)	Rank	Name of software	Count (%)
1	Descriptive Analytics/Models for Decision Making	14 (24.1%)	1	Excel	20 (48.8%)
2	Diagnostic Analytics/Causes of Past Results	7 (12.1%)	2	Excel Pivot Tables,	6 (14.6%)

2	Predictive Analytics/Regressions /Clustering/Classification/Simulation/Automate Decisions	7 (12.1%)
2	Analytics for Strategic Decision Making	7 (12.1%)
3	Prescriptive Analytics/Best Outcomes/Optimization Techniques	5 (8.6%)
4	Data Visualization including Charts, Dashboards and Advanced Visualization techniques	4 (6.9%)
5	Data Analytics for Financial Reporting and Analysis	3 (5.2%)
5	Probability and Statistical Techniques/Statistical Computing	3 (5.2%)
6	Analytics for Risk Assessment	2 (3.4%)
7	Analytics for Generating Key Performance Indicators (KPI)	1 (1.7%)
7	Databases/Building/Scripting /Querying	1 (1.7%)
7	Data Mining	1 (1.7%)
7	Programming Languages	1 (1.7%)
7	Fraud Detection using Analytics	1 (1.7%)
7	Other	1 (1.7%)
	Filtering, Macros	
2	Excel Solver/Data Tables/Scenario Manager/ Goal Seek	6 (14.6%)
3	Alteryx	1 (2.4%)
3	Microsoft Access	1 (2.4%)
3	Microsoft BI	1 (2.4%)
3	Monte Carlo simulation	1 (2.4%)
3	Open Source Tools	1 (2.4%)
3	PowerPoint	1 (2.4%)
3	Tableau	1 (2.4%)
3	Visual Basic	1 (2.4%)
3	XBRL	1 (2.4%)

The total number of responses (n) includes responses beyond the 10th rank and therefore may exceed the sum of counts for applications listed in the table above.

Table 3. *Top 10 Applications and Software in Cost Accounting*

Application (n = 51)			Software/Programming language (n = 51)		
Rank	Name of application	Count (%)	Rank	Name of software	Count (%)
1	Descriptive Analytics/Models for Decision Making	9 (17.6%)	1	Excel	17 (33.3%)
2	Data Visualization including Charts, Dashboards and Advanced Visualization techniques	8 (15.7%)	2	Excel Pivot Tables, Filtering, Macros	7 (13.7%)
3	Data Analytics for Financial Reporting and Analysis	5 (9.8%)	3	Excel Solver/Data Tables/Scenario Manager/ Goal Seek	5 (9.8%)
3	Diagnostic Analytics/Causes of Past Results	5 (9.8%)	3	Tableau	5 (9.8%)
3	Predictive Analytics/Regressions/Clustering/Classification/Simulation/Automate Decisions	5 (9.8%)	4	Alteryx	3 (5.9%)
4	Analytics for Strategic Decision Making	4 (7.8%)	4	PowerPoint	3 (5.9%)
5	Prescriptive Analytics/Best Outcomes/Optimization Techniques	3 (5.9%)	5	ERP (Enterprise Resource Planning)	2 (3.9%)
5	Probability and Statistical Techniques/Statistical Computing	3 (5.9%)	5	Microsoft Access	2 (3.9%)
6	Analytics for Risk Assessment	2 (3.9%)	6	ACL	1 (2%)
6	Data Mining	2 (3.9%)	6	Microsoft BI	1 (2%)
6	Other	2 (3.9%)	6	Open Source Tools	1 (2%)
7	Analytics for Generating Key Performance Indicators (KPI)	1 (2%)	6	SQL	1 (2%)
7	ETL (Extraction, Transformation and Loading of Data)	1 (2%)	6	Visual Basic	1 (2%)
7	Text Mining	1 (2%)	6	XBRL	1 (2%)
			6	Other	1 (2%)

The total number of responses (n) includes responses beyond the 10th rank and therefore may exceed the sum of counts for applications listed in the table above.

Table 4. *Top 10 Applications and Software in Intermediate Accounting*

Application (n = 55)			Software/Programming language (n = 38)		
Rank	Name of application	Count (%)	Rank	Name of software	Count (%)
1	Data Analytics for Financial Reporting and Analysis	16 (29.1%)	1	Excel	16 (42.1%)
2	Data Visualization including Charts, Dashboards and Advanced Visualization techniques	11 (20%)	2	Tableau	8 (21.1%)
3	Descriptive Analytics/Models for Decision Making	6 (10.9%)	3	Excel Pivot Tables, Filtering, Macros	7 (18.4%)
4	Predictive Analytics/Regressions/Clustering/Classification/Simulation/Automate Decisions	4 (7.3%)	4	Excel Solver/Data Tables/Scenario Manager/ Goal Seek	3 (7.9%)
5	Diagnostic Analytics/Causes of Past Results	3 (5.5%)	5	Alteryx	1 (2.6%)
5	Data Mining	3 (5.5%)	5	IBM SPSS	1 (2.6%)
5	Fraud Detection using Analytics	3 (5.5%)	5	PowerPoint	1 (2.6%)
6	Analytics for Strategic Decision Making	2 (3.6%)	5	Other	1 (2.6%)
6	Analytics for Generating Key Performance Indicators (KPI)	2 (3.6%)			
6	Audit Analytics (Descriptive, Diagnostic, Predictive, Prescriptive)	2 (3.6%)			
7	Analytics for Risk Assessment	1 (1.8%)			
7	ETL (Extraction, Transformation and Loading of Data)	1 (1.8%)			
7	Machine Learning	1 (1.8%)			

The total number of responses (n) includes responses beyond the 10th rank and therefore may exceed the sum of counts for applications listed in the table above.

Table 5. *Top 10 Applications and Software in Tax Accounting*

Application (n = 13)			Software/Programming language (n = 10)		
Rank	Name of application	Count (%)	Rank	Name of software	Count (%)
1	Analytics for Tax Rates and Tax Compliance	3 (23.1%)	1	Excel	5 (45.5%)
2	Data Analytics for Financial Reporting and Analysis	2 (15.4%)	2	Excel Solver/Data Tables/Scenario Manager/ Goal Seek	2 (18.2%)
2	Descriptive Analytics/Models for Decision Making	2 (15.4%)	3	Alteryx	1 (9.1%)
2	Diagnostic Analytics/Causes of Past Results	2 (15.4%)	3	Excel Pivot Tables, Filtering, Macros	1 (9.1%)
3	Data Visualization including Charts, Dashboards and Advanced Visualization techniques	1 (7.7%)	3	Tableau	1 (9.1%)
3	Predictive Analytics/Regressions/Clustering/Classification/Simulation/Automate Decisions	1 (7.7%)			
3	Analytics for Strategic Decision Making	1 (7.7%)			
3	ETL (Extraction, Transformation and Loading of Data)	1 (7.7%)			

The total number of responses (n) includes responses beyond the 10th rank and therefore may exceed the sum of counts for applications listed in the table above.

Table 6. *Top 10 Applications and Software in Auditing*

Application (n = 141)			Software/Programming language (n = 96)		
Rank	Name of application	Count (%)	Rank	Name of software	Count (%)
1	Analytics for Risk Assessment	25 (17.7%)	1	Excel	28 (29.2%)
2	Audit Analytics (Descriptive, Diagnostic, Predictive, Prescriptive)	19 (13.5%)	2	IDEA	14 (14.6%)
3	Fraud Detection using Analytics	17 (12.1%)	3	Tableau	13 (13.5%)

4	Data Visualization including Charts, Dashboards and Advanced Visualization techniques	14 (9.9%)
5	Data Analytics for Financial Reporting and Analysis	9 (6.4%)
5	Analytics for Testing Transactions/Client Processes	9 (6.4%)
6	Descriptive Analytics/Models for Decision Making	7 (5%)
7	Data Mining	6 (4.3%)
8	Continuous Auditing	5 (3.5%)
9	Diagnostic Analytics/Causes of Past Results	4 (2.8%)
9	Probability and Statistical Techniques/Statistical Computing	4 (2.8%)
10	Predictive Analytics/Regressions/Clustering/Classification/Simulation/Automate Decisions	3 (2.1%)
10	ETL (Extraction, Transformation and Loading of Data)	3 (2.1%)
10	Auditing in a Complex/IT environment	3 (2.1%)
4	Excel Pivot Tables, Filtering, Macros	10 (10.4%)
5	ACL	9 (9.4%)
6	Excel Solver/Data Tables/Scenario Manager/ Goal Seek	4 (4.2%)
7	Other	3 (3.1%)
8	Alteryx	2 (2.1%)
8	ERP (Enterprise Resource Planning)	2 (2.1%)
8	Microsoft BI	2 (2.1%)
8	PowerPoint	2 (2.1%)
8	XBRL	2 (2.1%)
9	Microsoft Access	1 (1.0%)
9	Python	1 (1.0%)
9	R	1 (1.0%)
9	SAS JMP	1 (1.0%)
9	SQL	1 (1.0%)

The total number of responses (n) includes responses beyond the 10th rank and therefore may exceed the sum of counts for applications listed in the table above.

Table 7. *Top 10 Applications and Software in Accounting Information Systems*

Application (n = 205)			Software/Programming language (n = 219)		
Rank	Name of application	Count (%)	Rank	Name of software	Count (%)
1	Data Visualization including Charts, Dashboards and Advanced Visualization techniques	23 (11.2%)	1	Excel	41 (18.7%)
1	Databases/Building/Scripting/ Querying	23 (11.2%)	2	Excel Pivot Tables, Filtering, Macros	36 (16.4%)
2	Data Analytics for Financial Reporting and Analysis	16 (7.8%)	3	Tableau	23 (10.5%)
2	ETL (Extraction, Transformation and Loading of Data)	16 (7.8%)	4	Excel Solver/Data Tables/Scenario Manager/ Goal Seek	19 (8.7%)
3	Descriptive Analytics/Models for Decision Making	15 (7.3%)	5	Microsoft Access	18 (8.2%)
4	Analytics for Risk Assessment	12 (5.9%)	6	SQL	12 (5.5%)
4	Audit Analytics (Descriptive, Diagnostic, Predictive, Prescriptive)	12 (5.9%)	7	ERP (Enterprise Resource Planning)	11 (5%)
5	Fraud Detection using Analytics	11 (5.4%)	8	PowerPoint	8 (3.7%)
6	Data Storage/Warehousing	10 (4.9%)	9	IDEA	7 (3.2%)
7	Diagnostic Analytics/Causes of Past Results	8 (3.9%)	9	XBRL	7 (3.2%)
7	Auditing in a Complex/IT environment	8 (3.9%)	10	Alteryx	6 (2.7%)
8	Data Measurement and Variability/Profiling/Cleansing	7 (3.4%)	10	Microsoft BI	6 (2.7%)
8	Analytics for Testing Transactions/Client Processes	7 (3.4%)			
9	Predictive Analytics/ Regressions/Clustering/Classification/Simulation/Automate Decisions	6 (2.9%)			
9	Data Mining	6 (2.9%)			
10	Probability and Statistical	5 (2.4%)			

	Techniques/Statistical Computing	

The total number of responses (n) includes responses beyond the 10th rank and therefore may exceed the sum of counts for applications listed in the table above.

Table 8. *Top 10 Applications and Software in Analytics in Accounting*

Application (n = 181)			Software/Programming language (n = 130)		
Rank	Name of application	Count (%)	Rank	Name of software	Count (%)
1	Data Visualization including Charts, Dashboards and Advanced Visualization techniques	19 (10.5%)	1	Excel	22 (16.9%)
2	Predictive Analytics/Regressions/ Clustering/Classification/Simulation/Automate Decisions	15 (8.3%)	2	Excel Pivot Tables, Filtering, Macros	20 (15.4%)
3	Data Analytics for Financial Reporting and Analysis	14 (7.7%)	3	Tableau	16 (12.3%)
4	Descriptive Analytics/Models for Decision Making	13 (7.2%)	4	Excel Solver/Data Tables/Scenario Manager/ Goal Seek	10 (7.7%)
4	ETL (Extraction, Transformation and Loading of Data)	13 (7.2%)	5	Microsoft Access	8 (6.2%)
5	Fraud Detection using Analytics	12 (6.6%)	6	SQL	7 (5.4%)
5	Audit Analytics (Descriptive, Diagnostic, Predictive, Prescriptive)	12 (6.6%)	7	Alteryx	5 (3.8%)
6	Diagnostic Analytics/Causes of Past Results	9 (5%)	7	ERP (Enterprise Resource Planning)	5 (3.8%)
7	Analytics for Strategic Decision Making	8 (4.4%)	7	IDEA	5 (3.8%)

7	Databases/Building/Scripting/Querying	8 (4.4%)	7	Microsoft BI	5 (3.8%)
7	Data Measurement and Variability/Profiling/Cleansing	8 (4.4%)	7	R	5 (3.8%)
8	Analytics for Risk Assessment	7 (3.9%)	7	XBRL	5 (3.8%)
8	Analytics for Generating Key Performance Indicators (KPI)	7 (3.9%)	7	Other	5 (3.8%)
8	Probability and Statistical Techniques/Statistical Computing	7 (3.9%)	8	PowerPoint	3 (2.3%)
9	Data Storage/Warehousing	5 (2.8%)	9	ACL	2 (1.5%)
9	Data Mining	5 (2.8%)	9	Machine Learning	2 (1.5%)
10	Prescriptive Analytics/Best Outcomes/Optimization Techniques	4 (2.2%)	9	Python	2 (1.5%)
10	Analytics for Testing Transactions/Client Processes	4 (2.2%)	10	Azure	1 (0.8%)
			10	IBM SPSS	1 (0.8%)
			10	Open Source Tools	1 (0.8%)

The total number of responses (n) includes responses beyond the 10th rank and therefore may exceed the sum of counts for applications listed in the table above.

Table 9. *Top 10 Applications and software in Other courses*

Application (n = 65)			Software/Programming language (n = 56)		
Rank	Name of application	Count (%)	Rank	Name of software	Count (%)
1	Data Visualization including Charts, Dashboards and Advanced Visualization techniques	9 (13.8%)	1	Excel	12 (21.4%)
2	Fraud Detection using Analytics	7 (10.8%)	2	Excel Pivot Tables, Filtering, Macros	9 (16.1%)
3	Data Analytics for Financial Reporting and Analysis	6 (9.2%)	3	Tableau	8 (14.3%)
4	Data Mining	5 (7.7%)	4	IDEA	7 (12.5%)
4	Audit Analytics (Descriptive, Diagnostic, Predictive, Prescriptive)	5 (7.7%)	5	Excel Solver/Data Tables/Scenario Manager/ Goal Seek	5 (8.9%)
5	Analytics for Risk Assessment	4 (6.2%)	6	Other	4 (7.1%)
6	Descriptive Analytics/Models for Decision Making	3 (4.6%)	7	Microsoft Access	2 (3.6%)
6	Diagnostic Analytics/Causes of Past Results	3 (4.6%)	7	SQL (Structured Query Language)	2 (3.6%)
6	Analytics for Testing Transactions/Client Processes	3 (4.6%)	8	ACL	1 (1.8%)
7	Predictive Analytics/Regressions/Clustering/Classification/Simulation/Automate Decisions	2 (3.1%)	8	Alteryx	1 (1.8%)
7	Analytics for Strategic Decision Making	2 (3.1%)	8	Monte Carlo simulation	1 (1.8%)
7	Analytics for Generating Key Performance Indicators (KPI)	2 (3.1%)	8	Open Source Tools	1 (1.8%)

7	Data Storage/Warehousing	2 (3.1%)	8	PowerPoint	1 (1.8%)
7	ETL (Extraction, Transformation and Loading of Data)	2 (3.1%)	8	Visual Basic	1 (1.8%)
7	Databases/Building/Scripting/ Querying	2 (3.1%)	8	XBRL	1 (1.8%)
7	Text Mining	2 (3.1%)			
7	Probability and Statistical Techniques/Statistical Computing	2 (3.1%)			
8	Prescriptive Analytics/Best Outcomes/Optimization Techniques	1 (1.5%)			
8	Machine Learning	1 (1.5%)			
8	Auditing in a Complex/IT environment	1 (1.5%)			

The total number of responses (n) includes responses beyond the 10th rank and therefore may exceed the sum of counts for applications listed in the table above

Tables 1 to 9 show that the five applications that appear near the top in most courses, except for specialized courses such as Tax, AIS, Auditing, and Analytics in Accounting, are

1. Data Visualization including Charts, Dashboards and Advanced Visualization techniques
2. Descriptive Analytics / Models for Decision Making
3. Diagnostic Analytics / Causes of Past Results
4. Predictive Analytics / Regressions / Clustering / Classification / Simulation / Automate Decisions
5. Data Analytics for Financial Reporting and Analysis.

For Tax courses, Analytics for Tax Rates and Tax Compliance was the most popular application, with the other most popular applications being the same as those listed above. For AIS, the second most popular application was Databases/Building/Scripting/Querying, and the fourth most popular was ETL (Extraction, Transformation and Loading of Data). The other most popular applications were the same as those listed above. For Auditing, the top three applications were:

1. Analytics for Risk Assessment
2. Audit Analytics

3. Fraud detection using analytics

The other top applications were the same as those listed above for most accounting courses.

For Analytics in Accounting the fifth most popular application was ETL (Extraction, Transformation and Loading of Data), while the other most popular applications were the same as those for other courses. Thus, except for specialized courses, the same applications were the most popular in many of the courses, and even specialized accounting courses used many of the same applications with the addition of specific software relevant to their course topics.

Tables 1 to 9 indicate that the most popular software used was Excel and its applications. In almost all courses, the top three spots were occupied by

1. Excel;

2. Excel Pivot Tables, Filtering, Macros; and

3. Excel Solver / Data Tables / Scenario Manager / Goal Seek.

The exceptions were that Tableau was in second place in Intermediate Accounting and in third place in Auditing, AIS, and Analytics in Accounting. Tableau was in fourth place in Financial Accounting and Cost Accounting, making it one of the most popular software options overall besides Excel and its applications. Alteryx was in third place in Tax Accounting, fourth place in Managerial Accounting, and fifth place in Cost Accounting and Intermediate Accounting. Among specialized courses, IDEA was in second place and ACL in fifth place in Auditing. In AIS, Access was in fifth place, SQL in sixth place, and ERP in seventh place. Other than the software mentioned here, the rest was used by a small percentage of the respondents (usually 5% to 10% or less). Thus, Excel and its applications seem to the most popular software used across all courses. Tableau was also used frequently, as was Alteryx. Specialized courses used specialized software. Auditing used IDEA and ACL. AIS used Access, SQL and ERP.

4. CONCLUSIONS

The most popular applications in many courses were Data Visualization, Descriptive Analytics/Models for Decision Making, Diagnostic Analytics, Predictive Analytics, and Data Analytics for Financial Reporting and Analysis. Specialized courses such as Tax, Auditing, and AIS also taught applications specialized to those areas. Thus, the applications taught seemed to be those that were useful for the particular courses. The use of different applications may be influenced by the amount of data analytics teaching resources available for

different courses and the level of faculty knowledge about different data analytics tools.

The most popular software used across all courses was Excel and its applications, with Tableau being another common response in many courses. Specialized courses used software specialized for those subjects. For example, Auditing used ACL and IDEA. AIS used Access, SQL and ERP. However, even in these courses Excel was the most popular software used. This may be because of its usefulness and availability, as well as because Excel skills are desired by employers. Thus, schools should enhance training in the use of Excel for data analytics for both faculty and students. However, other software that is useful for teaching the content of other courses should also be available. There may be an issue of resources available to devote to the acquisition of new software and to faculty training in it.

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AUDITOR ATTRIBUTES DURING THREE DIFFERENT STAGES OF PROFESSIONAL DEVELOPMENT

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ABSTRACT

This study explores the influence of auditor attributes that may influence the efficacy of red flag fraud detection in financial statements, by internal auditors employed by corporations and external auditors employed by public accounting firms. Exploring auditors during the early, middle, and late professional development stages, the findings detect that fraud efficiency is influenced by the following attributes: auditing experience, gender, income, position, on-the-job training, red flag usage, prior fraud detection, certifications, in-house training, and continuing professional education (CPE) hours.

Key Words: Red Flag Fraud Detection, Auditor Attributes, Internal Auditors, External Auditors

INTRODUCTION

The Enron, WorldCom, and Arthur Anderson scandals exposed the need for fraud detection and triggered the Auditing Standards Board (AICPA, 2002b) to publish the Statement of Auditing Standard (SAS) No. 99 - Consideration of Fraud in a Financial Statement Audit. Later, the Public Company Accounting Oversight Board (PCAOB) (2018) adopted SAS No. 99. This standard requires external auditors conducting financial statement audits, with or without the assistance of internal auditors, to use 42 red flags to detect fraudulent financial reporting activities occurring in publicly traded corporations (AICPA, 2002b).

Red flags used by internal and external auditors, indicate potential material misstatements caused by fraud or errors. Internal auditors may assist external auditors in conducting financial statement audits to detect fraudulent material misstatements (AICPA, 2002a). The International Professional Practices

Framework of the Institute of Internal Auditors (Institute of Internal Auditors, 2009) defines the role of internal auditors to "detect, prevent, and monitor fraud risks" that direct the planning of the audits performed by organizations.

According to the National Commission on Fraudulent Financial Reporting (1987) and the SAS No. 99/PCAOB Auditing Standard (AICPA, 2002b), the Fraud Triangle focuses on three management causes of fraud, (1) pressures/incentives that cause management to commit fraud, (2) opportunities that represent situations allowing management to commit fraud, (3) rationalizations/attitudes that justify management to commit fraudulent acts.

Yücel (2013) discusses the effectiveness of the utilizing the SAS No. 99's fraudulent financial reporting tools (red flags). These red flag tools include 16 pressure or incentive flags, 14 opportunity flags, and 12 rationalization or attitude flags and are referred to as the 42 red flags required by the SAS to detect fraud during financial statement audits (AICPA, 2002b).

Studies have explored the influence of accounting certifications increasing the effectiveness of using red flags to detect fraud. The PCAOB (2018) requires CPAs to conduct financial statement audits to maintain a "professional skeptical attitude." A professional skeptical attitude expects auditors holding CPA certifications to question auditing issues and critically assess the audit evidence concerning such issues. This attitude enhances the CPAs' critical importance to planning and conducting financial statement audits as well as reporting audit opinions. Charron and Lowe (2008, p. 9) stated, "The rationale behind [accounting] standards is that high levels of professional skepticism (i.e., assuming a more questioning attitude) enhances the ability to detect fraud." Thus, auditors that hold the CPA certification and maintain a professional skeptical attitude are more likely to be effective in detecting fraud than non-CPA auditors. Elkins (2021) suggests that the most valuable certification for auditing and accounting professionals is the CPA certification. According to Boyd (2022), the CPA license represents the best certification for accounting and finance jobs, while the CMA certification is a valuable credential for corporate accounting and finance jobs. The CFA certification is valuable for Chief Financial Officers.

The effectiveness of red flags to detect fraud may be related directly to the number of years of external auditing experience and internal auditing experience. Bonner and Lewis (1990) confirmed that more auditing experience improves the effectiveness of auditors, since more experienced auditors have a greater ability to apply auditing knowledge than less experienced auditors as concluded by Choo and Trotman (1991). Auditing knowledge is acquired from

years of auditing experience as confirmed by Wright and Wright (1997). Similarly, Shamki and Alhajri (2017) verified a positive relationship between internal auditor effectiveness and the number of years of auditing experience. Moreover, Bond and DePaulo (2008) found that highly experienced auditors demonstrate a 67 percent accuracy in making auditing decisions, and a 78 percent accuracy in making auditing decisions not involving fraud.

