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Editorial Objective
The Michigan Journal of Business intends to provide undergraduate students worldwide with a platform for exceptional work in the field of business. The Journal seeks to publish distinguished theses, empirical research, case studies, and theories in issues relating to areas of Accounting, Economics, Finance, Marketing, Management, Operations Management, Information Systems, Business Law, Corporate Ethics, and Public Policy. The Journal is distributed and cataloged in prestigious university libraries around the world, and is enlisted in the Directories of Open Access Journals (DOAJ), a scholarly journal database that enlists more than 3000 of the world’s leading publications. The contemporary business environment is exceedingly complex. Analyzing this real world phenomenon through traditional applications of theories often yield a suboptimal understanding of the world. The Journal, accordingly, encourages work that takes an interdisciplinary approach to understanding a topic and emphasizes the importance of incorporating the knowledge of liberal arts into an area of interest. By providing a venue to recognize high quality work, the Journal gives an incentive for students to explore their area of interest, rewarding them with the experience to share the power of knowledge with
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others. The Journal’s mission and philosophy parallel the mission of the University of Michigan, the premier research university in the United States.

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The Journal only accepts works from undergraduate students or works completed during undergraduate study. Each manuscript submitted should include a short abstract, author information, and any acknowledgements. Papers will be evaluated based upon sound analysis, originality of argument, and novelty of research. For more information on submitting article for publication, please visit www.michiganjb.org.

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The organization is entirely student-run, with an editorial staff of about 20 of the top students at the Department of Economics and the Stephen M. Ross School of Business at the University of Michigan. Each semester, the Michigan Journal of Business calls for papers from undergraduate students around the world. Throughout the semester, the editorial board carefully reviews, selects, and edits exceptional work for publication. Faculty willing to advise the Journal is formed from each department to give minor oversight for the project. Throughout the process, a blind review process is implemented to ensure an impartial review of all submissions.

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Editor’s Note

The Michigan Journal of Business is proud to present its tenth volume of exemplary undergraduate papers. Founded in 2007, the Michigan Journal of Business remains committed to its goal of recognizing outstanding undergraduate research. The editorial board would like to thank everyone who contributed to the success of this edition. Thanks to the support of the Stephen M. Ross School of Business, we are able to distribute the printed publication to libraries across the country. We would also like to thank the staff at the Stephen M. Ross school of business and all the authors who contributed to the journal this semester.

Our publication process begins with a call-for papers when we reach out to universities around the world. Then, our editors get to work reviewing and analyzing the submissions from undergraduates. We then select the most outstanding papers from a truly impressive pool and begin to edit and revise them. After extensive deliberation, the editorial board selected these papers for publication.

This issue contains three articles. First, TJ Ragsdale offers a rigorous examination of financial speculation and the intellectual debate surrounding the boom and bust cycle. His paper adds to the scholarly literature that attempts to reconcile theoretical economics with human behavior. The second article, written by Rizwan Syed, attempts to understand the driving factors that determine the price of gold. In contrast to Ragsdale, Syed seeks to identify variables that are fundamentally tied to gold prices. Finally, Tajano Minnis delves into the inner workings of the Bahamian labor force.

I would also like to thank Ryan Kim for his help on our website and Russell Schindler for his help designing the cover of this edition. Lastly, I would like to thank graduating seniors Anna Prenzler, Grace Campbell, and Imaad Zaidi for their contributions to the Journal over the past few years.

Joel Goldstein
Editor-In-Chief
Animal Spirits: The Analysis of Fundamental Speculation

TJ Ragsdale
Washington University in St. Lewis

Abstract

In this paper, I set out to debunk pervasive macroeconomic theory relating to the boom and bust trajectory of financial markets and explore some alternate, potentially more realistic theories for why the U.S. (and global) economy insists upon such disjointed stop and go progress. Specifically, I will focus on the expansionary phase of economic progress, the boom, or as we will learn as the paper progresses, the bubble. In order to best demonstrate the concepts, I will first present the counterargument, which argues for the ruthless omniscience of markets and then proceed with the most compelling critiques of such a viewpoint. The Efficient Market Hypothesis’ assumptions are fundamentally flawed, requiring various in sundry leaps of faith to validate. Instead, a more applicable framework must be considered to justify the patterns of the market: the capital markets are orchestrated by a reflexive process, whereby fundamentals mean relatively little, and cognitive biases dictate the majority of price movements.
Section I. Introduction: The Dutch Tulip