Prior studies indicate that female and male auditors make critical auditing decisions differently. Hardies et al. (2016) found that female auditors seem to demonstrate a "higher audit quality" performance compared to male auditors. Furthermore, female auditors have a higher probability of expressing going-concern audit opinions than male auditors. As a result, the audit fees, charged by public accounting firms and paid by audit clients, are slightly higher for female audit engagement partners than the male counterparts (Hardies et al., 2015). Adding to the literature, Lai et al. (2017) found that when female directors serve on audit committees, the audit clients are more likely to pay higher audit fees for highly specialized auditors. In contrast, the male dominated audit committees (board of directors) are more likely to select CPA firms that provide lower quality audit services and charge reduced audit fees.

Disagreeing with Hardies et al. (2016) and Lai et al. (2017), Alleyne et al. (2018) stated male auditors are more effective in performing audit techniques than female auditors. Similarly, Gold et al. (2009) concluded that male auditors demonstrate more accuracy in making auditing judgments than female auditors. In addition, OseiAdu et al. (2016) discovered a significantly positive correlation between internal auditing performance to detect fraud and male internal auditors, which implies that male internal auditors are more likely to detect fraud than female counterparts.

Many red flag studies focus on managers. Hackenbrack (1993) discovered that external auditors of large audit clients concentrate more on the fraud risk attributes concerning opportunities for perpetuators to commit fraud. Apostolou and Hassell (1993) found internal auditors perceived the importance of red flags in identifying the possible occurrence of management fraud. Similarly, Albrecht and Romney (1986) noted that audit partners validated the significance of red flags as predictors of management. One-third of red flags are significant predictors of fraud, and most red flags tend to focus on the personal characteristics of management (Albrecht and Romney, 1986). Apostolou et al. (2001) found that external and internal auditors rated higher fraud indicators when management characteristics and influence over corporate control environment were being rated. Furthermore, Heiman-Hoffman and Morgan

(1996) surveyed external auditors of the former "Big Six" international public accounting firms and ranked the thirty most important warning signs of possible fraud, where management attitudes are considered the most important red flags. Church et al. (2001) noted internal auditors perceive red flags as more predictive, such as when managers overstate earnings to falsely earn bonuses.

DESIGN AND METHODOLOGY

The questionnaire was granted university approval and used non-student professionals with anonymous respondent names. The design was to collect information about certain attributes of internal and external auditors. The survey instrument implemented a six-point Likert scale that measured auditor perceptions regarding the fraud-detecting effectiveness of the 42 red flags. A total of 128 external auditors and 100 internal auditors from across the United States completed and returned the questionnaires. Of the 228 completed questionnaires, SPSS software was utilized to analyze the data collected. Data analysis resulted in logistic regression equations for each stage of professional development, where the dependent variable represents whether the responding internal and external auditors have detected fraud using red flags or not.

The red flag queries were created to determine which attributes may influence the level of fraud-detecting effectiveness of auditor employers in using red flags. This study discovered specific attributes that may influence the fraud-detecting effectiveness of the 42 red flags during the three stages of the auditors' professional development: (1) early professional development with auditor ages ranging from 21 to 35 years old, (2) middle professional development with auditor ages ranging from 36 to 50 years old, and (3) late professional development with auditor ages ranging from 51 to 65 years old. Linear regression models were developed for each of the three stages of professional development where the dependent variable represents whether the auditor employers (as organizations) have detected fraud using red flags or not.

In this study, whether the auditor employers have detected fraud using red flags or not is the dependent variable. The independent variables include the following: auditor exposure to red flags, frequency of auditor's prior use of red flags, red flag conferences, in-house red flag training, number of red flag CPE hours accumulated, job title or position, types of accounting certifications, number of years of auditing experience, master's degrees and college majors, gender, race, and income.

Table 1 Organization of regression equation results

Regression Equation Results by Table And Model Number in Terms of Auditor Attributes and Stage of Professional Development	
First Stage of Professional Development	
Table 3 **Model 1**	Seven Attributes of Internal and External Auditors That May Influence the Fraud-Detecting Effectiveness of SAS No. 99 Red Flags for Each Organizational Employer of the Auditors
Second Stage of Professional Development	
Table 4 **Model 2**	Ten Attributes of Internal and External Auditors That May Influence the Fraud-Detecting Effectiveness of SAS No. 99 Red Flags for Each Organizational Employer of the Auditors
Third Stage of Professional Development	
Table 5 **Model 3**	Eleven Attributes of Internal and External Auditors That May Influence the Fraud-Detecting Effectiveness of SAS No. 99 Red Flags for Each Organizational Employer of Auditors

This study ascertains which professional attributes may improve the effectiveness of red flags to detect fraud by internal and external organizational employers. The professional auditor attributes are as follows: certifications, CPE hours, experience, gender, race, income, job position, conferences, in-house training, prior fraud detection, and the usage of red flags.

Table 2 Demographics for internal and external auditor attributes

Auditor Attributes	100 Internal Auditors	128 External Auditors
Occasional use of red flags	84/84%	101/80%
Prior fraud detection using red flags	65/65%	91/71%
CPE hours in red flags	15	11
In-house training	20/20%	36/28%
Job title/management position	88/88%	93/73%
Certifications (Auditors may hold more than one certification)	CPA – 63 CIA – 35 CMA – 2 Other – 60 (1.6 per auditor)	CPA – 127 CIA – 5 CMA – 4 Other – 5 (1.1 per auditor)
Auditing experience in years	13-Internal 4-External	2-Internal 16-External
Degrees/Majors	100/100% Bachelor 66/66% Acct. major 28/28% - MBA	128/100% Bachelor 109/85% Acct. major 22 /17% MBA
Gender	Female-29/29% Male-71/71%	Female-26/20% Male-102/80%
Race	Caucasian-91/91%	Caucasian-119/93%
Average Annual Income	$111,000	$117,000
Due to rounding, totals may not equal 100%.		

DEFINITIONS

Organizational employers - Publicly owned corporations are the organizational employers of the respondent internal auditors, and public accounting (CPA) firms are the organizational employers of the respondent external auditors.

Independent variable attributes in all regression equations follow:

1. MBA = Auditors graduated with an MBA degree or not
2. MACC = Auditors graduated with a MACC degree or not
3. EA_EXP = Years of external auditing experience acquired by auditors
4. IA_EXP = Years of internal auditing experience acquired by auditors
5. CPA = Auditors acquired the CPA certification or not
6. CIA = Auditors acquired the CIA certification or not
7. EXPOS = How frequently auditors have prior exposure to red flags
8. USE = How frequently auditors have previously used red flags
9. TRAIN = Auditors have attended employer in-house red flag training or not
10. CONFER = Auditors have previously attended red flag conferences or not
11. CPE = Number of CPE hours previously accumulated by auditors
12. GENDER = Gender of the auditors
13. RACE = Race of the auditors
14. POSITION = Position or job title of the auditors
15. INCOME = Income earned by the auditors

Both an independent and dependent variable:

EMPLOYER_DETECT = Employers have previously detected fraud by using red flags or not

RESULTS

First Stage of Auditor Professional Development

Organizational employers of internal and external auditors (Model 1)

Seven professional attributes (independent variables) of internal and external auditors may influence the organizational effectiveness of the corporate and public accounting employers of auditors in detecting fraud. The dependent variable represents whether the corporations employing internal auditors and CPA firms employing external auditors detected fraud using red flags or not.

This linear regression equation analyzed the collected data for both internal auditor employers and external auditor employers. In Table 3, this regression equation (Model 1) is significant for both corporations employing internal auditors ($p = .055$) and CPA firms employing external auditors ($p = .0005$).

As organizations, CPA firms become significantly ($p = .041$) more effective in fraud detection using red flags, provided their external auditors (employees) had accumulated more external auditing experience. Similarly, both CPA firms ($p = .034$) employing external auditors and corporations ($p = .019$) employing internal auditors result in significant improvements for detecting fraud using red flags, if internal and external auditors (employees) had accumulated more internal auditing experience. Studies by both Bonner and Lewis (1990) and Shamki and Alhajri (2017) confirmed that additional internal and external auditing experience improves the effectiveness of auditors in detecting fraud. In contrast**,** this study determined acquiring more years of external auditing experience had no effect on the organizational fraud-detecting effectiveness of corporations employing internal auditors.

In Table 3, graduating with an MBA or MACC degree by internal and external auditors indicates no enhancement in the fraud-detecting effectiveness of their employer organizations (corporations and CPA firms). Comparably, MACC degrees held by internal and external auditors provide no effect upon the organizational fraud-detecting effectiveness of their employers.

CPA firms (organizations) are significantly ($p = .0005$) more effective in detecting fraud, provided their employed external auditors have previously detected fraud using red flags. In addition, obtaining CIA certification by internal auditors significantly ($p = .019$) advances the organizational fraud-detecting effectiveness of the corporations employing internal auditors.

This linear regression equation (Model 1) analyzed the collected data for both corporations employing internal auditors and public accounting (CPA) firms employing external auditors.

$EMPLOYER\_DETECT = \beta_0 + \beta_1 MBA + \beta_2 MACC + \beta_3 EA\_EXP + \beta_4 IA\_EXP + \beta_5 CPA + \beta_6 CIA + \beta_7 AUDITOR\_DETECT + \epsilon$

Table 3 presents the beta coefficients and p values for the seven independent variables of the linear equation (Model 1) that represents the attributes of both the internal auditors employed by corporations and the external auditors employed by public accounting (CPA) firms.

Table 3 (Model 1): Auditor attributes influencing their employers' organizational effectiveness using red flags to detect fraud during the first professional development stage

Independent Variable Names	**Corporations Employing Internal Auditors**		**CPA Firms Employing External Auditors**	
	Beta Coefficient	**P Value**	**Beta Coefficient**	**P Value**
Master of Business Administration (MBA)	-.273	.285	-.066	.825
Master of Accounting (MACC)	-.100	.831	.295	.433
External Auditor Experience (EA_EXP)	.010	.924	.124	.041**
Internal Auditor Experience (IA_EXP)	.187	.019**	1.099	.034**
Certified Public Accountants (CPA)	-.222	.387	-1.539	.187
Certified Internal Auditors (CIA)	.576	.019**	.560	.406
Auditor Have Detected Fraud (AUDITOR_DETECT)	.461	.122	1.215	.0005*
Constant	2.156	.272	2.482	.056**
Model Significance	.055**		.0005*	
Adjusted R Square	.075		.247	
F Value	2.073		6.379	
Level of Significance	* < 1%	** < 5%	*** < 10%	

Second Stage of Auditor Professional Development

Organizational Employers of Internal and External Auditors (Model 2)

The linear regression equation used in Table 4 contains ten professional attributes (independent variables), which influence the effectiveness of employer organizations in red flag fraud detection. In Table 4, the dependent variable represents whether the employers of the auditors have detected fraud using red flags or not. The regression equation analyzed the collected data for both corporate employers of internal auditors and CPA firm employers of external auditors. This regression (Model 2) equation is significant for both the corporate employers of internal auditors ($p = .009$) and the CPA firm employers of external auditors ($p = .0005$).

As organizations, CPA firms employing external auditors with MBAs are significantly ($p = .056$) more effective in detecting fraud than CPA firms employing non-MBA external auditors. External auditors with MACC degrees do not affect the organizational fraud-detecting effectiveness of their CPA firm employer. Also, corporations employing internal auditors that have either an MBA or MACC degrees show no impact on the organizational effectiveness of their corporate employers in red flag fraud detection.

In the second stage, accumulation of more external auditing experience by internal and external auditors has no change in the organizational effectiveness of their corporate and CPA firm employers for detecting fraud. In comparison, CPA firms employing external auditors with more internal auditing experience are significantly ($p = .023$) more effective in detecting fraud using red flags, whereas corporations employing internal auditors with more internal auditing experience indicate no impact on the organizational fraud-detecting effectiveness of their corporate employers.

Referring to Table 4, both extensive prior exposure to ($p = .063$, $p = .060$) and continuous usage ($p = .056$, $p = .020$) of red flags by internal and external auditors significantly increases the fraud-detecting effectiveness of their employer organizations (corporations and CPA firms). Internal and external auditors attending red flag conferences does not enhance the organizational fraud-detecting effectiveness of their corporate and CPA firm employers. External auditors, who have accumulated more CPE hours from red flag conferences ($p = .001$) enhance more significantly the organizational effectiveness of their CPA firm employers in detecting fraud. In addition, external auditors that have completed more in-house red flag training provide a marginal ($p = .082$) significant improvement in the red flag fraud-detecting effectiveness

CPA firm employers. The number of CPE hours accumulated by external auditors indicates a greater statistical increase in the degree of effectiveness of red flags than the red flag conferences attended by external auditors. In contrast, internal auditors, which have accumulated more CPE hours from red flag conferences and have received more in-house red flag training, indicate no change in the organizational fraud-detecting effectiveness of their corporate employers.

In Table 4, external auditors, which have previously detected fraud, improve more significantly ($p = .019$) the organizational fraud-detecting effectiveness of their CPA firm employers. In contrast, internal auditors that have previously detected fraud using red flags do not influence the organizational fraud-detecting ability of their corporate employers.

This linear regression equation (Model 2) analyzed the collected data for both corporations employing internal auditors and CPA firms employing external auditors.

$$EMPLOYER\_DETECT = \beta_0 + \beta_1 MBA + \beta_2 MACC + \beta_3 EA\_EXP + \beta_4 IA\_EXP + \beta_5 EXPOS + \beta_6 USE + \beta_7 CONFER + \beta_8 TRAIN + \beta_9 CPE + \beta_{10} AUDITOR\_DETECT + \epsilon$$

Table 4 presents the beta coefficients and p values of the ten independent variables of the linear equation (Model 2) for the attributes of both the internal auditors employed by corporations and the external auditors employed by public accounting (CPA) firms.

Table 4 (Model 2): Auditor attributes influencing their employers' organizational effectiveness using red flags to detect fraud during the second professional development stage

Independent Variable Names	Corporations Employing Internal Auditors		CPA Firms Employing External Auditors	
	Beta Coefficient	P Value	Beta Coefficient	P Value
Master of Business Administration (MBA)	-.364	.260	.155	.056***
Master of Accounting (MACC)	.185	.999	.240	.550
External Auditor Experience (EA_EXP)	-.032	.623	-.027	.627

Internal Auditor Experience (IA_EXP)	.126	.493	1.044	.023**
Auditor Extent of Exposure to Red Flags (EXPOS)	.092	.063***	.259	.060***
How Often Auditors Have Used Red Flags (USE)	.447	.056***	.275	.020**
Red Flag Conferences (CONFER)	-.360	.921	-.169	.414
In-House Red Flag Training (TRAIN)	.372	.998	.411	.082***
CPE Hours (CPE)	-.001	.965	.191	.001*
Auditors Have Detected Fraud (AUDITOR_DETECT)	.006	.961	.500	.019**
Constant	1.310	.014**	-.198	.738
Model Significance	.009*		.0005*	
Adjusted R Square	.150		.481	
F Value	2.589		11.474	
Level of Significance	* < 1%	** < 5%	*** < 10%	

Third Stage of Auditor Professional Development

Organizational employers of internal and external auditors (Model 3)

Eleven independent variables (auditor attributes) of this linear regression equation may influence the effectiveness of employer organizations in using red flags to detect fraud. In Table 5, the dependent variable represents whether the employers of auditors have detected fraud using red flags or not. The regression equation analyzed the collected data for both corporate employers of internal auditors and CPA firm employers of external auditors. In Table 5, the linear regression (Model 3) equation is significant for both corporate employers of internal auditors (p = .096) and CPA firm employers of external auditors (p = .0005).

During the third stage, most internal and external auditors are executive officers and hold accounting certifications. Internal auditors, working in executive management positions, increased more (p = .032) significantly the organizational fraud-detecting effectiveness of their corporate employers.

Internal auditors earning a higher income achieve a marginally (p = .093) significant improvement in the effectiveness of red flag fraud detection by their corporate employers. In contrast, the job position and income of external auditors indicates no effect on the fraud-detecting effectiveness of CPA firm employers. Obtaining either a CPA or CIA certification does not enhance the organizational effectiveness to detect fraud for either the corporate employers of internal auditors, or CPA firm employers of external auditors.

Graduating with either an MBA or MACC degree by internal or external auditors offers no improvement in the organizational effectiveness to detect fraud by either corporate or CPA firm employers.

Bonner and Lewis (1990) acknowledged that more auditing experience improves auditor effectiveness. In Table 5, when external auditors acquire either more internal auditing experience (p = .011), or more external auditing experience (p = .039), significant improvements in the fraud-detecting effectiveness of CPA firm employers (as organizations) occur. In comparison, internal auditors accumulating more internal auditing experience provided a marginally (p = .096) significant improvement in their corporate employers' ability to detect fraud, which agrees with the findings by Shamki and Albajri (2017). Gaining more external auditing experience does not change the fraud-detecting effectiveness of the corporations employing internal auditors.

In Table 5, CPA firms employing more female external auditors enhanced significantly (p = .021) their organizational fraud-detecting effectiveness. The gender of internal auditors has no effect over the organizational effectiveness of their corporate employers in detecting fraud. As an independent variable (attribute), the race of either internal or external auditors indicates no influence upon the organizational effectiveness of their corporate and CPA firm employers in detecting fraud. Female external auditor employees significantly (p = .021) improved the overall fraud-detecting effectiveness of their CPA firm employer organizations more than male external auditor employees. External auditors as employees of CPA firms, which have previously detected fraud, significantly (p = .00005) increased the organizational fraud-detecting ability of those CPA firms, but history of prior fraud detection was insignificant for corporations employing internal auditors.

The linear regression equation (Model 3) analyzed separately for corporations employing internal auditors and CPA firms employing external auditors.

$$EMPLOYER\_DETECT = \beta_0 + \beta_1 MBA + \beta_2 MACC + \beta_3 EA\_EXP + \beta_4 IA\_EXP + \beta_5 CPA + \beta_6 CIA + \beta_7 GENDER + \beta_8 RACE + \beta_9 POSITION + \beta_{10} INCOM + \beta_{11} AUDITOR\_DETECT + \epsilon$$

Table 5 presents the beta coefficients and p values for the 11 independent variables of the linear equation (Model 3) that represents the attributes of both the internal auditors employed by corporations and the external auditors employed by public accounting (CPA) firms.

Table 5 (Model 3): Auditor attributes influencing their employers' organizational effectiveness using red flags to detect fraud during the third professional development stage

Independent Variable Names	Corporations Employing Internal Auditors		CPA Firms Employing External Auditors	
	Beta Coefficient	P Value	Beta Coefficient	P Value
Master of Business Administration (MBA)	-.316	.284	-.265	.375
Master of Accounting (MACC)	.109	.573	.036	.927
External Auditor Experience (EA_EXP)	.024	.116	.152	.039**
Internal Auditor Experience (IA_EXP)	.142	.096***	1.261	.011*
Certified Public Accountants (CPA)	-.319	.289	-	-
Certified Internal Auditors (CIA)	-.464	.278	.587	.362
Gender (GENDER)	-.038	.285	.717	.021**
Race (RACE)	-.039	.110	.000	.999
Position (POSITION)	.102	.032**	-.062	.096
Income (INCOME)	.122	.093***	-.050	.492
Auditors Have Detected Fraud (AUDITOR_DETECT)	.293	.325	1.194	.000*

Constant	2.227	.826	.573	.519
Model Significance	.096***		.0005*	
Adjusted R Square	.018		.329	
F Value	1.138		5.814	
Level of Significance	* < 1%	** < 5%	*** < 10%	

In analyzing Table 3 through Table 5, external auditor responses perceive more attributes that significantly improve the red flag effectiveness for detecting fraud than the attributes of the internal auditor responses.

CONCLUSION

Most internal and external auditors had been exposed to red flags, used red flags, and detected fraud using red flags in financial statement audits. Internal auditors had slightly more exposure, usage, and detection experience with red flags than the external auditors. In comparison, external auditors received more in-house red flag training than internal auditors, whereas internal auditors attended more red flag conferences and accumulated more CPE hours than the external auditors.

Internal auditors accumulated more internal auditing experience and less external auditing experience. In contrast, external auditors had accumulated more external auditing experience and less internal auditing experience. The internal auditing profession attracted a slightly higher percentage of women and minorities.

During the first stage of professional development, public accounting firms were significantly more effective in fraud detection, provided the employed external auditors have the following attributes: (1) more internal auditing experience, (2) more external auditing experience, and (3) previously detected fraud using red flags. Similarly, corporate organizations significantly improved the fraud-detecting effectiveness, provided their employed internal auditors have accumulated more internal auditing experience. Moreover, provided that the employed internal auditors have CIA certifications, corporate organizations were significantly more effective in detecting fraud.

During the second stage of professional development, public accounting firms significantly improved the fraud-detecting effectiveness using red flags,

provided the employed external auditors have the following attributes: (1) graduated with an MBA, (2) accumulated more internal auditing experience, and (3) detected fraud previously. Also, extensive prior exposure and usage of red flags by both internal and external auditors significantly enhanced the organizational fraud-detecting effectiveness of both public accounting and corporate employers. Finally, external auditors, which have accumulated more CPE hours from red flag conferences and have attended additional in-house red flag training sessions, significantly increased the organizational effectiveness of their public accounting firm employers in fraud detection.

During the third stage, external auditors that have accumulated more internal auditing experience and external auditing experience significantly improved the organizational fraud-detecting effectiveness of CPA firm employers. Likewise, CPA firms that employed more female external auditors significantly improved the organizational fraud-detecting effectiveness. Prior fraud detection using red flags by employed external auditors significantly increased the organizational fraud-detecting effectiveness of CPA firm employers.

In summary, the motivation of this paper was to identify attributes that influence fraud-detecting effectiveness of red flags used by auditors and their organizational employers. The authors suggest future studies to further investigate which specific attributes influence red flag detection in specific regions across the nation as well as internationally. Such future research could focus on auditor attributes such: graduate degrees, accounting certifications, on-the-job training, conferences, gender, race, supervision, professional standards, government regulations, responsibility, and accountability.

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USING BIBLICAL PRINCIPLES TO TEACH THE STUDENTS ETHICS

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ABSTRACT: Many professors use ethical theories such as utilitarianism in their Ethics courses. The purpose of this research is to present ideas related to using Biblical principles to teach the students Ethics. Examples will come from the Book of James because it is an exhortation for ethical conduct.

Key Words: Ethics, Biblical Principles, Education

INTRODUCTION

Students are required to take an Ethics course as part of their academic experiences in most states. While many ethics courses simply describe ethical theories such as utilitarianism in the course content, the Bible has some excellent suggestions of important principles for the students to learn. The purpose of this research is to describe some of these Biblical principles, taken just from the Book of James. This book of the Bible is often called an exhortation for ethical conduct so many of the scriptures are helpful in teaching the students important ethical concepts that have been used throughout the many years that the Bible has been used by both Americans and Christians all over the world.

LITERATURE REVIEW

Several articles in the literature describe how scripture affects society as a whole. Beed and Beed (2005) maintained that Christian Scripture, specifically the social teaching of the Roman Catholic Church and other Christian theological systems, contain normative principles intended for application to contemporary socioeconomic life. The foundations of business and accounting concepts have ties to the Catholic Church of the Middle Ages (Gleeson-White, 2011). The Christian Crusades spurred a European explosion of trade and mercantilism. A Franciscan monk, Fra Luca Pacioli, an itinerant math tutor in the region, studied the system of record keeping developed by the shopkeepers of this time. He described these principles and methods in a treatise on double-entry accounting published in 1494. In addition, the Medici family served as the bankers of the Catholic Church and they, like the merchants of the time, became immensely wealthy from this activity (Soll, 2014). A Biblical quote from John 19:11 was interpreted to rationalize these

massive profits; it discussed that man's intellectual power over fortune could only be God-given and was therefore a virtue. The early merchants and bankers felt guilty for amassing great fortunes, as that was not the norm before this time. To remedy these feelings, they gave tithes to the Catholic Church, sponsored artists, lectures and civic projects, such as buildings with great architectural significance. Thus, the Renaissance was born from business and banking profits and the influence of the early Church's teachings. This interrelationship has relevance for our teaching of ethics today.

Several authors tie the use of Biblical teachings to the study of ethics. Welch (2002) presented the need for greater awareness of Biblical law in connection with the study of American legal history and the underlying fabric of the common law. This article showed that the study of Biblical law has much to offer to anyone interested not only in the history of American law but also in its future. Pava (2002) described three stages of moral development in organizations: ethical improvisation, ethical institutionalization and ethical revival. The research argued that the developmental perspective is inherent in the structure of Biblical narrative, especially in the stories of Genesis and Exodus. Beed and Beed (2015) studied the debate that has reignited among Christians on whether capitalism is compatible with Christianity. In the US, the majority of conservative evangelicals accept capitalism as it is while a minority of Christians favor socialism. Another position is that neither capitalism nor socialism is compatible with Christianity. Clements (2010) discussed how ethics oversight can be summarized as applying the timeless standards to the actions of the enterprise and ethics can never be assumed. Bloomberg (2012) discussed how various economists lamented that, while they tried to be very cautious in weighing in on religious or theological topics about which they knew comparatively little, it seemed to them that Biblical scholars and theologians did not reciprocate, making confident but simplistic pronouncements on complex economic issues that deserved much more careful study. Pava (1998) examined important Biblical, Talmudic, and post-Talmudic texts which deal with business ethics that are both legalistic and aspirational in nature. The theme of this study is that Jewish business ethics texts provide rules of behavior, but more importantly, the texts reveal a vision encouraging us to incorporate the highest human and spiritual ideals into the common world of business. Cunningham (1998) asserted that The Golden Rule is often used in business to determine whether a proposed action is good or not. The idea behind the Golden Rule has been a guide to right conduct, in some sense, ever since humans began to sort out the good from the bad. More recently, there has developed among some academics the conviction that the Golden Rule is not an adequate benchmark for ethical decision-making. The Golden Rule and alternative ideas are discussed.

Another line of ethics research involves the relationship between the Biblical principles and business management. Low (1999) encouraged readers to remember

basic guiding principles found in the Bible that are still applicable in today's society. Although some of these Biblical principles are in some people's minds, many managers concentrate on complicated modern management concepts, so much so that those in the Holy Bible are conveniently overlooked. The author suggested that modern management concepts should be synthesized with these Biblical principles to attain managerial efficacy. Wagner-Tsukamoto (2008) asserted that behavioral ethics still contribute to raising moral standards in interactions amongst the members (stakeholders) of a single firm, and the stakeholders of different firms. The premise of the Brown (2000) research was that the lack of connecting church financial management principles to a Biblical foundation is a primary cause for the lack of clergy and church leaders following effective financial management practices within a church setting. The primary research outcome was to provide an avenue of how to effectively teach ministerial education in the areas of finance and administration. A research study by Ellzey (2008) studied the impact of membership on CEOs who participate in a Christian accountability group. This study validated the success of CEO accountability groups and found that Christian CEOs who participated in accountability groups showed high levels of success, including business profitability, revenue growth, culture within the organization, leadership development, learning and application of new skills and technologies, personal spiritual growth, spiritual growth of the organization, personal happiness, family, and better decision-making.

Studies most related to teaching students about Biblical principles are also found in the literature. A research study conducted by Toledano-Nuria (2020) proposed a teaching alternative that can encourage the ethical reflective sensibility among students of social entrepreneurship by exploring the possibility of using religious parables as narratives that can be analyzed. This method provokes and encourages ethical discussions. An example is the use of a parable from the New Testament as an example of a religious narrative that can be used to prompt discussions about ethical dilemmas. Ohman (2001) compared the values of college freshman based on their secondary educational background. It was conducted at a private liberal arts college whose freshman class consisted predominantly of graduates from public, private Christian, and home schools. Findings indicated that the business ethics values of home school graduates were significantly higher than those of graduates from private Christian schools or the public school system. The study found that the continual impact of parents and the values of the home have facilitated strong ethical values in the children. These values should aid these individuals as they become active in the workplace.

O'Connor and Myers (2018) reviewed key values in the Ignation tradition as a foundation to be used to improve current pedagogical practices in developing business leaders. In contemporary business, the accountants,

comptrollers, and CFOs play a pivotal role in the process of creating goods, services, and wealth. As the business environment has increased in complexity during the 21st century, the authors assert that it has become essential to teach business leadership as a critical component to the sustainability of the planet and a quality of life.

Finally, important business leaders have used their platforms to integrate Biblical principles with their business lives. Current Intel CEO, Patrick Gelsinger once told a story about how he was just 18 years old and four months into an entry-level job at Intel when he heard a pivotal sermon at a Silicon Valley church (Clark, 2022). There, a minister quoted Jesus from the Book of Revelation. The words resonated with Mr. Gelsinger and changed his life. He realized he had been just a lukewarm believer, someone who just practiced his faith once a week. He vowed never to be neither hot nor cold again and integrated his faith with technical knowledge to climb the corporate ladder all the way to Intel's CEO position. Recently, Mr. Gelsinger delivered a Spring 2022 Commencement address at The Ohio State University and talked about how he was a devout Christian who was sure that God had a plan for everyone's life (Gelsinger, 2022).

TEACHING THE STUDENTS ETHICAL TOPICS BASED ON BIBLICAL PRINCIPLES FOUND IN THE BIBLE'S BOOK OF JAMES

Burkett (1998) provided a large variety of Biblical verses to be used in the conduct of business. The approach was to present ideas from both a leader/owner's point of view as well as an employee's perspective. This research will extend his activities by selecting Bible verses from just the Book of James and making suggestions about how they can be used to teach students important ethics lessons. All of the verses were found in Senior et al (1991) and Meyer (2019) books, but ultimately from the Bible itself. There are three different ethical themes presented to show how the Biblical principles can be used to teach the students these important ethical lessons.

Tests and Trials

While some students may have experienced serious challenges in their life before they came to college, many students are simply inexperienced and somewhat naïve about the tests and trials that are a part of life and business. The following Bible verses can help them prepare for this aspect of their personal and professional life:

James 1:2-4: Consider it all joy when you encounter various trials, for you know that the testing of your faith produces perseverance. And let perseverance be perfect, so that you can be perfect and complete, lacking in nothing.

This verse is important because it teaches the students that trials are actually to be welcomed in life and that tests usually result in character-building perseverance. When students understand this ethical lesson, they will often have a better attitude about encountering problems and will be better equipped to grow from the experience as well as resolve the challenges in a constructive manner.

James 1:12- 15: Blessed is the person who is steadfast under trial and perseveres when tempted; for when he has passed the test and been approved, he will receive the victor's crown of life which the Lord has promised to those who love Him. No one experiencing temptation should say, "I am being tempted by God" for God is not tempted to evil, and tempts no one. Rather, each person is tempted when he is lured and enticed by his own desire. The desire conceives and brings forth sin, and when sin reaches maturity, it gives birth to death.

This verse actually shows that there is a blessing to people who remain steadfast and who persevere during tests and trials. It also puts the temptation responsibility on the person, not on God. Often, tests and trials are used to mold a person to become better or to prune some aspect of a person's activity or persona. If a person recognizes the problems with their own desires or sin, the problems usually do not escalate and the sins do not reach maturity or death stages.

Listening, Speaking, and Anger

While many college classes have presentations in which the students speak formally, most students are never taught to listen or to speak informally, especially when the anger emotion is present. In our culture, there is an anger problem among many people because there are so many stresses and divisions among people. The following verses will help with this cultural problem and please understand that anger itself is not a sin:

James 1-19-20: Understand this, beloved brothers and sisters, let everyone be quick to hear, slow to speak, slow to anger, for the anger of man does not produce the righteousness of God.

This verse describes the priority and order in which the three ethical topics should be considered. Listening is mentioned first and the word "quick" is also used. The rest of the verse emphasizes how "slow" should be used in terms of both speaking and becoming angry. Careless words cannot simply be erased from people's minds like written words on a chalkboard. Words spoken in anger are also often like arrows to people who receive them so care to slow down and think before speaking and before getting angry is important. Righteousness or better outcomes result from listening (not just hearing) and carefully responding to others.

James 1:26-27 … If anyone thinks himself to be religious and does not control his tongue and deludes his own heart, this person's religion is worthless.

Confidentiality is also a very important ethical topic that needs to be taught to the students and this verse summarizes its importance. Gossip and detraction are serious ethical problems in business and this Biblical principle is short, but also wakes people up to how speaking is important.

James 3:3-6 … Now if we put bits into the horses' mouths to make them obey us, we guide their whole body as well. And look at the ships. Even though they are so large and are driven by strong winds, they are still directed by a very small rudder wherever the impulse of the helmsman determines. In the same sense, the tongue is a small part of the body, and yet it boasts of great things. See how great a forest is set on fire by a small spark! And the tongue is a fire, the very world of injustice and unrighteousness; the tongue is set among our members as that which contaminates the entire body, and sets on fire the course of our life and is itself set on fire by hell.

This Bible verse is a great analogy to help students understand how a small body part (the tongue) can make a big difference in their personal and professional lives. The rudder is not something that most people pay much attention to when looking at ships, but it is very important for navigation and safety. It is also interesting that the tongue is likened to a fire as one small spark can create big problems like an entire forest fire. These analogies will help students understand the ethical importance of speaking life and navigating situations with thoughtful speech.

James 3:8-10 … But no one can tame the human tongue; it is a restless evil, full of deadly poison. With it, we bless God and with it we curse men, who have been made in the likeness of God. Out of the same mouth come both blessing and cursing. These things should not be this way.

When angry, people often use speech as a weapon with cursing or perhaps the "deadly poison" to relationships. Again, apologies might help; however, cursing people with speech is very problematic from an ethical perspective and please note that this verse also describes the fact that no one can completely tame the tongue because it is a restless evil of sorts. The point to emphasize that the blessings also come from the tongue and speech is used best when blessing others with it.

Being "Doers" of the Word

While the previous set of Biblical principles described the importance of listening and speaking, actions often speak louder than words. When students enter the business environment, it might be best for them to spend most of their time listening to the wisdom of experienced leaders and simply doing their jobs to the best of their abilities as a way to somewhat earn their way to speaking and leading.

The following verses summarize this theme as they describe the importance of being ethical with actions instead of just words:

James 1:21-22: So get rid of all uncleanness and all the remains of wickedness, and with a humble spirit receive the word of God which is implanted and able to save your souls. But prove yourselves doers of the word and not merely listeners, deluding yourselves.

Please note that the first part of this verse involves the step of getting rid of problems and "wickedness" in an individual's life before this person can effectively serve others. Having a "humble spirit" also helps both the person and the people that this person is serving. The second part of the verse emphasize the importance of not just listening to ethical lessons – the themes must be practiced and put into action! There is an expression, "I would rather experience a sermon in action than listen to a sermon" and it is interesting to note that the Bible version mentions "prove yourselves doers of the word" instead of just deluding yourselves with listening and talking. When these students enter the workforce, they will be creating a reputation with listening, speaking, and, perhaps most important, their professional and personal actions. This ethical lesson addresses their actions.

James 2:14-17 … What is the benefit, my fellow believers, if someone claims to have faith but has no good works? Can that faith save him? If a brother or sister is without clothing and lacks food for each day, and one of you says, "Go in peace, warm and feed yourselves" but he does not give them the necessities for the body, what good does that do? So too, faith, if it does not have works, is by itself dead. But someone may say, "You have faith and I have works; show me your faith without works, and I will show you my faith by my works."

This Bible verse is perhaps the most well-known verse in the Book of James, often actually used by people who do not go to church or profess their faith verbally to others. Please notice that the "benefit" to society is emphasized in the first sentence and the "faith without works is dead" theme is reflected later in these verses. Again, the importance of action over words is described when the works of feeding and clothing others is mentioned. Also, the "daily" importance of action is mentioned because others have needs every day while some people simply express their faith by going to church one day per week. The most important aspect of this verse is actually in the last sentence whereby a comparison is made between a person who simply has faith and a person who simply has works – the person with works shows faith by the works. Students will be graduating with lots of new knowledge and even perhaps a new business vocabulary. Will they have "works" to help their employer, the business community, and society as a whole? That is the ethical question that this Bible verse addresses. It is important that students be given opportunities to use their knowledge and words to serve others through actions.

Finally, it is an ethical problem of sorts if students gain knowledge and words, yet never use them to help others in need either through their job or through community service of any kind. Receiving an education is considered a "right" in our country, but there are also "responsibilities" that come along with those rights. This Biblical principle exhorts students to make the most of their opportunities to help others on a daily basis. Having a Biblical foundation as students continue their "works" throughout their college and professional careers can help them both professionally and personally.

CONCLUSIONS AND SUGGESTIONS FOR FUTURE RESEARCH

This research study builds on the literature related to how Biblical concepts affect society as a whole as well as examples of educational programs related to the Bible that affected both business leaders and students. The Book of James is one proposal of Bible verses to be used to teach important ethical lessons to students. The suggestions found in this study enhance typical ethics education. Future research could explore other books of the Bible that prescribe ethical behavior in Bible, such as Deuteronomy and Leviticus. In addition, ethical business principles in the sacred texts of other religions, such as the Torah or the Koran, could be examined. Finally, survey research focusing on students' knowledge of Biblical principles could be conducted.

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A LONGITUDINAL STUDY OF COST STRUCTURE CHOICE IN THE U.S. TRUCKING INDUSTRY AND ITS IMPACT ON LONG-TERM PROFITABILITY AND RISK, 2005-2021

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ABSTRACT: MacArthur (2006) compared a successful high fixed cost structure trucking company, J.B. Hunt Transport Services, Inc. (Hunt), with a successful high variable cost structure trucking company, Landstar Systems, Inc. (Landstar). The study presented Hunt's higher operating margin volatility over nine years (1996-2004) than Landstar that indicated Hunt's higher return potential and higher risk. Trucking companies can select a cost structure with relatively high fixed costs (e.g., Hunt) or a cost structure with relatively low fixed costs (e.g., Landstar) that facilitates a comparison of the profitability and risk of both types of cost structure. Two further studies provided statistical evidence of a positive relationship between U.S. trucking firms' cost structure choice and stock Betas. This longitudinal study extends MacArthur (2006) for a further 17 years, from 2005-2021, and it also incorporates the account analysis approach to separate variable and fixed costs for Hunt and Landstar, to facilitate a more extensive profitability and CVP comparative analysis of the two trucking companies over the U.S. economy's ups and downs over the longer 17-year period. For example, the 2005-2021 period includes both Democratic and Republican Administrations, the "Great Recession" period (2007-2009), and the first two years of the Covid-19 Pandemic period (2020-2021) that likely impacted the fortunes of companies in the important U.S. trucking industry. Over the 17-year period, Hunt had only one year with a decline from the prior year in producer price index adjusted total operating revenues versus seven years of decline from the prior year for Landstar. Also, the longitudinal analysis shows Hunt to more profitable than Landstar in all 17 years, inter alia, because of Hunt's generally increasing total operating revenues and uniformly greater degree of operating leverage, but with more risk than Landstar in terms of some common CVP analysis measures.

Key Words: cost structure choice; longitudinal study; U.S. trucking industry; long-term profitability; risk; CVP analysis.

INTRODUCTION

This longitudinal investigation of cost structure choice in the U.S. trucking industry and its impact on long-term profitability extends earlier research studies

(MacArthur, 2006; MacArthur, Holmes, and Stranahan, 2008 [MHS]; Holmes, MacArthur, and Stranahan, 2012 [HMS]). The latter two studies, MHS and HMS, were closely related. MHS provided preliminary statistical evidence, and HMS provided further statistical evidence, of a positive relationship between U.S. trucking firms' cost structure choice and stock *Betas*. In MHS, forty-one publicly listed trucking companies were included in the statistical tests over the 2001-2006 period. In HMS, twenty-three publicly listed trucking firms had sufficient data for the statistical tests over the extended 1994-2006 period.

On the other hand, MacArthur (2006) compared a successful high fixed cost structure trucking company, J.B. Hunt Transport Services, Inc. (Hunt), with a successful high variable cost structure trucking company, Landstar Systems, Inc. (Landstar). "Freight bellwether" was used to describe Hunt (Smith, 2021) that indicates its leadership role in the trucking industry. MacArthur (2006) presented Hunt's higher operating margin volatility over nine years (1996-2004) than Landstar that indicated Hunt's higher return potential and higher risk. Also, MacArthur (2006) used least-squares regression analysis to identify average variable costs and average fixed costs over the nine-year period in order to estimate Hunt's and Landstar's average contribution margin percentage, average degree of operating leverage (DOL), and the average margin of safety in sales dollars (MOS $), and as a percentage of sales dollars (MOS %) ("sales dollars" was used interchangeably with "total operating revenues" in MacArthur, 2006). As expected, the CVP analysis results showed that Hunt had a much higher average DOL (3.5), and average breakeven point ($1,390,299), and lower average MOS $ ($563,455) and MOS % (28.8%), than Landstar's average DOL (1.9), average breakeven point ($651,950), average MOS $ ($707,534), and average MOS % (52%). Interestingly, the average operating margin percentage of Hunt (5.4%) and Landstar (5.2%) over the nine-year period were very close despite the greater volatility of Hunt's operating margin percentages (MacArthur, 2006, 33).

This study extends MacArthur (2006) for a further 17 years, from 2005-2021, but it incorporates the account analysis approach used in HMS to separate variable and fixed costs for Hunt and Landstar, to facilitate a more extensive profitability and CVP analysis over the longer 17-year period. The 2005-2021 period includes both Democratic and Republican Administrations, the "Great Recession" period (2007-2009), and the first two years of the Covid-19 Pandemic period (2020-2021).

The profitability and CVP calculations were conducted both on nominal, unadjusted data, and data adjusted for "General Freight trucking, long-distance, truckload" (Industry code 484121) producer price indexes over the 17-year period that were obtained from the U.S. Bureau of Labor Statistics (2022). For each year, the "General Freight trucking, long-distance, truckload" producer price index (hereafter, shortened to PPI index) was used because both Hunt and Landstar

mainly handle truckload (TL), also called full-truckload (FTL), shipments, and fewer less-than-truckload (LTL) shipments (HMS, 1185). For each of the 17 years, the PPI index used to adjust the nominal data was the average of the index for the beginning and end of the year in question, as the accounting numbers are for a 12-month period. For the 2021 fiscal year, for example, the PPI indices for December 2020 and December 2021 were added together and the sum was divided by 2. Hunt's consolidated statements of earnings for fiscal years 2005-2021 were obtained from its Form 10-K Annual Reports via URL https://www.sec.gov/edgar/browse/?CIK=0000728535&owner=include, with its fiscal years ending date uniformly on December 31. Landstar's consolidated statements of income for fiscal years 2005-2021 were obtained from its Form 10-K Annual Reports via URL https://investor.landstar.com/sec-filings, with its fiscal year ending dates ranging from December 25 to December 31.

HUNT'S VERSUS LANDSTAR'S COST STRUCTURE

Hunt (2022, 97) states that its five business segments "include Intermodal (JBI), Dedicated Contract Services® (DCS®), Integrated Capacity Solutions™ (ICS), Final Mile Services® (FMS) and Truckload (JBT)." Hunt mainly uses its own trucks, trailers, and drivers, but it also uses customer-owned trucks, and independent contractor trucks in segments to varying degrees. As will be illustrated later, Hunt has a cost structure with high fixed costs. For example, regarding its largest operating segment by operating revenue and operating income, JBI, Hunt (2022, 98) states: "The origin and destination pickup and delivery services (drayage) are handled by our company-owned tractors for the majority of our intermodal loads, while third party dray carriers are used where economical." Also, in regard to the operating segment with the second highest operating revenue and operating income, DCS, Hunt (2022, 99) states:

> At December 31, 2021, this segment operated 11,139 company-owned trucks, 544 customer-owned trucks, and 6 independent contractor trucks. DCS also operates 21,069 owned pieces of trailing equipment and 7,753 customer-owned trailers. The DCS segment employed 14,709 people, including 12,632 drivers, at December 31, 2021. DCS revenue for 2021 was $2.58 billion.

On the other hand, Landstar (2022, 3) states that it "is a worldwide technology-enabled, asset-light provider of integrated transportation management solutions." Landstar explains how it operates as an "asset light," low fixed cost trucking company in the following way (Landstar, 2022, 3):

> Landstar markets its integrated transportation management solutions primarily through independent commission sales agents and exclusively utilizes third party capacity providers to transport customers' freight.

> Landstar's independent commission sales agents enter into contractual arrangements with the Company and are responsible for locating freight, making that freight available to Landstar's capacity providers and coordinating the transportation of the freight with customers and capacity providers. The Company's third[-]party capacity providers consist of independent contractors who provide truck capacity to the Company under exclusive lease arrangements (the "BCO [Business Capacity Owners] Independent Contractors"), unrelated trucking companies who provide truck capacity to the Company under non-exclusive contractual arrangements (the "Truck Brokerage Carriers"), air cargo carriers, ocean cargo carriers and railroads.

Landstar (2022, 6) states that its "use of capacity provided by third parties allows it to maintain a lower level of capital investment, resulting in lower fixed costs."

Clearly, these two companies in the same industry, Hunt and Landstar, continue to have different strategic choices regarding the composition of their cost structure. This paper seeks to determine which of these two cost structures has been the most successful over the 17-year period, 2005-2021, in terms of long-term profitability and risk using some common CVP analysis measures. First, it is necessary to identify the estimated variable and fixed costs for the fiscal years 2005-2021 in order to calculate the estimated contribution margins and to perform CVP analysis. The way variable and fixed costs are estimated for Hunt and Landstar is explained next.

ESTIMATING VARIABLE AND FIXED COSTS USING THE ACCOUNT ANALYSIS METHOD

For Hunt, rents and purchased transportation, fuel and fuel taxes, and operating supplies and costs, were identified by the author as the most likely accounts to be strictly variable or predominantly variable. Hunt's remaining accounts, salaries, wages and employee benefits, depreciation and amortization, insurance and claims, operating taxes and licenses, general and administration costs, and communication and utilities, were identified by the author as most likely to be fixed or predominantly fixed costs. These variable and fixed cost classifications are the same as used in HMS that also used the account analysis approach to classify Hunt's accounts, but for its 2008 fiscal year only.

It is interesting to note that Landstar (2022, 28) provided the "variable contribution" (aka, contribution margin) and "variable contribution margin" (aka, contribution margin ratio) in its 2021 Form 10-K, probably for the first time (the term "variable contribution" was not found in a word search of prior Form 10-K annual reports, 2005-2020). The company supported their inclusion, although they

are “each non-GAAP financial measures,” in the following way (Landstar, 2022, 28):

> The Company believes variable contribution and variable contribution margin are useful measures of the variable costs that we incur at a shipment-by-shipment level attributable to our transportation network of third-party capacity providers and independent commission sales agents in order to provide services to our customers. The Company believes variable contribution and variable contribution margin are important performance measurements and management considers variable contribution and variable contribution margin in evaluating the Company’s financial performance and in its decision-making, such as budgeting for infrastructure, trailing equipment and selling, general and administrative costs.

A word search of Landstar’s 2021 Form 10-K identified the term “variable contribution” or “variable contribution margin” 37 times, “variable cost,” nine times, and semi-variable costs” one time. The terms “contribution margin,” “semi-variable costs,” “semi-fixed costs,” “variable contribution,” “variable contribution margin,” and “variable costs,” were not found in a word search of Hunt’s 2021 Form 10-K.

For Landstar, the author naturally followed the variable costs and “other costs” (assumed to represent mainly fixed costs) classifications used by Landstar in its 2021 Form 10-K that states the following regarding its cost classification (Landstar, 2022, 28):

> Costs of revenue include variable costs of revenue and other costs of revenue. Variable costs of revenue include purchased transportation and commissions to agents, as these costs are entirely variable on a shipment-by-shipment basis. Other costs of revenue include fixed costs of revenue and semi-variable costs of revenue, where such costs may vary over time based on certain economic factors or operational metrics such as the number of Company-controlled trailers, the number of BCO Independent Contractors, the frequency and severity of insurance claims, the number of miles traveled by BCO Independent Contractors, or the number and/or scale of information technology projects in process or in-service to support revenue generating activities, rather than on a shipment-by-shipment basis.

Elsewhere, “purchased transportation and commissions to agents” are described as “purely variable costs” (Landstar, 2022, 30). In HMS, “other operating costs” were included by the authors as variable costs, along with “purchased transportation and commissions to agents,” but are classified as fixed costs in this study. Possibly,

this account includes some of the "semi-variable costs of revenue" mentioned by Landstar (2022, 28) that is reproduced above.

A sample of Hunt's and Landstar's PPI index adjusted (real) estimated contribution margin income statements, along with their corresponding profitability and CVP calculations, are shown in Table 1 and Table 2, respectively. A simple average of the 17 years contribution income statements is shown in the "Average" column, and the first year (2005) and final year (2021) contribution margin income statements are shown in the next two columns, respectively. The final column presents the percentage changes in revenues and costs from the first year, 2005, compared with the final year, 2021.

Unless otherwise stated, this paper discusses the PPI index adjusted contribution margin income statements shown in Table 1 and Table 2, but, for reader information, the unadjusted (nominal) estimated contribution margin income statements, along with their corresponding profitability and CVP calculations, are shown in Appendix 1 and Appendix 2 for Hunt and Landstar, respectively. Of course, the profitability percentages and CVP ratios and percentages are the same using either the PPI index adjusted or unadjusted contribution margin income statement numbers.

PROFITABILITY ANALYSIS

As expected, Hunt had higher estimated contribution margin ratios than Landstar for the entire 17-year period, 2005-2021, as it has a lower proportion of variable costs than Landstar. This is illustrated in the average 2005 and 2021 contribution margin income statements shown in Tables 1 and 2 and Appendices 1 and 2. The range of Hunt's estimated contribution margin ratios is 38.0% (in 2013) to 49.5% (in 2005), versus Landstar's estimated contribution margin ratios range of 14.0% (in 2021) to 17.3% (in 2005).

It is interesting to note that Hunt's estimated total variable costs are 201.0% greater in 2021 than in 2005 mainly because of increased "rents and purchased transportation" costs that are 294.4 percent greater (Table 1). It appears that Hunt increasingly used non-company owned trucks, driven by non-company drivers, as the "rents and purchased transportation" costs generally increased over the 17-year period. Hunt's total operating revenues (hereafter, shortened to revenues) increased by a lower 151.8 percent (Table 1). In comparison, Landstar's estimated total variable costs adjusted increased by a lower percentage than Hunt (74.6 percent), and its revenues also increased by a lower percentage than Hunt (67.9 percent) (Table 2). When comparing fiscal years 2005 and 2021, Hunt's estimated total fixed costs also increased by a much greater percentage (107.4%, Table 1) than Landstar's estimated total fixed costs (12.8%, Table 2).

TABLE 1: HUNT'S 2005, 2021, AND AVERAGE 2005-2021 CONTRIBUTION MARGIN INCOME STATEMENTS AND CVP RESULTS, PPI INDEX ADJUSTED NUMBERS

Hunt (Real Numbers)	Average	2005	2021	2021-2005 % Change
	$'000	$'000	$'000	
Operating revenues, excluding FSR	$4,190,575	$2,705,355	$6,845,798	153.0%
Fuel surcharge revenues (FSR)	618,773	325,555	785,752	141.4%
Total operating revenues (TOR)	4,809,348	3,030,910	7,631,550	151.8%
Variable costs				
Rents and purchased transportation	2,287,673	1,025,587	4,044,639	294.4%
Fuel and fuel taxes	346,331	376,901	332,801	-11.7%
Operating supplies and costs	177,567	128,774	231,609	79.9%
Total variable costs	2,811,571	1,531,262	4,609,049	201.0%
Contribution margin (CM)	1,997,777	1,499,648	3,022,501	101.5%
Fixed costs				
Salaries, wages and employee benefits	1,108,404	828,752	1,732,033	109.0%
Depreciation and amortization	248,930	157,979	349,390	121.2%
Insurance and claims	69,139	53,552	103,515	93.3%
Operating taxes and licenses	32,596	34,716	37,293	7.4%
General and administration costs[1,2]	66,040	44,515	122,684	175.6%
Communication and utilities	19,221	21,896	21,866	-0.1%
Total fixed costs (TFC)[3]	1,544,330	1,141,410	2,366,781	107.4%
Operating income (OI)	$453,447	$358,238	$655,720	83.0%
Profitability Analysis				
Contribution margin ratio (CMR) (CM ÷ TOR)	41.4%	49.5%	39.6%	-20.0%
Operating income margin (OI ÷ TOR)	9.3%	11.8%	8.6%	-27.3%
CVP (Risk-Return) Analysis				
Breakeven point in TOR (BER) (TFC ÷ CMR)	$3,717,742	$2,306,883	$5,975,912	159.0%
Margin of safety in TOR (MOS) (TOR - BER)	$1,091,606	$724,027	$1,655,638	128.7%
MOS percentage (MOS ÷ TOR)	22.6%	23.9%	21.7%	-9.2%
Degree of operating leverage (CM ÷ OI)	4.4	4.2	4.6	10.1%

Notes

[1] Net of gains on asset dispositions (2005-2006).

[2] Net of asset dispositions (2007-2021).

[3] Excludes Arbitration settlement (2005).

TABLE 2: LANDSTAR'S 2005, 2021, AND AVERAGE 2005-2021 CONTRIBUTION MARGIN INCOME STATEMENTS AND CVP RESULTS, PPI INDEX ADJUSTED NUMBERS

Landstar (Real Numbers)	Average $'000	2005 $'000	2021 $'000	2021-2005 % Change
Revenue	$2,656,758	$2,439,756	$4,100,143	68.1%
Investment income[1]	2,221	2,611	1,792	-31.4%
Total operating revenues (TOR)[2]	2,658,979	2,442,367	4,101,935	67.9%
Variable costs				
Purchased Transportation	2,033,752	1,822,123	3,207,747	76.0%
Commissions to Agents	212,990	197,413	318,104	61.1%
Total Variable Costs	2,246,742	2,019,536	3,525,851	74.6%
Contribution Margin (CM)	412,237	422,831	576,084	36.2%
Fixed costs				
Other operating costs[3,4,5]	25,869	35,571	22,911	-35.6%
Insurance and claims	46,429	48,610	66,143	36.1%
Selling, general and administrative	127,359	129,927	138,778	6.8%
Depreciation and amortization	24,847	15,426	31,113	101.7%
Total fixed costs (TFC)[6]	224,504	229,534	258,945	12.8%
Operating income (OI)	187,733	$193,297	$317,139	64.1%
Profitability Analysis				
Contribution margin ratio (CMR) (CM ÷ TOR)	15.4%	17.3%	14.0%	-18.9%
Operating income margin (OI ÷ TOR)	7.1%	7.9%	7.7%	-2.3%
CVP (Risk-Return) Analysis				
Breakeven point in TOR (BER) (TFC ÷ CMR)	$1,448,077	$1,325,844	$1,843,789	39.1%
Margin of safety in TOR (MOS) (TOR - BER)	$1,210,903	$1,116,523	$2,258,145	102.2%
MOS percentage (MOS ÷ TOR)	46.0%	45.7%	55.1%	20.4%
Degree of operating leverage (CM ÷ OI)	2.2	2.2	1.8	-17.0%

Notes

[1] Landstar includes "Investment income" in calculating "Operating income."
[2] "Total operating revenues" is not reported by Landstar.
[3] Net of gains/losses on asset dispositions (2013-2014).
[4] Net of gains on asset sales/dispositions (2015-2019, and 2021).
[5] Net of gains/losses on asset sales/dispositions (2020).
[6] Excludes Impairment of intangible and other assets and Commission program termination costs (2020).

Hunt 2022 (page 113) states the following regarding some of the increases in its 2021 fiscal year costs:

> Rents and purchased transportation costs increased 30.2% in 2021, primarily due to increased third-party rail and truck purchased transportation rates in JBI and ICS, increased ICS load volume, and an increase in the use of third-party truck carriers by JBT and FMS during 2021. Salaries, wages and employee benefit costs increased 17.6% in 2021 from 2020. This increase was primarily related to increases in driver pay and office personnel compensation due to a tighter supply of qualified drivers, a trend we anticipate continuing, and an increase in the number of employees as well as an increase in incentive compensation compared to 2020. Depreciation and amortization expense increased 5.6% in 2021, primarily due to equipment purchases related to new DCS long-term customer contracts, the addition of trailing equipment and scheduled turnover of tractors within JBI, higher trailer counts in JBT, and increased capital investments in information technology.

As discussed earlier, evidently Hunt increasingly used third-party transportation over the 17 years, even though it still predominantly used its own trucks and truck drivers. Interestingly. Hunt has one variable cost that Landstar does not have, namely, "fuel and fuel taxes," as Hunt owns many tractors, but Landstar owns none and uses purchased transportation only.

Also, Hunt had higher operating income margin percentages than Landstar for the entire 17-year period, 2005-2021, with the smallest differences in the most recent fiscal years 2018 (0.7%), 2019 (0.7%), 2020 (0.8%), and 2021 (0.9%) and the largest differences in 2005 (3.9%) and 2015 (4.3%), with an average difference of 2.4% (Table 3). Hunt clearly benefited from its mostly increasing revenues over the 17-year period and the multiplier effect of its much higher DOL than Landstar in every year (see Tables 1 and 2; Appendices 1 and 2). For example, a hypothetical 10 percent increase in Hunt's revenues would generate an average (4.4 x 10% =) 44 percent increase in operating income versus only an average (2.2 x 10% =) 22 percent increase in Landstar's operating income, using the estimated average DOL presented in Table 1 and Appendix 1 for Hunt, and Table 2 and Appendix 2 for Landstar.

During the 17-year period, Hunt's estimated revenues declined from the prior year in 2009 only, which is the last year of the "Great Depression" period, but Landstar's revenues declined from the prior year in seven years, 2006, 2007, 2009, 2013, 2016, 2019, and 2020 (Table 3). Landstar experienced a very large increase in its revenues in 2021 over 2020 (36.9 percent, Table 3) that was directly linked to the nation beginning to recover from the Covid-19 Pandemic. For example,

Landstar (2022, 31) stated that the "significant, rapid decrease in demand early in the pandemic was followed by a substantially longer and greater sequential increase in demand that was unprecedented in the history of the Company." Hunt experienced a smaller increase in its revenues in 2021 over 2020 (9.4 percent), but this was still its fourth highest percentage increase in revenues over the 2005-2021 period (Table 3). However, in nominal terms, Hunt's revenues increase in 2021 over 2020 was its biggest percentage increase (26.3 percent) in the 2005-2021 period.

TABLE 3: HUNT AND LANDSTAR OPERATING MARGIN PERCENTAGES (OM%) AND REVENUES (PPI INDEX ADJUSTED), 2005-2021

	1	2	3	4	5	6	7
Year	**Hunt OM%**	**Landstar OM%**	**Difference (1 - 2)**	**Hunt Revenues[1]**	**Percentage Change**	**Landstar Revenues[2]**	**Percentage Change**
2005	11.8%	7.9%	3.9%	$3,030,910		$2,442,367	
2006	11.2%	7.6%	3.6%	$3,119,414	2.9%	$2,360,197	-3.4%
2007	10.6%	7.4%	3.2%	$3,208,051	2.8%	$2,291,317	-2.9%
2008	9.6%	7.1%	2.5%	$3,406,641	6.2%	$2,415,729	5.4%
2009	7.7%	5.7%	2.1%	$2,975,943	-12.6%	$1,867,386	-22.7%
2010	9.2%	5.8%	3.3%	$3,484,063	17.1%	$2,205,827	18.1%
2011	9.8%	6.9%	2.9%	$3,958,134	13.6%	$2,317,768	5.1%
2012	10.5%	7.4%	3.1%	$4,234,434	7.0%	$2,341,289	1.0%
2013	10.3%	6.6%	3.7%	$4,613,522	9.0%	$2,202,645	-5.9%
2014	10.2%	7.0%	3.2%	$5,041,721	9.3%	$2,605,456	18.3%
2015	11.6%	7.3%	4.3%	$5,093,664	1.0%	$2,735,068	5.0%
2016	11.0%	7.0%	4.0%	$5,515,598	8.3%	$2,666,431	-2.5%
2017	8.7%	6.7%	2.0%	$5,977,137	8.4%	$3,033,527	13.8%
2018	7.9%	7.2%	0.7%	$6,682,313	11.8%	$3,582,796	18.1%
2019	8.0%	7.3%	0.7%	$6,806,924	1.9%	$3,037,309	-15.2%
2020	7.4%	6.6%	0.8%	$6,978,906	2.5%	$2,995,609	-1.4%
2021	8.6%	7.7%	0.9%	$7,631,550	9.4%	$4,101,935	36.9%
Average	9.4%	7.1%	2.4%	$4,809,348		$2,658,980	

Notes

[1] Hunt Revenues = Total operating revenues (PPI index adjusted).

[2] Landstar Revenues = Total operating revenues (PPI index adjusted).

COST-VOLUME-PROFIT (RISK-RETURN) ANALYSIS

Three common CVP analysis models, DOL, breakeven point in revenues, margin of safety (MOS) in revenues, and MOS percentage, are considered next. They are used to highlight the greater risk that accompanies the greater return potential of Hunt's versus Landstar's cost structure.

Degree of Operating Leverage

As well as enhancing profitability, Hunt's uniformly higher DOL than Landstar's DOL (e.g., Table 1 and Table 2, respectively) contributed to significantly higher volatility in operating income during the 2005-2021 period. The Microsoft Excel "F-Test Two Sample Variances" was used to test the null hypothesis that Hunt and Landstar had equal variances during the research 17-year period. As expected, Hunt's variance of 0.000198 is greater than Landstar's variance of 0.0000366 (3.66E-05) in the F-Test results. Also, in the F-Test output, the "F" value (5.418744) is greater than the "F Critical one-tail" value (2.3333484) and the "P(F<=) one-tail" value is 0.000792 that is less than 0.001, therefore the null hypothesis of equal variances can be rejected at the 0.001 significance level. The F-Test results support the hypothesis that Hunt's variance is significantly greater than Landstar's variance that is consistent with Hunt having the riskier cost structure.

Breakeven Point in Revenues

Hunt's breakeven point in revenues (e.g., Table 1) was uniformly higher than Landstar's (e.g., Table 2) over the 17-year period but this is to be expected as Hunt's revenues were also uniformly higher over the 2005-2021 period. However, Hunt's breakeven revenues were always higher than Landstar's breakeven revenues by a higher percentage than Hunt's revenues were of Landstar's revenues. For example, using PPI index adjusted numbers, Hunt's average revenues were 80.9 percent higher than Landstar's average revenues, but Hunt's average breakeven revenues were 156.7 percent higher than Landstar's average breakeven revenues that is a 75.8 percent difference. The highest percentage difference was 138.1 percent (in 2021) and the lowest percentage difference was 32.8% (in 2010), in both PPI adjusted and nominal terms. Because of Hunt's proportionately higher fixed costs than Landstar, it took proportionately more revenues to breakeven that indicates Hunt's inherent greater riskiness from its cost structure.

Margin of Safety in Absolute and Relative Terms

Landstar's margin of safety (MOS) percentage (e.g., Table 2) is uniformly greater that Hunt's (e.g., Table 1), ranging from 1.6 times larger to 2.5 times larger, with an average of 2.0 times larger. Also, despite having uniformly lower revenues, Landstar's MOS is larger than Hunt's even in absolute revenue terms for eleven of the seventeen years (2005-2010 and 2017-2021). This indicates the greater risk of Hunt's revenues falling below the level needed to breakeven when revenues are falling. Continuing the earlier example, a hypothetical 10 percent decrease in Hunt's revenues would generate an average (4.4 x -10% =) 44 percent decrease in operating income versus only an average (2.2 x -10% =) 22 percent decrease in Landstar's operating income, using the average DOL presented in Table 1 and Appendix 1 for Hunt and Table 2 and Appendix 2 for Landstar.

FINAL THOUGHTS

During the 2005-2021 period, Hunt's operating income benefited from its much higher DOL than Landstar, provided by Hunt's greater proportion of fixed costs in its cost structure, as its revenues increased in all but one of the 17 years, 2005-2021. Hunt was more profitable than Landstar in all 17 years with its consistently higher DOL multiple helping to generate higher operating income margin percentages than Landstar. The greater return achieved by Hunt was accompanied by higher risk. For example, Hunt had a proportionally higher breakeven point in revenues and a lower margin of safety ratio than Landstar.

In future years, if revenues of both Hunt and Landstar are on a downward trend, Landstar may become more profitable than Hunt. Landstar has a less risky cost structure than Hunt, with relatively higher variable costs and relatively lower fixed costs that result in Landstar having lower operating income volatility.

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APPENDIX 1: HUNT'S 2005, 2021, AND AVERAGE 2005-2021 CONTRIBUTION MARGIN INCOME STATEMENTS AND CVP RESULTS, UNADJUSTED NOMINAL NUMBERS

Hunt (Nominal Numbers)	Average	2005	2021	2021-2005 %
	$'000	$'000	$'000	Change
Operating revenues, excluding FSR	$5,213,888	$2,791,926	$10,915,442	291.0%
Fuel surcharge revenues (FSR)	758,115	335,973	1,252,860	272.9%
Total operating revenues (TOR)	5,972,003	3,127,899	12,168,302	289.0%
Variable costs				
Rents and purchased transportation	2,869,058	1,058,406	6,449,068	509.3%
Fuel and fuel taxes	413,610	388,962	530,642	36.4%
Operating supplies and costs	218,164	132,895	369,294	177.9%
Total variable costs	3,500,832	1,580,263	7,349,004	365.0%
Contribution margin (CM)	2,471,171	1,547,636	4,819,298	211.4%
Fixed costs				
Salaries, wages and employee benefits	1,373,422	855,272	2,761,680	222.9%
Depreciation and amortization	307,959	163,034	557,093	241.7%
Insurance and claims	85,482	55,266	165,052	198.7%
Operating taxes and licenses	39,611	35,827	59,462	66.0%
General and administration[1,2]	83,631	45,939	195,616	325.8%
Communication and utilities	23,310	22,597	34865	54.3%
Total fixed costs (TFC)[3]	1,913,415	1,177,935	3,773,768	220.4%
Operating income (OI)	557,756	$369,701	$1,045,530	182.8%
Profitability Analysis				
Contribution margin ratio (CMR) (CM ÷ TOR)	41.4%	49.5%	39.6%	-20.0%
Operating Income margin (OI ÷ TOR)	9.3%	11.8%	8.6%	-27.3%
CVP (Risk-Return) Analysis				
Breakeven point in TOR (BER) (TFC ÷ CMR)	$4,624,093	$2,380,703	$9,528,431	300.2%
Margin of safety in TOR (MOS) (TOR - BER)	$1,347,910	$747,196	$2,639,871	253.3%
MOS percentage (MOS ÷ TOR)	22.6%	23.9%	21.7%	-9.2%
Degree of operating leverage (CM ÷ OI)	4.4	4.2	4.6	10.1%

Notes

[1] Net of gains on asset dispositions (2005-2006).

[2] Net of asset dispositions (2007-2021).

[3] Excludes Arbitration settlement (2005).

APPENDIX 2: LANDSTAR'S 2005, 2021, AND AVERAGE 2005-2021 CONTRIBUTION MARGIN INCOME STATEMENTS AND CVP RESULTS, UNADJUSTED NOMINAL NUMBERS

Landstar (Nominal Numbers)	Average $'000	2005 $'000	2021 $'000	2021-2005 % Change
Revenue	$3,256,960	2,517,828	6,537,568	159.7%
Investment income[1]	2,652	2,695	2,857	6.0%
Total operating revenues (TOR)[2]	3,259,613	2,520,523	6,540,425	159.5%
Variable costs				
Purchased Transportation	2,496,364	1,880,431	5,114,667	172.0%
Commissions to Agents	261,167	203,730	507,209	149.0%
Total Variable Costs	2,757,532	2,084,161	5,621,876	169.7%
Contribution Margin (CM)	502,081	436,362	918,549	110.5%
Fixed costs				
Other operating costs[3,4,5]	30,745	36,709	36,531	-0.5%
Insurance and claims	56,817	50,166	105,463	110.2%
Selling, general and administrative	153,293	134,085	221,278	65.0%
Depreciation and amortization	30,504	15,920	49,609	211.6%
Total fixed costs (TFC)[6]	271,360	236,880	412,881	74.3%
Operating income (OI)	$230,722	$199,482	$505,668	153.5%
Profitability Analysis				
Contribution margin ratio (CMR) (CM ÷ TOR)	15.4%	17.3%	14.0%	-18.9%
Operating income margin (OI ÷ TOR)	7.1%	7.9%	7.7%	-2.3%
CVP (Risk-Return) Analysis				
Breakeven point in TOR (BER) (TFC ÷ CMR)	$1,761,722	$1,368,271	$2,939,873	114.9%
Margin of Safety in TOR (MOS) (TOR - BES)	$1,497,891	$1,152,252	$3,600,552	212.5%
MOS percentage (MOS ÷ TOR)	46.0%	45.7%	55.1%	20.4%
Degree of operating leverage (CM ÷ OI)	2.2	2.2	1.8	-17.0%

Notes

[1] Landstar includes "Investment income" in calculating "Operating income."
[2] "Total operating revenues" is not reported by Landstar.
[3] Net of gains/losses on asset dispositions (2013-2014).
[4] Net of gains on asset sales/dispositions (2015-2019, and 2021).
[5] Net of gains/losses on asset sales/dispositions (2020).
[6] Excludes Impairment of intangible and other assets and Commission program termination costs (2020).

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UNPREDICTABLE SHORT ATTACK: THREE CASES WITH DIFFERENT OUTCOMES

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ABSTRACT

Short attacks are not always successful. They can be total busts, or they can instill even greater investor confidence, giving the target company a boost. It is difficult to predict how investors will react. This paper presents three cases of short attack that have very different outcomes. Short sellers successfully exposed the fraudulent nature of Luckin Coffee, causing its stock to plummet and be delisted from NASDAQ. GSX not only survived the short attacks, its stock price soared to all-time highs. Kasen International Holdings stock price recovered from the initial 90% slump and surged 472% the next day after Kasen published its rebuttal. Since the ultimate objective of short sellers is to cause stock price to fall and profit from it, their interest may not be aligned with those of shareholders. Their reports may not be independent, unbiased, or even accurate. It is up to readers to interpret their findings.

Key Words: short attack, short selling, short sale, earnings manipulation

INTRODUCTION

This paper presents three cases of short attack to illustrate that it is difficult to predict if short attacks will be successful in driving down target companies' stock prices so that short sellers could profit from it. To some extent these three cases bring up the following questions: Did the short sellers perform due diligence in gathering evidence and conduct a thorough investigation before they made their allegations public? Or was the short selling predatory, with an objective of using false and misleading information simply to damage target company's reputation so that the short sellers could profit from the slumping stock price? Even if the short sellers' intention was not to conduct a smear campaign, conclusions could have been drawn from inaccurate information that led to damages to the target company's reputation. It is up to readers to interpret the evidence presented by short sellers and the counter-arguments made by target companies.

The three cases are interesting in that the effect of short sellers' reports on these three target companies' stocks are all very different. Luckin Coffee denied the short sellers' allegations at first, but eventually admitted that fraud has been committed in its financial reporting. Its stock was eventually delisted from

NASDAQ. The short attack was successful in this case, and a fraudulent company was cleaned off the market. The case of GSX was completely opposite. Although several reputable short sellers alleged that the success of GSX was based on a fraudulent scheme, investors did not seem to believe the allegations. Stock price reached all-time highs instead. The short attack did not succeed. In the third case, investors of Kasen International Holdings reacted negatively initially to the short seller's report. Stock price plunged at first. But when Kasen refuted the allegations in a well-documented report, stock price surged. It appeared that grave mistakes had been committed by the short seller's investigators, and the allegations were based on inaccurate information. It is also possible that the short seller's motive was simply to damage Kasen's reputation and profit from the resulting decline in stock price. If that was true, the short seller's action could be considered successful, but not ethical.

SHORT SELLING

Short sellers, either individuals or institutions, borrow shares of stock, typically from their brokers, and sell those shares at market price. The objective is to gain profit by re-purchasing the same shares of stock at a lower price in the future and returning the borrowed shares to the lenders. These short sellers retain services of forensic accountants, private detectives, investigative journalists, and others to do in-depth research, and to find targets, usually listed companies, that they allege have dodgy business or accounting. They issue a very detailed investigative short seller report (short attack). The market will react after the issuance of the reports, generally with the target companies' stock price plummeting, which gives short sellers an opportunity to make profits.

The detailed and in-depth reports are often regarded as the highest-quality research in the market. However, since the ultimate objective of short sellers is to cause the stock price to fall and profit from it, their interest may not be aligned with that of shareholders in general. The reports may be published with the intention of undermining investor confidence in the company and its management, and to harm its reputation. As such, the investigations may not be independent or unbiased. It is up to investors to interpret the findings presented in the report.

Studies on Short Selling

Short sellers are generally considered to be speculators seeking a profit. It is popularly believed that short selling is questionable and a form of stock market manipulation. A particularly flagrant form of stock manipulation is known as bear raid, in which a certain stock is sold short in an effort to drive down the price of the security. For instance, a short seller can spread false rumors about a firm. He then places himself in a position to acquire the stocks at artificially deflated prices. Such "distort and short" activity undermines investors' confidence in financial markets and decrease market liquidity (Karpoff and Lou, 2010).

On the other hand, short selling can also confer a number of economic benefits

on markets. Investors who believe that a stock is overvalued may short-sell in an attempt to make a profit from the difference between the stock price and its actual value. These short sellers increase the efficiency of stock pricing and the price discovery because their transactions inform the market of their unfavorable information, and this assessment is reflected in the resulting market price. They improve efficiency by speeding up the discovery of financial misrepresentation, bringing mispriced securities closer to their fundamentals (Boehmer and Wu, 2013), and stabilizing the market (Li and Yuan, 2020). Short sellers can also help expose violations of financial reporting (Einhorn, 2008). Indeed, studies find that they are proficient at identifying earnings manipulation, financial misrepresentation, and even fraud before they are revealed to the investing public (Christophe et al., 2004; Desai et al., 2006; Karpoff and Lou, 2010).

Studies also find that short-selling directly influence the behavior of firm managers. As short sellers increase price informativeness and combat company misconduct, the speed with which the market uncovers earnings management increases. Consequently, short selling inhibits managers' incentive to manipulate earnings (Fang et al., 2016). In this sense, short selling functions as an external governance mechanism to discipline managers (Massa et al., 2015), reducing the probability of financial restatements (Chen and Liu, 2014; Zhang et al., 2016). Li et al. (2019) also find that short selling promotes corporate innovation by reducing corporate information asymmetry and improving the efficiency of managerial contract. Their results indicate that short-selling is a necessary complementary mechanism of firms' corporate governance system.

HOW FORENSIC ACCOUNTANTS CONTRIBUTE

While short seller companies utilize the investigative skills and knowledge of forensic accountants to expose alleged deceptive behaviors of target companies, defending parties also enlist the same professionals to fight off the allegations and protect their reputations. Therefore, the role of forensic accountants is equally important on both sides of the battle.

When a company is attacked by short sellers, it usually launches an independent investigation to assess the accuracy of the charges. The independent investigation will typically be conducted by a law firm that, in turn, retains a forensic accounting firm to help with the investigation. Forensic accountants apply their accounting knowledge and investigative skills to find out if the allegations are out-right wrong, inaccurate, or if the short sellers simply do not have a good understanding of the target company's industry, resulting in biased or incomplete allegations. They will then be able to formulate their rebuttals to rebuild investor confidence. But if they discover evidence of concerns that rise to the level of materiality, they will then try to determine whether the incident is a single independent event, involving a small number of employees, or if it is a systemic problem. Any significant or material allegations will be raised to the level of the board and the audit committee.

Forensic accountants conduct interviews, talking to anyone in the organization who is connected to the incident being investigated. They obtain information from

the interviewees to uncover where mistakes may have been made or fraud may have been perpetrated. They also look into whether any clients have any secret relationships with high-level management of the company. They could even elicit a confession from the interviewee to help build the case.

Records forensic accountants examine could include bank records, tax receipts, journal entries, land certificates, annual reports, human resource records, contracts, and others. Forensic accountants focus on detecting any unusual or unreasonable transactions. For instance, if they want to find out whether sales have been overstated, they compare records on both purchases and sales to see if they match. They check if there are invoices for any single buyer or seller that are in sequential orders. They probe into clients' contracts to check for exceptional provisions.

In addition to examining the target company's internal documents, forensic accountants compare the company's performance in relation to that of competitors and industry trend. For example, is the company's sale growth, gross profit margin, etc., reasonable? If obvious deviation is detected, the forensic accountants meet with management to seek explanations. If management cannot provide reasonable explanations, the forensic accountants continue to investigate in order to find the reason for discrepancy and get to the root of the problem.

Since fraud usually involves related-company, forensic accountants analyze transactions that involve large sums of money. They examine the background of the parties involved in such transactions. With the aid of information found on digital media, they can check if any customer, shareholder, board member, or even legal representative has any unethical or illegal connections with high-level management of the company.

In the current high-tech environment, many investigations involve a large amount of electronic records and data. Numerous transactions and accounts are stored in different data bases, sources, or applications. Forensic accountants use electronic discovery, or e-Discovery, to gather information that are useful in the investigations. E-Discovery is the process of discovery that is carried out in electronic formats. It encompasses what most often is referred to as electronically stored information, or ESI. Examples of ESI include email, instant messaging chats, documents, databases, voicemail, audio and video files, social media, web sites, and any other electronic information that could be relevant evidence. The process of e-Discovery includes mainly the following five steps:

Identification: All parties involved are identified. For example, if the forensic accountants suspect the Sales Director is involved in bribery, they secure all the hardware (e.g., computer, mobile phone) as well as files and documents (e.g. e-mail) from the Sales Director and his subordinates so that they can collect information and evidence.

Preservation: Data and files identified as potentially relevant is placed in a legal hold to ensure that it will not be tampered with or destroyed.

Extraction: Using computer technology, the forensic accountants extract data and files that are useful to the investigation; e.g., retrieving deleted files. Technologies can be used to screen out all the documents that are duplicates, cutting down the amount of data involved and making further investigation easier.

Analysis: With all the document, data, and information collected, forensic accountants perform all the necessary analysis by utilizing Artificial Intelligence, applying data analytics, and using analytical tools to help with interpretation of data and arriving at conclusions.

Presentation: Forensic accountants compile a report that summarizes all related issues and possible remedies and present it to the independent investigation board or committee.

RECENT SHORT ATTACKS

Since the start of COVID-19 pandemic in 2020, in a short 110-day period from January 29 to May 28, there were four short attacks in Hong Kong and seven in the U.S. It is rare to see so many short attacks within such a short time. The immediate impact after the short attack was quite serious for some target companies, with one stock's price plummeting by as much as 91%. The adverse effect was not limited to only these target companies. The image of many Chinese concept companies was also badly damaged as a result of these attacks.

The following are three cases of short attack that generated very different results.

THE CASE OF LUCKIN COFFEE

Luckin Coffee Inc. is a Chinese coffeehouse chain founded in Beijing in 2017. It aimed to instill the culture of coffee drinking into Chinese consumers and become the Starbucks of China. The Company became famous in China by using many celebrities in its commercials. It promoted its business by generously giving out cut-throat discounts and coupons for free coffee. Luckin Coffee managed 4,507 stores as of January 2020, which exceeded the number of Starbucks stores in China. Most of its stores were small pick-up locations in office buildings or on university campuses that also delivered online orders.

The Company was listed on NASDAQ in May 2019, only 18 months after its opening in October 2017, a record for Chinese companies listed on NASDAQ. Starting from the third quarter in 2009, it delivered operating results that showcased a dramatic growth in revenues and profits, and sent its stock price up over 160% in a little over two months.

Eight months after Luckin listed on NASDAQ, a detailed anonymous 89-page report surfaced on January 31, 2020, claiming that Luckin Coffee had falsified financial and operating numbers. Muddy Waters Research, LLC, a well-known short selling company, claimed that it received it from an anonymous party. It found the report credible and of high quality, and decided to make it public. A few days later, Ash Illuminations Research supported Muddy Waters and concurred that the reasoning behind the arguments in the report was difficult to ignore.

Allegations in the Anonymous Report (Anonymous, 2020)

Allegation 1: Supported by the 11,260 hours of store traffic video, the

anonymous report alleged that number of items sold per store per day was inflated by 69% and 88% in the third and fourth quarters in 2019, respectively. Anonymous alleged that Luckin Coffee deliberately skipped order numbers in order to inflate sales. To verify that order numbers were jumped, investigators placed an order and stayed in the store for a short period of time (half an hour to one hour), counting the number of orders picked up by customers or delivery personnel. Then they placed another order at the end of the session, and compared the gap between the order numbers on the two receipts with the actual counted number of orders. The hit ratio of catching order jumping was significantly high.

Allegation 2: Anonymous alleged that sales figures disclosed by Luckin Coffee did not match amounts shown on customer receipts. During the fourth quarter in 2019, investigators visited 2,213 stores in 45 cities and collected 25,843 receipts from actual customers. The investigators discovered that the average number of items sold per order decreased from 1.74 in the first quarter in 2018 to 1.14 in the fourth quarter of 2019. This decrease in items sold per order contradicted the sales increase claimed by Luckin Coffee. Revenues should have declined instead.

Allegation 3: Drawing from the analysis of the 25,843 customer receipts collected, Anonymous alleged that net selling price per item was inflated by at least RMB1.23, or 12.3%. Luckin Coffee gave away a large number of coupons for free coffee but it understated the number of free items given to customers. In addition, Luckin Coffee sold vouches redeemable for coffee to companies that had connections to Luck Coffee's chairman and controlling shareholders. When these vouches were redeemed, employees booked them as regular sales to pump up revenue. Excluding free products, actual selling price was only 46% of listed price, instead of 55% claimed by management. In actuality, the store-level loss was as high as 24.7% to 28%.

Allegation 4: Luckin Coffee also sold other products (e.g. light meals, juices, nuts, mugs, etc.) in addition to freshly-brewed drinks. By analyzing the 25,843 customer receipts collected, investigators found that revenues from sales of other products were inflated by almost 400% in the third quarter of 2019.

Allegation 5: Anonymous alleged that Luckin Coffee overstated its advertising expenses. Tracking by CTR Market Research, a credible market research company, showed that Luckin Coffee overstated its advertising expenses by 100% and 150% for the second and third quarters of 2019, respectively. In addition, Anonymous alleged that Luckin Coffee rerouted the overstated expenses to recognize it as revenue, creating revenue that did not exist.

Fraud Admission by Luckin Coffee

Luckin Coffee's stock price fluctuated only mildly after the anonymous report was published. Although some short sellers shorted the stock, others entered into long positions.

On April 2, 2020, Luckin Coffee announced that, after its own internal investigation, it found sales from the second to the fourth quarter of 2019 were inflated by RMB2.2 billion (about US$310 million). Consequently, several

executives were removed from their positions. On the next day, China Securities Regulatory Commission (CSRC) and State Administration for Market Regulation (SAMR) joined forces to investigate Luckin Coffee for fraud. Two days later, the U.S. Securities and Exchange Commission (SEC) also launched an investigation on Luckin Coffee. On April 8, the U.S. stock market halted trading on all Luckin Coffee shares due to fraud probe. On May 15, the Company received a delisting notice from NASDAQ.

Share price dropped almost 75% the day Luckin Coffee admitted fraud, triggering the circuit breaker six times. The stock plummeted by over 80% during the first eight days in April. When Luckin Coffee stock was allowed to be traded again on May 20, surprisingly, stock price did not continue to drop, but even rallied significantly at times. By May 26, the stock price rebounded by more than 50%. It surged 139.1% from the record low set on May 22 to June 22. But trading was suspended again on June 29 and Luckin Coffee was delisted from NASDAQ.

How did investigators gather incriminating evidence on Luckin Coffee? Ninety-two full-time and 1,418 part-time investigators were hired to monitor Luckin Coffee by running surveillance. These workers went to 620 Luckin Coffee stores and continuously recorded store traffic, resulting in video recordings of 981 store-days covering 100% of daily operating hours (11,260 hours of footage). The video recording was painstakingly thorough and flawless. If even a 10-minute segment of recording was missing on a certain day, that day's recording was discarded, and the workers would re-do the video-recording the next day. Although the success rate of the recording was only 54%, the integrity of the successful footage was unquestionable.

In this case, the investigators performed due diligence in gathering evidence. The investigation was meticulous and thorough. The report was very detailed, and allegations were fully supported by evidence. The short attack succeeded in causing the stock price to decline. The fraudulent Company was eventually delisted.

THE CASE OF GSX

GSX Techedu Inc. (GSX) is a Chinese technology-driven education company that provides live online K-12 large-class after-school tutoring service to students in China. It also offers other foreign language as well as professional and interest courses. Services are provided under the following brands: Genshuixue (K-12 online and non-K-12 online), Gaotu Ketang (K-12 online), Chengxi (non-K-12 offline), Jinyou (non-K-12 online), Weishi (online live broadcasting service vendor), and others.

GSX was founded in June 2014 and went public on NYSE on June 6, 2019. It was the first live K-12 online education company to be listed in the U.S. As of January 29, 2020, with a market capitalization of US$8.8 billion, GSX had the highest value among all publicly-traded online education companies. It is also the only technology company that has gone public after only one round of funding. As of September 30, 2019, GSX claimed that it had achieved over 400% year-to-year

sales growth for four consecutive quarters and had been profitable for six consecutive quarters. The COVID-19 pandemic further helped GSX increase its revenues when online education became more essential.

Allegations by Short Sellers

GSX was attacked by several short selling companies beginning on February 24, 2020, when Grizzly Research started questioning GSX's operating results. It called GSX the worst publicly-traded education company and accused it as being a scam (Grizzly Research, 2020). Citron Research followed on April 14, alleging up to 70% of GSX's revenues were fabricated (Citron Research, 2020). In early May, Scorpion VC concluded that GSX's financial data were doubtful, and business data fraud was obvious (Scorpio VC, 2020). On May 18, Muddy Waters alleged that at least 70% of GSX's users were robots, and called it a near-total fraud and a massive loss-making business (Muddy Waters Capital LLC, 2020). On June 2, Grizzly Research announced that it also believed most of GSX's students were fake, and student enrollment and revenue were overstated by 900% (Grizzly Research, 2020). On August 11, Citron Research's Andrew Left said the hyped startup GSX was a "complete fraud" and called for immediate government investigation and stock delisting. Left believed that GSX's growth trajectory was too good to be true. He estimated that at least 70% to 80% of GSX's users and revenue were fabricated. Left said, "It's a total fraud. If you believe its financials, it means that this company has done better than anyone else since Google in the early 2000s. It's crazy to believe that. It's not just me. It's the first Chinese company that every major short seller has looked at and said, 'Oh, it's a fraud,' which is very rare." (Cao, 2020). The following are some of the allegations presented in these short sellers' reports.

Allegation 1: GSX's financials were too good to be true. It reported 2019 fourth-quarter revenue of RMB935 million (about US$134 million), up more than 400% from prior-year period. Gross billings soared nearly 400% to RMB1.58 billion, while total enrollments surged 290% to 1.12 million. Net income was up 659% to RMB197.8 million. Although online education organizations were popular, competition was keen. It was not possible to have 300% and 400% increase in revenues from 2017 to 2018, and 2018 to 2019, respectively, in such competitive condition. GSX's numbers reflected a growth rate 10 times as fast as that of the competitors. This extremely high growth in revenue was questionable, especially because GSX was new and not yet well-established. GSX could not have achieved such high revenues when none of its competitors could.

Allegation 2: GSX's financial reports to the SEC did not reconcile with the financial records obtained from China's State Administration for Industry and Commerce (SAIC) filings, PRC Credit Reports, and web analysis. In addition, their PRC Credit Reports and SEC filings showed a 75% discrepancy in net profits. GSX's success was actually based on a fraudulent scheme.

Allegation 3: GSX inflated its revenues by as much as 70% by planting fake students in Weibo and WeChat groups. The evidence was spotted in their overly

positive, frequent, and identical comments. It was obvious that these students were fake and the conversations were created by robots.

Allegation 4: GSX's classroom participation patterns were suspicious. Multiple users joined a classroom at the exact same time, which was statistically impossible for students joining from diverse locations. At least 73% of users were fake.

Allegation 5: GSX fudged its numbers by duplicating classes in the elementary school programs, which GSX claimed to be its fastest-growing segment. These classes were exactly the same, taught by the same instructors at the exact same time. This was a trick used by GSX to make up for the shortfall in revenue.

Allegation 6: Employees were given coupons to buy classes at full price. However, the cost of these "free" classes were all recorded in the revenue even if the coupons were not redeemed.

Allegation 7: Multiple related parties were suspected to have been used to offload costs in order to report better financials to the SEC and investors. Based on employee CVs, job recruitment postings and work locations, several off-balance sheet entities were alleged to be alter-egos of GSX.

Rebuttal by GSX

GSX released a rebuttal after the short sellers' reports were published. It provided an explanation for students joining classes at precisely the same time. GSX stated that students logged on to class early and did warm-ups with tutors. But when class started, students transitioned to the instructor's classroom at the same time. This transition created the suspicious precise-joiner issue noticed by short sellers. Concerning IP joiners, GSX argued the short sellers were just plain wrong. While the short sellers found 28.2% overlap in IP addresses, GSX stated that the overlap was only 0.78%.

GSX Stock Price Reaction

Share price of GSX did not seem to be affected by the short attacks. There was not an obvious downward trend after the attacks. GSX stock price fell immediately after Muddy Waters' announcement on May 18, and was down 15% two days later. However, it went up 25% from May 21 to June 2. Even alter Grizzly's announcement on June 2, stock price continued to rise. It seems investors were inexplicably shrugging off the news. GSX's price rallied 200% from May 18 to August 10, reaching record high.

As in the case of Luckin Coffee, GSX investigators performed due diligence in gathering evidence. The investigations were meticulous and thorough. The reports were very detailed, and allegations were well-supported by evidence. However, investor reactions were completely different. They did not seem to be troubled by the allegations posted by the short sellers. Their confidence in GSX was not shaken. Although stock price declined briefly at times, it continued to rise and even reached all-time highs. The short attacks were not successful in this case.

THE CASE OF KASEN INTERNATIONAL HOLDING

Kasen International Holdings Limited is a Hong Kong-based investment holding company primarily engaged in manufacturing, property development, and travel businesses. The manufacturing segment is engaged in the manufacturing of upholstered furniture, including automotive and furniture leather. Kasen has operated in the leather business for over 20 years. The seven subsidiaries in the leather business made up almost 60% of the whole company's sales before they were sold off in 2016. The property development segment is engaged in property and amusement park development. The travel segment is engaged in businesses such as tourist resorts, hotels and restaurants, as well as travel-related services.

Allegations by Blue Orca Capital

On November 21, 2019, Blue Orca Capital published a short seller report, making various allegations against Kasen International (Blue Orca Capital, 2019). Kasen immediately refuted all the major allegations the next day (Kasen International Holdings Limited, 2019).

Allegation 1: Blue Orca alleged that Kasen disposed of its most valuable and profitable automotive and furniture leather manufacturing business to Kasen chairman's daughter at below-market price in 2016 and understated revenues and profits of the disposed entities. It further alleged that liabilities associated with the disposed entities were not transferred and remained in the Company's books.

Before the disposal, the automotive and furniture leather manufacturing business, which made up 60% of the Company's sales, was very profitable, whereas the Company's other businesses were incurring big losses. Blue Orca found that Kasen's 2016 net income was RMB2.2 billion, not RMB1.3 billion as disclosed by the Company. Blue Orca concluded that the Company understated its profits so that it could sell the leather business to the chairman's daughter at an artificially low price.

Investigative forensic accountants found that the basis Blue Orca used to determine Kasen's profits was different from that used by Kasen. Blue Orca used individual unaudited numbers from the seven subsidiaries, whereas Kasen's reported profit was based on audited consolidated financial reports. Since consolidation was not simply summation of the seven individual companies, that explained the discrepancy between the profits computed by Blue Orca and the profits disclosed by Kasen.

Kasen countered that the historical income and profit of the disposed leather business had been independently audited and were accurate in material respect. The Company also countered that the sale of the leather subsidiaries was completed by transferring equity interests of the subsidiaries that were sold, and denied that any liabilities that existed in the entities of the disposed group remained with the Company upon completion of the disposal. Furthermore, the reason the Company decided to sell the leather manufacturing business was because it was no longer appealing to investors due to declining demand of leather, a weakening yuan, and rising operating costs. Selling the leather business would improve the

Company's overall performance and future prospects as a whole.

Allegation 2: Referring to a joint venture arrangement entered into by Kasen in January 2018 for a Cambodian water park, Blue Orca alleged that the joint venture would require RMB113 million to acquire land, but the Company still had not received the title to the land as of June 2019 despite having paid RMB177 million as prepayments.

Blue Orca also claimed that there was no evidence of the proposed development at the plots of land. Investigators went to the project site and interviewed villagers who were living there. But none of the villagers had heard about the development of a waterpark. In addition, Blue Orca figured that if the waterpark were to be developed there, it would take up 80% of the village, displacing almost all the villagers who lived there. Since it was unlikely that Kasen would do such a deed, Blue Orca concluded that the waterpark must be a sham.

To verify the location of the land, the forensic accountants checked the purchase contract for the land in Cambodia and the land certificates, which had the coordinates of the land purchased by Kasen. They found that Blue Orca investigators actually went to a wrong location. As for the proposed development site, Kasen clarified that the joint venture company entered into agreements to acquire approximately 265,700 square meters of land in Cambodia, out of which land title of approximately 261,900 square meters had been obtained and passed to the joint venture company. The land certificates for the remaining plot of land was expected to be obtained shortly after. As for the RMB177 million Blue Orca alleged to be prepayment for the land, it was actually for another unrelated land purchase in Cambodia.

Allegation 3: In April 2018, Kasen entered into a cooperation agreement with Attwood Investment Group in relation to a proposed development in the Steung Hav International Port and Special Economic Zone in Cambodia. As part of the development, Kasen would finance and construct a power plant and a paper factory. Blue Orca alleged that Kasen had not received the two sets of coal-fired generators it purchased for RMB218 million despite having paid RMB96 million as prepayment. Blue Orca further referred to the Engineering, Procurement and Construction (EPC) contract for the construction of a thermal power plant entered into by Kasen with China Energy Engineering Group Northwest Electric Power Construction Engineering Co., Ltd. (CEEG) in November 2018. One of the agreements was that Kasen would provide a bridge loan to CEEG to pre-pay for certain costs before CEEG received bank financing. Blue Orca stated that CEEG Northwest, being a subsidiary of a Chinese state-owned enterprise, China Energy Engineering Corporation Limited, would not need a small bridge loan, and alleged that the agreement was designed to pump Kasen's stock.

The forensic accountants found that as of November 22, 2019, the title of the aforementioned generators had been passed to Kasen. As of December 31, 2018, the related cost of purchasing the generators were accounted for as property, plant and equipment, not as prepayment as alleged in Blue Orca's report. In addition, the RMB96 million reported by Blue Orca as prepayment for the generators was actually for some other properties, not the generators. Regarding the EPC contract

entered into by Kasen for the related project, Kasen clarified that it was common practice that a contractor of an EPC contract would arrange for bank financing of the project, and that repayment will be made to the contractor out of the income generated from the project. Kasen also denied that it had provided any bridge loan to CEEG Northwest. All the payment and financing arrangement with CEEG Northwest were consistent with industry practice and in accordance with the terms of the EPC contract.

Allegation 4: Blue Orca alleged that Kasen claimed to have spent RMB714 million on property, plant and equipment (PP&E), yet the Company reported only RMB8 million in PP&E for its remaining manufacturing subsidiaries for 2017 and 2018 when most of Kasen's reported capital expenditures supposedly occurred. Blue Orca further alleged that, despite Kasen claiming to have spent RMB714 million on PP&E, the Company's profit from its manufacturing businesses grew by only RMB8 million from 2016. Blue Orca suggested that the expenditures were either fabricated to conceal fake profits or the funds were misappropriated.

Kasen refuted this allegation. It found that Blue Orca derived at the RMB714 million of capital expenditure by basing on the capital expenditures for the half-year periods in 2017, 2018, and 2019. But as disclosed in Kasen's financial reports for the relevant periods, the Company's capital expenditures for the years 2017 and 2018 and for the six months ended June 30, 2019, amounted to approximately RMB90.7 million, RMB585.7 million, and RMB169.3 million, respectively, with a total of approximately RMB845.7 million. Kasen further countered that the capital expenditures were spent on PP&E for operational purposes across the Company's businesses, not confined to the manufacturing segment as alleged by Blue Orca. These expenditures on PP&E were made in view of the Company's long-term development and did not necessarily translate to dollar-to-dollar increase in profit for the corresponding periods.

In relation to the alleged RMB8 million spent on PP&E for Kasen's remaining manufacturing subsidiaries and the RMB8 million profit from the Company's manufacturing businesses from 2016, Blue Orca did not identify the sources of these figures. As such, the forensic accountants could not evaluate the validity and credibility of the credit reports.

Allegation 5: In its report, Blue Orca referred to an agreement entered into by Kasen in 2009 in relation to the Company's acquisition of 51% of Hainan Hejia Property Development (Hainan Company). Blue Orca alleged that Hainan Company was to acquire the rights to develop land in Sanya, Hainan, and yet ten years later it had obtained title for only 11% of the land despite having paid a total of RMB843 million as a deposit. Blue Orca further alleged that other companies were scammed of prepayments for land in the same development area in Sanya and suggested that the Company could be one of the victims.

Kasen countered that the development project of a residential, hotel, and tourism resort in Sanya was ongoing. Although the progress of development was slower than anticipated, Hainan Company completed the process of obtaining certificates for land-use right of certain lands. Hainan Company has been continuously communicating with relevant local government authorities, paying

the remaining cost of land acquisition, and applying for the remaining certificates for the right for land use. Kasen stated that the cost paid for land each year had been disclosed in the Company's annual reports in previous years, and refuted the allegation that the development in Sanya was a scam.

Kasen Stock Price Reaction

Kasen's stock slumped 90% on the day of the attack, resulting in a trading halt. The Company described the report as untrue and misleading, and refuted all major allegations the next day. As the stock resumed trading the day after Kasen's refutation, price surged as much as 600% before closing for a 472% gain.

Blue Orca never contacted nor sought clarification from Kasen or any of its directors before or after the publication of the report. It also appears that the short seller's investigations were flawed. It is unclear if the investigators practiced due diligence when gathering evidence. It seems that serious mistakes were made during the probe, and conclusions could have been drawn from inaccurate information. Moreover, the short seller's motive could have been unethical, simply trying to damage the reputation of the target company to drive down stock price so that profits could be made. No matter what the motive was, in this case, the short attack was not successful.

CONCLUSION

Although investigative experts can lay the groundwork for damaging allegations with evidence of fraudulent activities carried out by target companies, short attacks are not always successful due to unpredictable market reactions as shown in the three cases presented above. It is not surprising that Luckin Coffee was driven to the ground because it could not refute any of the allegations presented in the anonymous report. In the end, it admitted committing fraud in its financial reporting. As a result, executives who were involved in the scandal were relieved of their positions, regulators launched fraud investigations, and the Company was eventually delisted. In this case, short sellers achieved their objective of driving down the stock price and profit from their short sales.

It is also not surprising that Kasen's stock was not adversely affected because it appears that most of Blue Orca's investigation was flawed, and the allegations were based on inaccurate information. It is inconceivable that Blue Orca could have committed such grave errors in its investigation. Yet, it is possible that those were deliberate mistakes, and the short seller's intention was to undermine investor confidence in Kasen and its management, and harm its reputation, so that the short seller could benefit from the stock price slump. However, Kasen was able to refute all five main allegations posted by Blue Orca. As a result, stock price soared. Even so, if the timing was right, the short seller still could have taken advantage of the temporary decline in stock price and make a profit before it rebounded.

The most puzzling case is GSX. Several short selling companies called it a near-total fraud, or even complete fraud. Its financials were too good to be true. Its

success was based on a fraudulent scheme. It was actually a massive loss-making business. Fraudulent activities were detailed and well-explained in the short sellers' reports. GSX countered that the short sellers lacked a basic understanding of its business. Muddy Waters responded by pointing out that GSX's claim of a misunderstanding was the same response employed by the previous seven companies that were delisted following its investigations. It seems unlikely that all those short sellers did not understand GSX's business and drew the same conclusions that GSX was a fraud. Yet investors just shrugged off the allegations, and the stock price kept rising, even reaching all-time highs. In this case, the short sellers failed to achieve their objective. Not only did GSX survive the attack, its stock thrived even more from the unexpected investor confidence.

When short attacks occur, stock price of the target company usually reacts negatively at first. Yet, even with strong defensive evidence and unassailable counter-arguments from the target companies to fend off the allegations, it is difficult to predict how investors will react. The attacks can be total busts, or they can instill even greater investor confidence, giving the target company a boost.

One thing readers should take away from these three cases, especially Luckin Coffee, is that tall claims warrant great skepticism. And if something seems too good to be true, it usually is.

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THEORETICAL CONSTRUCTS CRITICAL TO UNDERSTANDING FASB CONCEPTUAL FRAMEWORK

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ABSTRACT

There seems to be a widespread belief among those interested in financial reporting that there is a set of even more underlying, conceptual foundations that one should grasp to fully understand the FASB conceptual framework. The authors performed an exhaustive review of all the literature related to fundamental, basic concepts underlying financial reporting. Relevant studies by organizations such as AICPA, AAA, FASB and individual theorists' research publications were examined. These sources are cited in the References section at end of paper. Based on this comprehensive search, the authors gleaned the eight most fundamental concepts, some refer to as assumptions, that support the FASB conceptual framework. The belief is an understanding of these underlying basic eight notions are critically important to understanding the framework that guides financial reporting standards. This paper will identify and discuss how these critical, foundational concepts are used by the authors in the classroom of both undergraduate and graduate accounting courses to provide more insight into the FASB conceptual framework. Some empirical statistics are provided to reflect the perceptions of students. These statistics suggest students place extreme importance on the role these eight fundamentals play to understanding properly financial reporting.

Key Words: Basic Accounting Postulates, Fundamental Concepts, Underlying Assumptions, Foundation Concepts, Theoretical Accounting Constructs

INTRODUCTION

Each of the eight basic concepts that collectively form the foundation for the financial accounting standard setting board to establish its much-needed conceptual framework are presented in the same sequence the authors introduce them to students in the classroom. The eight fundamental concepts are: Entity, Going Concern, Periodicity, Duality, Revenue Recognition, Matching, Cost, and Monetary Measurement Unit. For six of these eight, a visual that has proven to be most effective in conveying the essence of the concept will be provided followed by narrative prose that enhances the communication of the concept.

Both graduate and undergraduate feedback is included at the end of the paper to show empirical evidence of the effectiveness of this pedagogical approach to teaching accounting. The students like how the interrelationships among the foundation concepts are more easily grasped.

A perusal of the references section of the paper reflects that we used a combination of individual theorists and organizations interested in financial reporting. An attempt was made to select some of the most recognized works over the years going all the way back to Paton's first attempt to put into writing accounting theory. A Statement of Basic Accounting Theory (ASOBAT) published by the American Accounting Association was examined. Maurice Moonitz often cited Basic Postulates which was accounting research study number 3 by the Accounting Principles Board (APB) was also analyzed and provided very helpful information.

This learning methodology is applied using a three prong approach. After using symbolic logic and carefully selected prose to communicate the theoretical constructs, empirical examples from real world situations were shared, then thirdly an attempt to integrate humor was made to drive home the concept.

THEORETICAL CONSTRUCTS

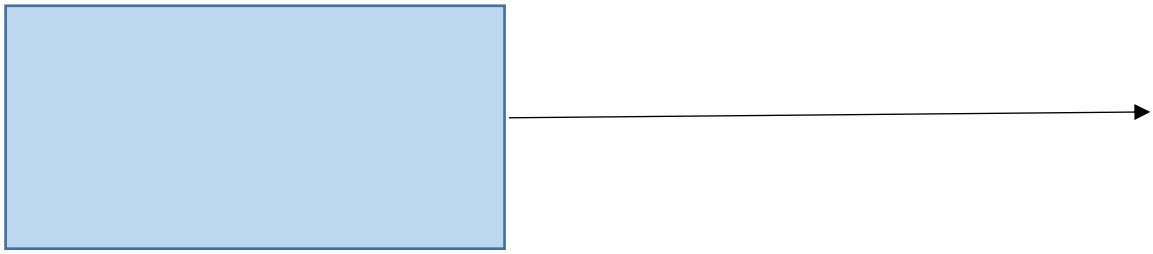
Graph 1 : Entity is an Artificial Being

First it must be understood that the focus of accounting is the specific segment of activity known as an artificial being referred to as an entity. The authors have found it especially helpful to students beginning to learn the accounting language to focus attention on the entity that does the action. For example, it is common for students in the first accounting course at both undergraduate and graduate levels to be asked to assess the effect of a set of transactions on the basic financial position of the business entity. As the late Peter Drucker once said, the most fundamental model in a business is assets = liabilities + owners' equity (A = L + OE).

So when students are asked to indicate what effect a transaction has on this basic equation, inevitably the question arises as who is doing the buying or selling, who is paying or receiving the dividends etc. The authors have found it to be profoundly helpful to ask the students to forget about stockholders, management, vendors, employees, and specific parties but think about how an artificial entity is doing the action. It can sue and be sued. This seems to eliminate confusion regarding who is doing the action.

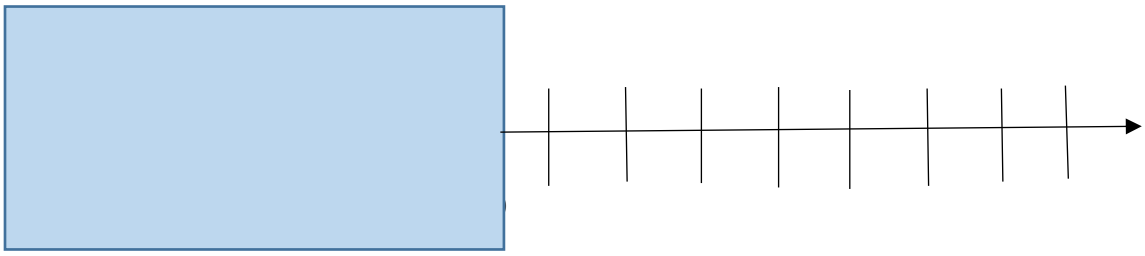
To help them change their focus, a box as illustrated above is drawn It has been so gratifying to see the positive impact this has on understanding the accounting for transactions. The comments from students at end of the paper will confirm that viewing the artificial being as being engaged in the transactions is of inestimable value in moving up the learning curve of the accounting language.

Graph 2 : Going Concern



Next the going concern construct is defined as an entity with an indefinite life. This notion is depicted as shown above by drawing a straight line to the right of the box with an arrow on the end. The assumption is the entity will continue to thrive and meet its present obligations. The end of the entity's life is unknown. It may be five years, ten years, or fifty years. It is stressed that transactions of the entity are accounting for assuming an indefinite life. It is pointed out that liquidation of an entity is a separate type of accounting.

Graph 3 : Periodicity



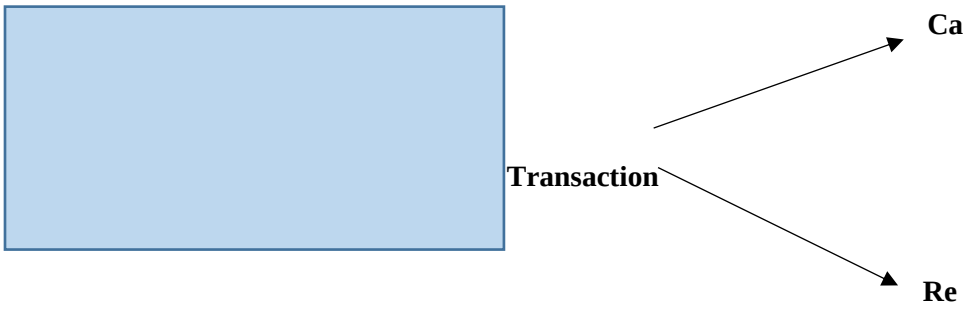
To illustrate the periodicity concept, this indefinite horizontal line is shopped into intervals representing annual, quarterly, or monthly time periods. At this point the origin of annual reporting is discussed. The three major economic ages of agriculture, industrial, and information are identified. Then a description of how that annual reporting originated in the agricultural age when there would be yearly accounting for soybeans, cotton, corn, tobacco etc. The impact of IT on shorter periods is discussed at this point.

It is generally believed that this periodicity concept by itself complicates the preparation of financial reports. It adds to the complexity by requiring a lot of effort to make sure revenue earned and expenses incurred are recorded in the appropriate period. This is the essence of the revenue recognition and matching basic concepts discussed later in this paper.

When discussing this periodicity concept reference is often made to the Statement of Financial Position of the entity at the end of a period while the Statement of Income relates to the interval between two points of time. The analogy of snapshot and video is made. Interrelationship of concepts beings to emerge.

Before revenue recognition and the matching basic concepts are introduced, it seems preferable to clarify the very important duality concept. The duality concept must be understood first.

Graph 4 : Duality



venue Concept

The authors believe this basic concept is perhaps the most critical to understanding the theory of accounting as well as the procedural system of debit and credits. This belief is based on observations that students tend to blur the distinction between a concept only, versus a thing in the empirical world. As each transaction of an entity generates dual effects on the financial position, a communication problem takes place because the brain tends to think of a concept

as a something. In other words, the brain has a tendency to reify a concept. This problem has been referred to as the Pygmalion Syndrome.

In this information age in which we live, there seems to be an increased tendency for human beings to confuse conceptual models of real things and events with the things and events themselves. A well-known physicist chose to call this confusion the Pygmalion Syndrome, after the symptoms of the legendary sculptor of Cyprus who carved a statue of such astonishing realism that it came to life for him and he fell in love with the statue.

The physicist who originated the term Pygmalion Syndrome claimed that this syndrome is a disease of the mind which blurs the distinction between the real world and the conceptual models employed by humans to communicate complex issues. Accounting theorists contend that this disease is just as widespread and perhaps more prevalent among accountants than it is among physicists. Loyd Heath claims that this syndrome is insidious in that it begins as a seemingly harmless short-hand way of describing things, but it evolves into much more serious communication problems for those attempting to teach or learn accounting as a discipline.

Since the Pygmalion Syndrome is inextricably linked to the basic accounting concept of duality, it is useful to first describe this economic principle and the associated double entry procedural system for capturing these dual effects into a set of business accounts. Let there be no confusion, duality is the economic impact of a business transaction and the double entry system is an arbitrary procedural system designed to capture this dual economic impact on the financial position of a business entity. In other words, duality is a conceptual model while the accounting double entry system is a procedural something. The double entry system has rules but no underlying theory to explain them. There is no "because answer" to any "why question" related to this procedural debit/credit system. This paper is written with the assumption that the reader understands the basic debit/credit rules of this procedural system. If the rules are followed appropriately, the dual economic effects would result in equal debits and credits when the transaction giving rise to the effects is recorded into the accounts.

Implications of this syndrome are not limited to accounting education. There are negative consequences for the corporate world, the practice of accounting and the financial news reporting. Understanding the duality basic concept is of inestimable value to a proper interpretation of financial reports.

As stated earlier, the brain has a tendency to reify a concept. Reification comes from Latin "res" meaning "thing" or "object". Therefore, to reify a concept means to speak of it as if it were a physical, concrete thing or, as John Condon, Jr. expresses it, "To reify is to 'thingify.'"

At this point in the classroom we display the diagram above with the dual effects at end of each arrow with one effect being an empirical something and the other effect a concept only. As used in the example above an illustration of difference between cash and revenue is described. Accounting students and accountants often reify revenue. They speak of generating it, producing it, achieving it, and so forth.

Revenue is a concept. Some theorists define revenue as the market value of the goods or services provided by a business entity. A formal definition of revenue is provided by the FASB in its conceptual framework. Revenues are inflows or other enhancements of assets of an entity or settlements of its liabilities (or a combination of both) from delivering or producing goods, rendering services, or other activities that constitute the entity's ongoing major or central operations. Too often a student will define a term by describing how it is calculated. That is a different type of problem than this paper is addressing but nevertheless is very widespread and needs to be addressed as a separate accounting education issue.

Revenue is a conceptual model and cannot be observed directly but it is a representation of a real-world, empirical event. When a business entity provides a good or service to a customer in a transaction, with the broader definition of the FASB cited above not withstanding; an increase in revenue (owners' equity) is one of two effects on the financial position of the business entity providing the service. One effect is this increase in equity of the owners while the other effect is usually an increase in the assets of the entity. This is duality at work.

After discussing the diagram above, the authors have found it useful to share the following examples to help students grasp the duality concept. Since feedback from students suggests that understanding the duality concept is absolutely essential to learning accounting, this paper places the largest attention to this fundamental, theoretical construct.

A simple example using Uber Services, Inc. illustrates dual effects of a transaction and the confusion created when the distinction between the revenue effect and the asset effect are not clearly understood. This example has been especially effective based on student comments presented at end of this paper.

Suppose one of the vehicles owned by Uber Services takes a traveler from his house to the airport and the fare is $100 USD. The customer hands the driver $100 in cash. From the perspective of the Uber Services entity, two effects on its financial position are resultant from this service being provided. Revenue of $100 has been increased and $100 in the asset cash has been increased. Revenue is a temporary owners' equity account. One could say owners' equity was enhanced by $100 but this effect is stored in a temporary revenue account until later. So the question becomes what is the difference between the revenue and the asset effect?

The driver is holding $100 in cash, a something, while at the same time it represents the market value of the transportation service just provided, a concept. An analogy could be drawn using a golf club given to an individual as a birthday gift. Like cash, the golf club has molecular properties. Cash can be touched, seen, and has weight. The golf club can be touched, seen, and has physical dimensions such as length and weight. Concurrently, the golf club is also a birthday gift which is only a concept. Gift has a definition in the same manner that revenue has a definition. Giving a person something special on their date of birth is the definition of a birthday gift. Gift is a conceptual model of a real-world empirical something. Would an individual ever receive a box of revenue as a gift? No. But it is very likely and desirable to receive a box of cash as a birthday gift. So like cash, this golf club is both a something and a gift simultaneously. The $100 is an increase to Uber's cash and at the same time is an increase in revenue for that accounting period. Using the double entry system referred to earlier, the accountant would record these dual effects as follows:

Accounts	**Debit**	**Credit**
Cash (Thing)	$100	
Service Revenue (Concept)		$100
Golf Club (Thing)	XXX	
Birthday Gift (Concept)		XXX

Although the accounting concept of revenue is a model of real-world events, revenue does not exist in the real world any more than a family of 2.5 children exists in the empirical world. Both exist only in the thought world of our minds. They are intangible concepts or abstractions.

Some may dismiss the reification of revenue as a harmless practice or "merely a matter of semantics." It is a matter of semantics all right, but that does not mean it is unimportant. Categorizing it as semantics does not equate it to harmless. Reifying revenue gives rise to communication problems and often results in faulty reasoning by a student or a user of accounting information.

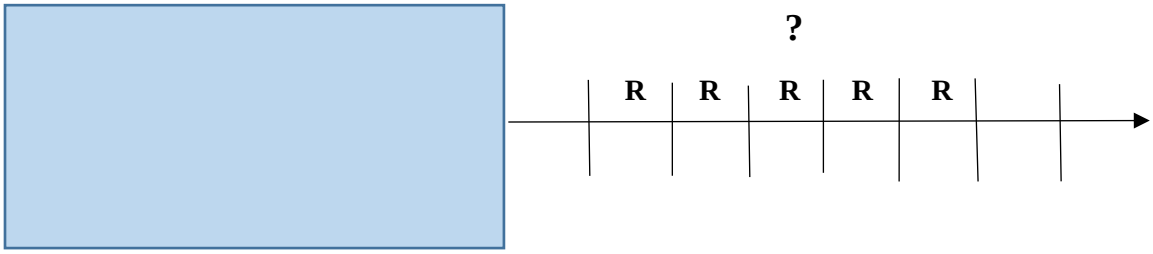
As alluded to earlier, the duality concept cannot be separated from the reification issue. Therefore, linking the two has been highly successful in explaining the duality notion.

All that has been said so far about revenue we could say about income, retained earnings and dividends. Since users of accounting reports such as analysts place

such a high value on income of a company and dividend policy, attention should also be placed on these three concepts and their frequent reification. The authors do this in another publication. A brief empirical classroom example involving retained earnings will end this duality concept discussion.

The authors believe that the account retained earnings is the most widely misunderstood account. An example of a question that was asked by a MBA student illustrates what so many mistakenly believe is the nature of this account. A case involved a business that had some deteriorating trends reflected in its financial statements. The bank called the CFO of the business and said if these negative trends are not reversed the bank was going to call in all its loans. A student raised his hand and asked the following, "why doesn't management take some of those retained earnings and get out of debt"? A clear example of the Pygmalion Syndrome and not understanding the duality basic concept.

Graph 5 : Revenue Recognition



Revenue is a concept. Some professors define revenue as the market value of the goods or services provided by a business entity. A formal definition of revenue is provided by the FASB in its conceptual framework. Revenues are inflows or other enhancements of assets of an entity or settlements of its liabilities (or a combination of both) from delivering or producing goods, rendering services, or other activities that constitute the entity's ongoing major or central operations.

Revenue recognition is a timing notion. Concern and controversy continue to exist over the precise meaning of the terms recognition and realization. Recognition is the formal process of reporting a transaction or event in a company's financial statements, whereas realization is the process of converting noncash assets to cash or claims to cash. Transaction based accounting recognizes and reports revenue that is realized or realizable. Economists argue that revenue is earned continuously over time. Accountants contend that it is not practical to record revenue on a continuous basis. Therefore, accountants must choose an appropriate point in time to record the occurrence of revenue. In general, companies usually recognize revenue at the time they sell their product or service, however there are some

exceptions that are industry dependent. So the general guideline of recognizing revenue at the point of sale needs some further explanation below.

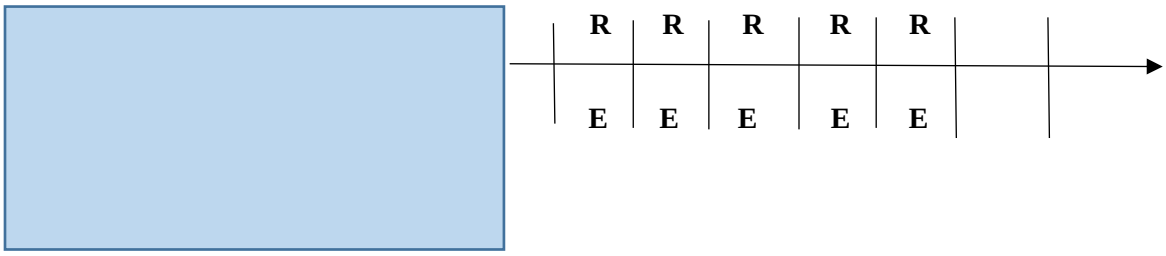
Under GAAP, revenue should be recognized when both of the following criteria have been met:

a. The revenue has been earned. Revenue is considered earned when a company has accomplished all that it must do to be entitled to the benefits represented by the revenue. For revenue to be considered earned the business has completed substantially what it must do to be entitled to the revenue. A critical event must have been accomplished to grant entitlement. Such an event may differ across firms or industries.

b. The revenue has been realized or is realizable. These terms imply that the revenue can be measured with a reasonable degree of certainty. In other words, the amount of the revenue can be quantified with reasonable assurance or their accuracy.

These guidelines are rather broad, and over the years have resulted in many interpretations. Therefore, the FASB continues to work toward developing more specific guidelines for certain industries. The FASB has expressed its desired goal of developing a single revenue recognition model that can be applied consistently regardless of industry.

Graph 6 : Matching



Once a company has met the FASB criteria and recognized revenue, it must then identify all expenses associated with producing that revenue. This process of associating revenue earned with expenses incurred is known as the matching concept. The authors are shocked when students express their understanding of the matching concept as debits = credits. It is such a fallacy in their thinking.

Expenses are revenue-producing cost expirations. The cost concept will be the next basic concept discussed in the paper. For some expenses the association with the revenue generated is straightforward. For example, when a company

purchases inventory it buys an asset. This purchase incurs a cost. As the inventory is sold, the cost expires which results in an expense accountants call cost of goods sold. So the expense is recognized matching it with the contributed revenue.

For expenses other than cost of goods sold the association with produced revenue is not as evident. For these expenses estimation is required. For example, a long-term asset such as equipment requires an estimated useful life and an allocation of the cost of the asset over this estimated useful life.

This usually takes us into a discussion of the relationship between expenses and cash flow. Time is taken to define accrued versus deferred expenses. Later in the course we talk about accruals and deferrals in the context of adjusting entries before financials are prepared and the indirect method of converting net income to cash flow from operations. As indicated earlier, the periodicity concept complicates preparation of financial statements because of the need to match revenue and expenses properly.

Cost

Cost is the amount given in consideration of goods received or to be received. Costs can be classified as unexpired (assets), which are associated with the production of future revenue and expired (expenses) and deducted from revenue in the current period as was discussed previously in explaining the matching principle.

This cost concept and the remaining monetary measurement unit concept are often referred to as the two weakest links in the chain of the fundamental basic eight. This criticism is made particularly when there are significant price changes in the economy. It is generally agreed that financial reports based on GAAP do not reflect the effect of price changes.

The literature is replete with arguments to abandon this cost concept and replace the attribute of cost with some form of fair market value. Fair market value is more relevant is the usual basis for this position. Except for financial assets, the generally accepted view is that while fair market value may be more relevant than cost, the loss in reliability is so much that overall usefulness suffers.

There are some that prefer not changing the cost concept but change the measurement unit to price-level adjusted historical cost. Sweeney advocated this change in the 1930s when he wrote about “the fruit salad balance sheet stressing that assets come into the business at different times and thus are not additive. So purchasing power units is not a recent proposal as will be discussed in the following section.

Monetary Measurement Unit

Because money is the medium of exchange in economies and is a standard of value, accountants record transactions and events in terms of money. This is so subtle of the eight basic concepts that many often overlook its importance. Nonmonetary measurements are more prevalent in internal reporting such as physical measurements like gallons, pounds, and linear feet.

As was discussed earlier, it is easy to monetize mistakenly such concepts as income, dividends, and retained earnings. But the majority view is that money is easier to understand than purchasing power units as Sweeney was first to advocate. Understandability is claimed by the American Accounting Association as a characteristic of useful information in its widely quoted ASOBAT publication.

Empirical Evidence

A one-page questionnaire was distributed to both undergraduate and graduate students at the end of the semesters of past two years. The sample consisted of 110 undergraduate and 52 MBA students. First, a Likert scale was used to assess responses to the general statement about the overall usefulness of understanding the eight fundamental theoretical constructs:

The first part of the instrument asked the students to respond to the statement below. The students were to answer anonymously and in no way suggested their response would impact their course grade. Students were given 30 minutes to complete all parts of the questionnaire. Here are the responses to the part one general statement:

Part 1 of Questionnaire

"Emphasis on the eight fundamental concepts was helpful to my learning the accounting language."

Strongly Disagree Disagree Neutral Agree Strongly Agree

MBA Students Responses:

Strongly Agree	94%
Agree	4%
Neutral	2%

An overwhelming 98% thought the emphasis on the eight theoretical underpinnings is important to understanding financial reporting by accountants. None disagreed.

Undergraduate Responses:

Strongly Agree	96%
Agree	4%

The undergraduate students expressed an even higher agreement that understanding the eight theoretical concepts is critically important to learning accounting and the financial reports.

Part 2 of Questionnaire

The second part of the questionnaire asked the students to rank order the importance of each of the fundamental constructs to learning accounting. Interestingly 100% of both the graduate and undergraduate students ranked the duality and periodicity constructs as first and second respectively. All the students ranked monetary measurement unit last in importance.

Part 3 of Questionnaire

Thirdly, there was an open ended question for comments about the value of combining the theoretical concepts with an empirical example and humor which was described earlier as the three prong approach to classroom teaching/learning.

Some of the comments in this third section were as follows:

"Most effective methodology I have experienced in learning any field of knowledge"
"Understanding the duality concept was of inestimable value"
"Cannot overstate how much I learned with this three prong approach; this should be taught in education courses for use in other areas of study"
"The Pygmalion Syndrome opened my eyes"
"Putting the focus on the entity engaging in transactions was critically important"

These comments in part 3 provide some insight into why the responses in part 1 were so favorable to understanding the more fundamental theoretical underpinnings as described in the paper.

CONCLUSIONS AND SUGGESTIONS FOR FUTURE RESEARCH

The working hypothesis the authors used when beginning research for this paper seems to be confirmed by the findings. The belief that there is a set of constructs most fundamental in nature that must be understood to grasp the FASB conceptual framework is supported by both the theory found in the literature review and the responses by students to the administered questionnaire. The graphical presentations of these theoretical constructs seem to be especially effective in communicating the fundamental constructs according to the responses provided by students.

The empirical investigation in this study was limited to an academic classroom. The authors would like to broaden their approach and attempt to assess how the communication of these fundamental constructs would be received by other groups who are interested in financial reporting. These groups would include independent auditors, preparers of financial reports, and users of financial reports. This study would involve assessing the opinions of CPAs, controllers, CFOs, and financial analysts. Random samples would be surveyed from AICPA, IMA, FEI, and FAF memberships.

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ARE LOSSES BEING HIDDEN IN OTHER COMPREHENSIVE INCOME? A TWENTY-YEAR EXAMINATION OF THE S&P 100'S AOCI

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ABSTRACT

The term "comprehensive income" was first introduced by the FASB in Statement of Financial Accounting Concepts No. 3. Since that time, the US GAAP reporting requirements for comprehensive income have been criticized for a variety of reasons, including for the manner in which the predominant choice of "less transparent" reporting methods may be used by companies to systematically "hide losses" from financial statement users.

A recent study (Mulford and Babinets, 2018) examined other comprehensive income (OCI) reporting by the S&P 100 companies during the period from 2013 to 2015 and concluded that OCI reporting, particularly that related to unrealized investment gains and losses, was being used to systematically hide losses.

The study reported here examined the balances in the S&P 100 companies' *accumulated* other comprehensive income (AOCI) accounts at five-year intervals from 1999 to 2019, and did *not* find evidence of OCI reporting in general, or that specifically related to unrealized investment gains and losses, being systematically used to hide losses. Rather, the authors conclude that Mulford and Babinets' findings are likely the result of the relatively short time period they examined.

Key Words***:*** *Financial Reporting, Other Comprehensive Income, Accumulated Other Comprehensive Income, Earnings Management*

INTRODUCTION

The reporting of other comprehensive income (OCI) has been controversial since long before it was first required by U.S. Generally Accepted Accounting Principles. It took the better part of twenty years after the FASB first introduced the concept of other comprehensive income in its Statement of Financial Accounting Concepts (SFAC) No. 3 (FASB, 1980) before OCI was first required to be reported by Statement of Financial Accounting Standards (SFAS) No. 130 (FASB, 1997). There were a number of impassioned calls for comprehensive income reporting in the years between SFAC 3 and SFAS 130 (e.g., Robinson,

1991; AIMR, 1993; Johnson, et al., 1995; Beresford, et al., 1996; Linsmeir, et al., 1997). The acceptable methods for reporting comprehensive income were debated in the years leading up to the issuance of SFAS 130 (FASB, 1997) and particularly afterwards, as it became clear that the vast majority of companies were not using the preferred reporting method (e.g., Jordan & Clark, 2002; Chambers, et al., 2007; Bamber, et al., 2010). Scholars have repeatedly contended that the current operationalization of OCI reporting in US GAAP is fundamentally flawed at a conceptual level (e.g., Rees & Shane, 2012; Detzen, 2016; Du, et al., 2016). And there have been assertions that OCI may be used as a "dumping ground" (Chasan, 2014) to "pile losses" (Katz, 2017) onto companies' balance sheets so that "they don't have to talk about them" (Levine, 2014), rather than reporting them in net income.

On this last point, Mulford and Babinets' (2018) reported on their examination of OCI amounts reported by the S&P 100 companies in the years 2013, 2014, and 2015. Mulford and Babinets summarized their results as indicating

> …a systematic tendency for firms to report more losses than gains in other comprehensive income, both in frequency and amount. This result is especially true for investment-related gains and losses, where management has more discretion in the timing of gain and loss recognition. (2018, p. 212)

Numerous studies have found that earnings information is more "value relevant" when reported in a primary income statement than when included in a separate statement of comprehensive income (e.g., Hirst & Hopkins, 1998; Maines & McDaniel, 2000; Hunton, et al., 2006; Jones & Smith, 2011; Lin, et al., 2018). Therefore, the finding that companies are systematically hiding losses in other comprehensive income is troubling. However, it is important to recognize that Mulford and Babinets' conclusions were based on the examination of annual amounts of other comprehensive income reported in only three, consecutive years. It is currently unknown whether this same pattern extends beyond the period examined by Mulford and Babinets.

The purpose of our research was to determine whether Mulford and Babinets' (2018) findings are robust over a longer period of time. Specifically, our study was focused on answering the following two questions:

1. Is OCI being used to systematically "hide" losses?
2. Is OCI related to unrealized investment income being used to systematically "hide" losses?

We also used the S&P 100 companies as our sample, to allow comparison to Mulford and Babinets' (2018) results. Rather than examining annually-reported

OCI amounts, however, we gathered information regarding the amounts of *accumulated* other comprehensive income (AOCI) reported on the companies' balance sheets in five-year intervals from 1999 to 2019 (i.e., for the years 1999, 2004, 2009, 2014, and 2019). This approach allowed us to cover almost the entire period of mandatory comprehensive income reporting.

In summary, our results do not support Mulford and Babinets' (2018) conclusions that OCI in general, and that component specifically related to unrealized gains and losses on investment securities in particular, are being used to systematically "hide" losses. Rather, it appears that Mulford and Babinets' (2018) findings may have resulted from the relatively short period of time they examined.

The following section of this paper provides background regarding the concept of comprehensive income and its reporting. This is followed by a description of our research methods and results. The paper then concludes with a summary and discussion of our findings, recognition of inherent limitations, and description of possible areas for future research.

COMPREHENSIVE INCOME REPORTING

Debates regarding the basis for reporting income have been in the accounting literature for a very long time, often between advocates of "all-inclusive" and "current operating performance" approaches. The FASB took a major step toward the all-inclusive approach with its first articulation of the concept of "comprehensive income" in Statement of Financial Accounting Concepts No. 3 (FASB, 1980). The FASB at that time defined comprehensive income as:

> the change in equity (net assets) of a business enterprise during a period from transactions and other events and circumstances from nonowner sources. It includes all changes in equity during a period except those resulting from investments by owners and distributions to owners. (FASB, 1980, par. 56)

This definition was consistent with the asset-liability approach to income determination (Robinson, 1991; Miller & Bahnson, 2010; Miller, et al., 2016) also introduced in SFAC No. 3, and was seen by at least some commentators as laying the groundwork for a move to fair value accounting (Sutton & Johnson, 1993; Johnson, et al., 1995; Miller, et al., 2016). However, there was no concurrent requirement to report comprehensive income. In fact, there were items required by new standards issued after Concepts Statement No. 3 that could have been reasonably reported as components of comprehensive income, but were instead accounted for via direct adjustments to equity (e.g., SFAS No. 52, *Foreign Currency Translations* (FASB, 1982); SFAS 87, *Accounting for Pensions* (FASB, 1985); and, SFAS 115, *Accounting for Certain Investments in Debt and Equity Securities* (FASB, 1993)).

Calls for a formal requirement to report comprehensive income, after the term was first introduced in Concepts Statement No. 3, grew through the 1990s (e.g., Robinson, 1991; AIMR, 1993; Johnson, et al., 1995; Beresford, et al., 1996; Linsmeir, et al., 1997). In fact, a plea for the FASB to require comprehensive income reporting was prominent in the Association for Investment Management and Research's *Financial Reporting in the 1990s and Beyond* (AIMR, 1993).

The FASB finally issued SFAS No. 130, *Reporting Comprehensive Income*, in June 1997. SFAS 130 required companies to report net income, comprehensive income, and other comprehensive income. Other comprehensive income comprises all items of comprehensive income that are not included in net income, which generally fell into four categories:

1. foreign currency translation adjustments;
2. available-for-sale marketable securities adjustments;
3. minimum required pension liability adjustments; and
4. adjustments on derivative securities that qualify for cash flow or foreign currency hedge accounting treatment. (Du, et al., 2016)

Annual amounts of OCI were required under SFAS 130 to be closed to AOCI in much the same way as net income is closed to retained earnings. AOCI was required to be shown as a separate line item in the equity section of the balance sheet, with disclosure also required of the components of AOCI. The requirements of SFAS 130 were effective for most companies beginning with their 1998 financial statements.

While the SFAS 130 requirement to finally report comprehensive income was welcomed by its advocates, it was not without controversy. The format of presentation was among the concerns. SFAS 130 provided three options for reporting comprehensive income:

1. displaying the components of other comprehensive income below the net income total in an income statement reporting results of operations (the one-statement approach);
2. including a separate statement of comprehensive income that begins with net income, reports each component of other comprehensive income, and ends with total comprehensive income (the two-statement approach); and
3. displaying comprehensive income as part of the statement of changes in equity. (Du, et al., 2016)

The FASB, however, discouraged use of the third method because "it hides comprehensive income in the middle of the financial statements" (Lucke & Meeting, 1998, p. 46). In fact, this concern was so significant that the FASB initially included only the first two alternatives in its Exposure Draft preceding SFAS 130. However, the FASB ultimately relented under pressure from

stakeholders, and against the dissent of two Board members, to permit the third method in the final standard (Yen, et al., 2007).

It was perhaps unsurprising, given the strong preference expressed by financial statement issuers during the SFAS 130 due process, that the vast majority of companies elected to use the third method when they were required to begin reporting comprehensive income. For example, Bamber, et al., (2010) found that less than 20% of the S&P 500 companies chose to use either the first or second reporting method in the year they first reported comprehensive income.

It might seem that, in an "efficient market," the choice of reporting method shouldn't have any effect on the judgements of financial statement users. Empirical studies conducted in the period after the issuance of SFAS 130, however, consistently found that users were better able to detect OCI-related earnings management in companies reporting via a single, continuous statement of comprehensive income (i.e., the first option above) than in companies reporting OCI using either of the other two methods permitted by SFAS 130 (e.g., Hirst & Hopkins, 1998; Maines & McDaniel, 2000). Hunton, et al. (2006) also found that managers were more likely to engage in OCI-related earnings management when using the "less transparent" reporting formats (i.e., reporting using the two-statement approach or via the statement of changes in equity).

For these and other reasons, the FASB reconsidered the options for OCI reporting. The Exposure Draft of Accounting Standards Update (ASU) *Comprehensive Income: Statement of Comprehensive Income* (FASB, 2010) proposed eliminating the options of reporting OCI in the statement of changes in equity, and of reporting via a separate statement of comprehensive income. Rather, it proposed that reporting would be only via a single continuous statement of comprehensive income with subtotals provided for net income and OCI. This proposal was in part an effort to align with the IASB standard also then under development, as well as in response to input from financial statement users (FASB, 2010, p. BC4) to increase the prominence and transparency of comprehensive income reporting.

Bowing to pressure from respondents to the Exposure Draft (Du, et al., 2016), however, the FASB relented and permitted both the one-statement and two-statement approaches in the final ASU 2011-02 (FASB, 2011). Again, perhaps unsurprisingly, the vast majority of reporting companies have elected to use the less-transparent, two-statement approach in the years after the issuance of ASU 2011-02. Mulford and Babinets, for example, reported that 98% of the Fortune 100 companies used the two-statement approach during the years 2013 through 2015 (2018, p. 230).

Various commentators have expressed concerns over the years that companies may take advantage of the "incomprehensibility" (Du, et al., 2016) of OCI reporting,

particularly with the alternatives available, to "hide losses" (e.g., Levine, 2014). For example, Chasan reported that:

> Other Comprehensive Income, which includes items initially excluded from net income in a particular accounting period, has gotten a reputation as a sort of dumping ground where companies store information that would be too damaging to earnings. (2014)

These assertions, however, had generally not been subjected to scholarly empirical study. Mulford and Babinets (2018) attempted to begin addressing this lacuna in the literature with their examination of OCI reporting by the S&P 100 companies in the years 2013 through 2015. Specifically, they described the purpose of their study as seeking to "understand whether companies are attempting to engage in selective earnings management by "hiding" losses in OCI" (2018, p. 214). Based on their study, Mulford and Babinets reported, in part, that:

> We find a systematic tendency for firms to report more losses than gains in other comprehensive income, both in frequency and amount. This result is especially true for investment-related gains and losses, where managements have more discretion in the timing of gain and loss recognition. (2018, p. 212)

It is important to note, though, that Mulford and Babinets' study was limited to an examination of OCI reporting by the S&P 100 during only the three-year period from 2013 to 2015. This leaves open the question of whether their findings are generalizable to the entire period of OCI reporting, from 1998 to the present.

RESEARCH QUESTIONS, DATA AND ANALYSIS

Our goal was to assess whether Mulford and Babinets' (2018) finding of OCI being used to "hide" losses, including particularly unrealized investment losses, was generalizable beyond the three year period they examined. More specifically, as indicated earlier, our study was focused on answering the following two questions:

1. Is OCI being used to systematically "hide" losses?
2. Is OCI related to unrealized investment income being used to systematically "hide" losses?

We decided, however, not to pursue these questions through the examination of annually-reported OCI. Instead, we chose to focus on the balances in the accumulated other comprehensive income (AOCI) account, which we believed would allow us to better recognize long-term trends in annually-reported OCI amounts. Specifically, we hypothesized that AOCI balances would be consistently and increasingly negative if OCI was being used to systematically "hide" losses. We thus reformulated the general research questions above more specifically in terms of AOCI as follows:

1. Is AOCI systematically negative over time?

2. Is AOCI related to unrealized investment income systematically negative and increasing over time?

We decided to pursue these questions by examining the AOCI reporting by the S&P 100 companies. This allowed for the most direct comparison of our results with those of Mulford and Babinets (2018). Data were gathered at five-year intervals beginning from 1999 through 2019 (i.e., for the years 1999, 2004, 2009, 2014, and 2019). To minimize the potentially confounding impact of changes in the composition of the S&P 100 over the twenty-year period, we obtained AOCI information at each of these five-year intervals for the companies that comprised the S&P 100 in 2019. Given changes in the composition of the S&P 100 over time, this resulted in fewer than 100 companies comprising the sample at some points prior to 2019. The number of companies included in our sample at each five-year point is shown in Table 1.

Table 1
Number of Sample Companies

Year	**# of Companies**
2019	100
2014	100
2009	98
2004	95
1999	90

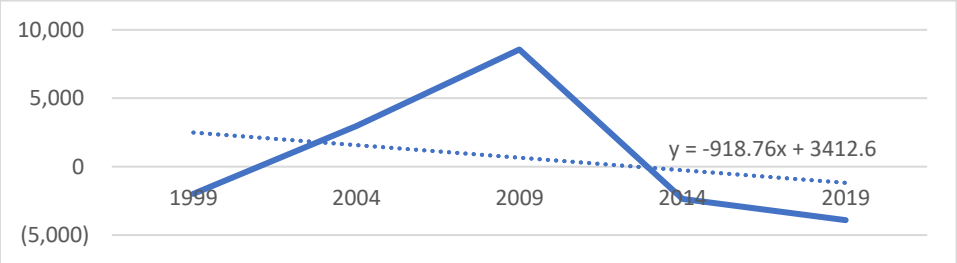
We obtained the amounts of overall AOCI and AOCI components, as well as the amounts of other selected financial statement components (e.g., retained earnings, owners' equity, and liabilities and owners' equity) for each of the sample companies at each of the five-year intervals from their Annual Reports on Form 10-K available through the SEC's Electronic Data Gathering And Retrieval (EDGAR) system. This data was used in the analyses described below.

We first computed the mean overall AOCI balance for the sample companies at each of the five-year intervals. This analysis is summarized in Table 2. We also graphed the means, to assist in discerning patterns. The graph of the mean AOCI at the five-year intervals examined is presented in Figure 1. The graph in Figure 1 also includes a linear regression line and equation. While we hesitate to draw any inferences from a regression analysis based on so few observations, we believe that the regression results aid in identifying the overall trend. As can be seen, there is considerable variation in the mean AOCI balances over time. However, the overall trend appears to be negative; that is, the mean overall AOCI balances became increasingly negative over time.

Table 2
Mean AOCI Balances

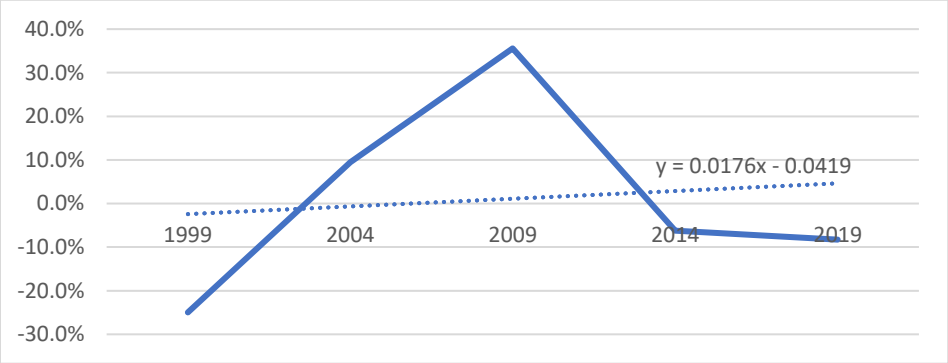
	Overall AOCI	
Year	**Mean [1]**	**% of RE**
1999	($1,986)	(25.0%)
2004	$2,977	9.4%
2009	$8,564	35.6%
2014	($2,364)	(6.2%)
2019	($3,910)	(8.3%)
1. In millions of dollars		

Figure 1
Mean AOCI Balances



We were concerned, however, that the changes in the raw AOCI means might be at least partially reflective of changes in the overall size of the firms over time. We decided, therefore, to standardize the results by dividing the mean AOCI by the mean retained earnings balances for the sample firms at the same five-year intervals. We believed this to be a reasonable approach given that the amounts in AOCI would have been added to retained earnings if they had been reported in net income rather than OCI. We repeated the process using both mean owners' equity, and mean liabilities & owners' equity as the denominator in the standardization calculation; the patterns were qualitatively the same using all three approaches. The results of this analysis are also presented in Table 2, and are shown in graphical form, including the associated linear regression line and equation, in Figure 2.

Figure 2
Mean AOCI as Percentage of Retained Earnings



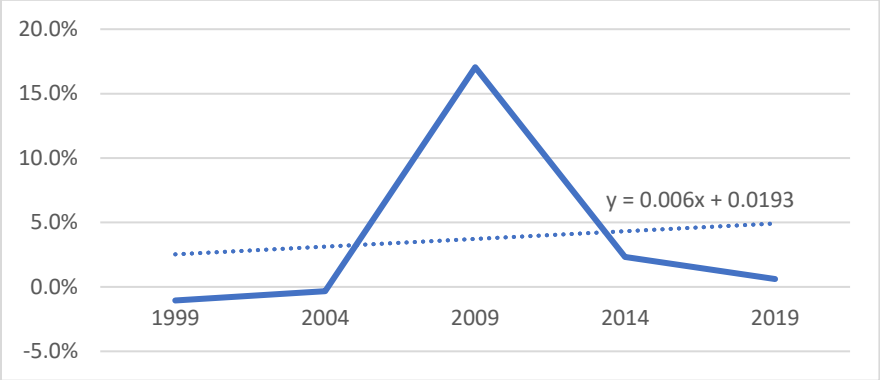
While we are again reluctant to draw inferences from a regression analysis based on only five observations, we can see that while there have been some significant ups and downs, overall AOCI as a percentage of retained earnings has averaged relatively close to zero over the twenty-year period examined. If anything, there appears to be a slight upward trend over time; that is, moving from an overall accumulated net loss position to an overall net gain position. This appears contrary to our expectation, based upon the Mulford and Babinet's (2018) findings, that overall AOCI would be consistently and increasingly negative over time.

We then turned to our second research question. There we hypothesized that the investments-related component of AOCI would be consistently and increasingly negative, if Mulford and Babinets' finding that OCI reporting was being used to consistently "hide" unrealized investment losses was robust throughout the history of OCI reporting. We applied the same approach as for our analysis of overall AOCI. Table 3 presents both the overall mean investments-related AOCI balances at each of the five-year intervals, and those means as a percentage of mean retained earnings at the same points. The mean AOCI balances as a percentage of retained earnings are then shown graphically, along with the associated regression line and equation in Figure 3.

Table 3
Investments-Related AOCI

	Investments-Related AOCI	
Year	**Mean** [1]	**% of RE**
1999	($84)	(1.1%)
2004	($101)	(0.3%)
2009	$4,104	17.0%
2014	$882	2.3%
2019	$288	0.6%
1. In millions of dollars		

Figure 3
Investments-Related AOCI as a Percentage of Retained Earnings



These analyses show that there were again some fairly significant fluctuations over time, including periods in which substantial net unrealized gains were being recorded, and other periods in which substantial net unrealized net losses were being added to AOCI; and, it is not surprising that there is a significant point of inflection around 2009, given the turmoil in financial markets at the time. However, it appears that the overall pattern has been slightly positive over time; that is, trending from the accumulation of net unrealized losses to the accumulation of net unrealized gains. At worse, the trend is relatively flat. However, it clearly doesn't show the pattern of consistent and increasing net losses that would be expected if Mulford and Babinets' (2018) finding of OCI being used to systematically "hide" unrealized investments-related losses held across the twenty-year period examined in our study.

SUMMARY AND DISCUSSION

The term "comprehensive income" was first introduced by the FASB in its Statement of Financial Accounting Concepts No. 3 (FASB, 1980). Since that time, the US GAAP reporting requirements for comprehensive income have been criticized for multiple reasons, including for: the long delay before reporting of comprehensive income was first required in 1997 (e.g., Robinson, 1991; AIMR, 1993; Johnson, et al., 1995; Beresford, et al., 1996; Linsmeir, et al., 1997); the ad-hoc manner in which items of other comprehensive income have come to be defined (e.g., Rees & Shane, 2012; Detzen, 2016; Du, et al., 2016) and, for the manner in which the choice of "less transparent" reporting methods may allow companies to "hide losses" from financial statement users (e.g., Chasan, 2014; Levine, 2014; Katz, 2017).

While multiple authors had asserted that companies may be using OCI reporting to hide losses on their balance sheets, Mulford and Babinets (2018) were among the first to subject these assertions to systematic empirical analysis. Specifically, Mulford and Babinets examined the aggregate amounts of OCI reported by the

S&P 100 companies during the three-year period from 2013 to 2015, reporting based on their analysis that:

> We find a systematic tendency for firms to report more losses than gains in other comprehensive income, both in frequency and amount. This result is especially true for investment-related gains and losses, where managements have more discretion in the timing of gain and loss recognition. (2018, p. 212)

This was an important and troubling finding. However, given that Mulford and Babinets only examined the OCI amounts reported in three consecutive years, an important question remained as to whether there results were robust over time.

It is this question that we focused on in the study reported here. Specifically, we examined the accumulated other comprehensive income (AOCI) amounts reported on the balance sheets of the S&P 100 companies at five-year intervals from 1999 through 2019 in an attempt to answer the following two research questions:

1. Is OCI being used to systematically "hide" losses?
2. Is OCI related to unrealized investment income being used to systematically "hide" losses?

Based on our examination of the patterns in mean AOCI balances over the twenty-year period we examined, we've concluded that the answer to both of these questions is "No;" it doesn't appear that losses are being systematically "hidden" over time in either overall AOCI or the component of AOCI related to unrealized gains and losses on investments. Rather, it appears that Mulford and Babinets' (2018) findings may have resulted from the relatively short period of time they examined.

Our study also has some important limitations, which we want to be sure to acknowledge. First, we only looked at 100 companies; and, in fact, fewer in the earliest years examined because of our choice to define our sample as the 2019 S&P 100 companies. Even though these companies represent a very significant portion of the overall US market capitalization, any inferences to other populations need to be made with extreme caution. Additionally, our analysis was limited to the use of aggregate measures—for example overall means and percentages calculated based on overall means. We didn't do any detailed examination of the reporting by individual companies within the S&P 100. Further, our data was gathered as "snapshots" at five-year intervals from 1999 through 2019. While our graphs show a straight-line progression from one five-year point to the next, we do not have any empirical knowledge of the patterns in AOCI during the intervening periods. However, logic would suggest that the patterns are likely much more complex than is reflected in our analyses. Additionally, we chose to standardize the mean AOCI amounts used in our analyses by the mean retained earnings balances of these companies at the same point. We considered this to be an appropriate approach to controlling for changes in the financial size of the S&P

companies over the twenty-year period examined. However, we recognize that critics may question our methodology.

These inherent limitations, and others not explicitly mentioned, notwithstanding, we believe that it is possible to draw at least some tentative conclusions and implications from our study.

First, returning to our primary research questions, it does not appear that losses are being systematically and consistently "hidden" by the S&P 100 companies in either overall OCI or the OCI component related to unrealized investment-related gains and losses. Rather, it appears that Mulford and Babinets' (2018) findings, which were the springboard for our study, resulted from the relatively short period of time they examined.

Second, we believe our study shows the value of examining AOCI, rather than annual amounts of OCI in a small sample of years, by those attempting to understand long-term patterns in OCI reporting. We hope that this will be helpful to other researchers working in this area.

Third, we want to be clear that our findings do not in any way rule out the possibility that OCI reporting is being used for purposes of earnings management, which is Mulford and Babinets' (2018) overarching inference. Rather, our results suggest that earnings management activities, if they do exist, may have different goals at different times—for example, reporting more net income in some periods and less in others—and that the objectives and associated behaviors may certainly differ across companies.

Finally, we believe our findings suggest that there may still be much more that can be revealed through further examination of OCI reporting; in fact, the existing literature appears to have merely scratched the surface of this important area. However, developing that further understanding is likely to take a more detailed approach than has been employed to date; for example, examining the patterns of reporting by individual companies or groups of companies, such as by industry grouping.

In summary, while there may still be many valid oppositions to the current OCI reporting requirements under US GAAP, we do not believe that their use by the S&P 100 companies to systematically "hide" losses from financial statement users should be among them.

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SIMULATION MODELING OF OPPORTUNITY COSTS FOR EMERGENCY FUNDS

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Abstract

Financial planners advise everyone to first build a minimum balance in an emergency funds account. The funds in the account are to be used for a personal financial emergency, kept in extremely liquid and low risk investments such as money market mutual funds, checking or savings accounts which yield low returns. There are few formal models analyzing the opportunity costs of this low return savings vehicle. Existing research looks to the existence of accounts among households and their relative levels compared to prescribed norms. Extant research does not address the cost side of investing significant sums of money in low return investments. Hatcher (2000) developed a formal model equating the benefits and costs of maintaining a low-yield emergency fund account. Holding emergency funds enables one to avoid high cost borrowing in the event of need. The trade-off is the loss of higher returns possibly received from long-term investments. Hatcher (2000) derived a simple relationship between the liquidity premium forgone with the "safe" emergency fund investments, cost of borrowing emergency funds, and the probability of an emergency occurring. We extend Hatcher's model and using the same broad framework with two simulations with combinations of stocks and bonds and random investment returns. The primary objective is to see if Hatcher's results hold in a random return world. Results suggest that the benefits from holding emergency funds may be overstated for most individuals. Deterministic simulation runs of the model using broad assumptions suggest that one needs to have rather high probability of emergencies to justify the commonly prescribed levels of funds.

Keywords: Emergency funds, financial emergency, low-yield investments, simulation, opportunity costs

Introduction

An emergency fund invested in safe, liquid assets is one of the basic tenets of most personal financial planning. Individuals are advised to first save for the emergency fund before almost all other personal finance goals. The actual amount for an emergency is often stated, as three to six months living expenses, or two or three months' salary. This amount is based on some implied high cost when one

has to face a personal financial emergency such as loss of job, serious personal injury or medical need. The implied benefit from the emergency fund is the avoidance of high costs of borrowing or costly suboptimal liquidation of investments. The cost of maintaining an emergency fund at a low rate of return is rarely discussed. There are few models analyzing the benefits and costs of a low return emergency fund.

Existing research looks at such accounts among households and their relative levels compared to prescribed norms. The available evidence finds prevalence of emergency funds only for wealthier households and those headed by educated individuals. Extant research does not address the cost side of investing significant sums of money in low return investments.

Hatcher (2000) and Scott, et al., (2013) are exceptions. Hatcher (2000) developed a formal cost-benefit model equating the benefits and costs of maintaining a low-yield emergency fund. Holding emergency funds enables one to avoid high cost borrowing in the event of a financial emergency. The trade-off is the loss of higher returns one could have earned from long-term investments. Hatcher (2000) found that given the normal differential between return on the emergency fund investments and the cost of borrowing emergency funds, the probability of an emergency has to be fairly high to justify holding a low return emergency fund. Hatcher uses simple simulation runs with constant returns to prove his model's conclusions.

Scott, et al., (2013) used more complex models comparing the wealth effects of holding emergency fund assets in cash against portfolios of varying stock-treasury bond compositions. Their research also found evidence that an all-cash emergency fund account is not optimal and reduces individual wealth.

A simple example can easily illustrate the cost of holding assets invested in low-yield investments for ones' lifetime. An account holding $20,000 in emergency funds for 40 years and yielding an annual rate of 2% is effectively giving up over $100,000 in retirement wealth, if one assumes even 6% return on the alternate investments.

Our paper is organized as follows. First, we review the literature on emergency funds and personal financial planning. Second, we present our two models. Next, we discuss the simulation results. The final section offers a summary, suggested further research, limitations, and concluding comments.

Literature Review

According to Keown (2016, p.41), an emergency fund is "a reserve or rainy-day fund with money set aside to be used in an emergency, when an unexpected expense is incurred or when normal income is disrupted". Illness, loss of job, or any other unfortunate event can create a financial strain on individuals and families without any liquid assets (Winger & Frasca, 1997, p.60). Liquid assets are defined as "cash and investments that can easily be converted into cash, such as checking accounts, money market funds, and certificates of deposit" (Keown, 2016). In order to provide income in emergencies, these assets should be highly liquid and low risk. Greninger, Hampton, Kitt and Achacoso (1996) surveyed 156

financial planners and educators and found that the average recommendation for an emergency fund was three months of living expenses. In addition, most textbooks on personal finance recommend a fund of three to six months of living expenses (for example, see Keown, 2016, p. 41; Kapoor, Dlabay, & Hughes, 2015, p. 100). However, the Survey of Consumer Finances, found that only about one-third of households actually save these amounts for emergencies/income shocks (Johnson & Widdows, 1985; DeVaney, 1995; Chang, 1995; Chang & Huston, 1997; Bhargava & Lown, 2003).

Johnson and Widdows' (1985) study viewed emergency funds in three stages of liquidity: quick, intermediate, and comprehensive. The most liquid funds, such as checking, savings, money market accounts, and money market funds were considered quick funds, while intermediate funds also included certificates of deposit. By contrast, a comprehensive investment would include stocks, bonds and mutual funds, for their emergency funds. This combination of investments was expected to provide liquidity along with positive real rates of return.

Since financial emergencies are rare, Clements (2001) agreed with the comprehensive approach in order to keep up with inflation and taxes. Lown (2004) also advocated this strategy suggesting that "educators should explain how to structure emergency funds on a sliding scale, trading off liquidity for higher returns" (p. 33). She recommended a savings account or money market fund for quick funds, short-term (3-6 months) certificates of deposit and government EE and I bonds for intermediate term. The mix of stocks, bonds and mutual funds can provide investments for long-term financial goals while also providing a cushion if a financial emergency occurs.

Bi and Montalto (2004) suggested acquiring a home equity line of credit as an alternative to an emergency fund because of lower interest costs than credit cards, etc. However, low-income households may not have access to this type of borrowing and may have to employ: informal lending, skipping another payment, payday lenders, pawnshops, auto title pawn, refund anticipation loans, credit cards, retirement/pension loans or liquidation, or life insurance draws (Chase, Gjertson, & Collins, 2011). These sources of credit have higher costs than conventional types of credit.

According to their study based on risk management theory and the permanent income hypothesis, Baek and DeVaney (2010) suggested when families are confronted with economic hardships about 34.12% used savings or investments and 50.46% used credit. Although the opportunity cost of maintaining an adequate emergency fund could make the use of credit more desirable, the use of credit is riskier for some families and may not be available except at high costs.

Hatcher (2000) used a cost-benefit analysis to determine whether putting money in an emergency fund consisting of liquid assets is financially beneficial. In his study, the cost of having an emergency fund would be what one may earn on higher return non-liquid assets and the return on liquid assets. The benefit of having an emergency fund would be what one would have to pay to borrow money in case of a financial emergency. He concluded that, emergencies would have to occur often in order for the costs of holding a liquid emergency fund to offset the

benefit. For the emergency fund to be justified, the liquidity spread would have to be greater than 8%, borrowing costs more than 15%, and the emergency would need to occur more than once per year.

Scott, et al., (2013) furthered Hatcher's (2000) study by including utility theory and risk tolerance in the use of emergency funds. Using a simulation-based approach, they compared funds invested in different levels of equities to an all-cash emergency fund. They found that an all-cash emergency fund may not be utility maximizing for households due to lost returns on higher yielding equities. They suggested, "practitioners should reconsider the 100 percent allocation of cash in an emergency fund" guideline. They should treat wealth as fungible and consider investing a portion of emergency funds assets in the market to "improve efficiency and overall, long-term wealth" (p. 61).

The Hatcher Model

Hatcher (2000) used a simple model comparing the accumulated wealth of an individual holding an emergency fund account (E-Fund) which had 15% of his income invested in safe, low-yielding assets. The individual was assumed to save 10% of his annual income and will first build the E-Fund before investing in higher return assets. A financial emergency was assumed to occur every 4 years, when the E-Fund was used to meet the needs of the emergency expenses. The individual replenished the E-Fund from his savings again before investing in higher return investments. Hatcher assumed constant returns for both the E-Fund investments and the higher return investments. The assumptions of Hatcher's (2000) model are given below in Table 1.

Table 1: Hatcher (2000) Model Assumptions

Parameters	Hatcher Model
Saving as percentage of income	10%
Emergency Fund as percentage of income	15%
Return on Investment Fund Assets (Constant)	10%
Return On E-Fund Assets (Constant)	4%
Borrowing Rate (Constant)	16%
Accumulated wealth with E-Fund	26.14
Accumulated wealth with no E-Fund	27.28
Ratio of wealth: No E-Fund/E-Fund	1.04

Source: Hatcher (2000).

The accumulated wealth values of 26.14 and 27.28 should be interpreted as the multiple of one's annual income. Hatcher (2000) also used an alternate model with emergency occurring every eight years with lower cost of borrowing and also lower returns. We did not use this alternative as this is even less favorable for the E-Fund alternative.

OUR MODEL

We extend Hatcher's model, and using the same broad framework, run simulations with random investment returns. We replicated Hatcher's (2000) model by using random returns for the investments. This approach captured the potential risk in not having an E-Fund. We assumed random returns with normal distributions and run simulations with two different sets of assumptions to compare accumulated wealth over a 40-year period for an individual with an E-Fund and another with all funds invested in a risky asset portfolio with the given returns, and the returns generated randomly.

The difference between the two models is the rate of return assumption. Model 1 uses a return of 10% that approximates to the historic returns of a portfolio combination of 80% stocks (S & P 500 index) and 20% 10-year Treasury bonds. Model 2 using a return of 8 % would represent a portfolio combination of 40% stocks and 60% bonds. Our models and the simple framework can be easily adapted for a wide range of different assumptions. Our model assumptions are given below in Table 2.

Table 2: Comparison of Assumptions of our Two Models

Parameters	Model 1	Model 2
Saving as percentage of income	10%	10%
Emergency Fund as percentage of income	15%	15%
Return on Investment Fund Assets	10%	8%
Standard Deviation of returns	16.7%	13.3%
Return On E-Fund (Constant)	4%	2%
Borrowing Rate (Constant)	16%	12%

Simulation Results – Model 1

We used simulation modeling because this was used in the original project (Hatcher, 2000). We ran 1000 simulations of each model. We used Excel spreadsheets to generate random normal returns based on the mean and standard deviations. It should be mentioned that this approach was prone to give some extreme values. Because of the extreme values that are produced by some of the simulation runs, the median values should be seen as a better reflection of the likely portfolio performance than the mean. The No E-fund portfolio shows a median value of 22.51 against the E-Fund alternative value of 19.69. In other words, not having an emergency fund invested in low return assets can result in 14 percent higher net worth. These numbers represent multiples of the investor's annual income.

It should be mentioned that not having a zero-risk emergency fund can result in more uncertain outcomes. This was reflected in the extremely low minimum and very high maximum values produced by the simulation runs. The results of the simulation for Model 1 are given below in Table 3.

Table 3 – Results of Simulations-Model 1

	E-Fund	No E-Fund	Ratio No E-Fund/E-fund
Accumulated Value - Mean	25.69	2232.44	86.91
Accumulated Value – Median	19.69	22.51	1.14
Standard Deviation	20.26	15,513.83	
Maximum	153.99	277,478.5	
Minimum	0.89	0.18	

Simulation Results – Model 2

With a lower rate of return assumed, the accumulated values are lower compared to Model 1 results. Again, the no E-fund alternative shows higher median and mean values compared to the E-Fund choice with the median accumulated value at the end of the 40-year period being 15% higher compared to the E-Fund alternative.

The results of the simulations support the case that having a dedicated E-Fund with low investment returns can result in significantly lower wealth accumulation. Of course, not having an E-Fund can result in some volatile outcomes. The median values are better indicators of performance for the two alternatives. Our results combined with that of Hatcher (2000) and Scott, et al., (2013) clearly show there is a need for a new approach to determining an emergency fund for most individuals. One has to consider the nature of a probable emergency, the likely probability, as well as the best investment asset, if one decides to have an emergency fund. Results for Model 2 are given in Table 4.

Table 4 – Results of Simulations-Model 2

	E-Fund	No E-Fund	Ratio No E-fund/E-fund
Accumulated Value - Mean	15.03	249.87	16.63
Accumulated Value - Median	12.58	14.51	1.15
Standard Deviation	9.75	830.52	
Maximum	80.14	10,451.6	
Minimum	2.51	0.19	

Discussion

Personal finance textbooks, and most financial planners routinely recommend that individuals should build an emergency fund account as the first step in a sound financial plan. It is also usually suggested that the emergency fund account is best invested in safe, liquid, low yield assets. This recommendation

ignores the opportunity cost of lost investment returns over long periods, resulting in possible loss of wealth accumulation opportunities. Our model, which is an extension of earlier work by Hatcher (2000), and simulation runs using random returns suggest that a separate emergency fund account is not necessarily optimal. Individual financial plans should consider the likely cost of maintaining an emergency fund with low return investments in the light of the likely probability of a financial emergency occurring. We recommend a comprehensive approach, as suggested by Scott, et al (2013) and Johnson and Widdows (1985), that includes different asset classes as part of the emergency funds portfolio. This portfolio could provide liquidity without sacrificing return opportunities. The composition of the emergency fund portfolio should change, in line with the individual's wealth and other assets she has. The approach should consider access to available low-cost lines of credit.

Conclusions, Limitations, and Recommendations

Our results support Hatcher's (2000) conclusions. The emphasis on a separate emergency fund account invested in low yield assets may be misplaced. It is suggested that the concept of a stand-alone emergency fund account needs to be reconsidered with specific recognition of the opportunity cost involved and the probability of a potential financial emergency. A one-size fits all approach needs to be changed.

The current project has limitations, like any research project. First, the data is based on simulations rather than real events. Second, the data uses historic stock market returns which may or may not be reflective of future returns. Third, the frequency of emergencies is impossible to predict, as the COVID 19 crisis, the housing boom and bust, and weather disasters show.

There are many opportunities for further research on this topic. The 2007 financial collapse and the COVID 19 pandemic stretched the viability of emergency funds for many families. A systemic economic emergency could pose a risk that models haven't considered. Under the current health system, medical costs continue to escalate and insurance companies are transferring those costs to consumers in the form of higher premiums and larger deductibles. This might precipitate an increased occurrence of financial emergencies. One might want to consider varying the size and frequency of the financial emergencies to determine impacts on emergency fund parameters. Another potential area of research is risk aversion relative to the emergency fund portfolio. Fan, Chang and Hanna (1993) incorporate risk aversion into a two-period model of when it is optimal to borrow. Shorter time horizons between emergencies could impact the viability of a riskier portfolio and require borrowing more often. Finally, this paper doesn't address the need for an emergency fund when a person has retired. The same analysis could be done for those who are retired or with fixed incomes.

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