In the early 1600’s, the Dutch Tulip had earned itself a niche in the Netherlands. It was a culturally sought after signifier of economic or social standing. After the flower had bloomed in the May or June months, it was taken from the soil and kept dry inside, only to be replanted in September or October and left through the winter. During the summer’s “dry bulb time”, connoisseurs or liefhebbers, much like those who analyze grape harvests at wineries, would evaluate the yellowed bulb. The tenets by which bulb quality was determined were fairly standardized, thus resulting in relatively few discrepancies in reservation price. Like in the international markets for coffee or cocoa, buyers were relatively uniform in their valuations of the commodity and thus profit-making opportunities were scarce. From year to year, the going rate would vacillate slightly, not because the objective value was actually changing, but because weather conditions and thus supply was variable.

By 1634, the marketplace for tulips had changed in nature. Tulips were sold by weight while still rooted, with a promissory note to detail the character of the flower, namely its planting weight and planned lifting date. Bulbs were not sold, but rather rights to bulbs. Such slips of paper were reminiscent of the bearer bond: a promise from a government or company to deliver payments at a predetermined time to the bond holder upon presentation of the slip. The transition to weight-based sale was a fairer, more objective system. A smaller juvenile bulb should be worth less than a mature one. Furthermore, the heavier bulbs tended to sprout offset bulbs, which could be sold individually for additional revenue. The heavier bulbs with offsets could not be sold too early because the owner
then foregoes the ability to replicate his crop identically. By this time, tulip preference had diversified and certain varieties of bulb had come into favor. Thus, a grower would not be wise to sell an offset-heavy bulb of an optimal variety too early, because he/she foregoes the enviable position of being the sole grower of such a desired variety in the market. Because bulbs planted in September were bound to weigh more when they were lifted the next May, speculation naturally wandered into the market. Buyers began to speculate that the promissory notes they held, giving them a right to delivery for a fixed price, would be worth significantly less than the bulb, the underlying asset, at lifting. These notes could thus be sold to other buyers for profit. The scrutiny of bulb value and subsequent profit-seeking speculation were no longer solely activities for the *liefhebber*, but rather the carpenter, baker, and weaver.

Experiencing the tremendous appreciation of tulip prices, artisans and craftspeople became involved. Given the not yet developed function of bank credit, they frequently provided deposit in kind (goods, property, and services) when money was unavailable. Prices had been driven so high that people would deposit farmhouses, plots of land, and even their homes for the plant. In one spectacular case, “for a single Viceroy (rare), valued at Fl. 2,500, two lasts (a measure that varied by commodity and locality) of wheat and four of rye, eight pigs, a dozen sheep, two oxheads of wine, four tons of butter, a thousand pounds of cheese, a bed, some clothing, and a silver beaker were exchanged.”

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Speculation of such nature was inherently risky, as buyers had put their own assets down as deposit, so they relied solely on the appreciation of the tulips before lifting season in order to pay the remaining balance. Despite the risk to these novices’ livelihoods, commoners flooded into the seemingly lucrative market.

The contagious bidding that transpired during the 1636-37 winter paid no heed to the dearth of legitimate, fundamental rationale for the herd buying. Until it did. At some point, the smarter buyers became cognizant of the ‘irrational exuberance’ (Shiller; Greenspan) that had intoxicated market participants and ceased participating. Once there were more sellers than there were buyers, the asset values stopped appreciating. Once asset values stopped appreciating, people scrambled to sell tulips, regardless of the severe losses they would have to take. The market collapsed in a fraction of the time it took to reach its top. Thousands of commoners lost their deposits, which were often their family’s property and means of sustenance, and people became frugal. The subsequent drop in consumer spending took the economy by storm and precipitated an economic crisis in the Netherlands. ²

The Dutch Tulip Mania was the first recorded instance of the common speak term ‘a bubble’. Inherent in the designation, a bubble is characterized by an inflation of expectation. A bubble takes hold when the market price for a given asset or set of assets deviates markedly from the intrinsic value of that same asset. Bubbles have appeared throughout economic history, in nearly

every continent, and have been set off by nearly every asset class. The examples range from the ancient South Sea Bubble to the Japanese housing bubble to the Californian model home bubble to the subprime lending bubble. Bubbles are not simply a construct birthed by the rapid increase in productivity of the 20th and 21st centuries. They have existed since speculation was possible.

Section II. The Efficient Market Hypothesis

Eugene Fama’s Efficient Market Hypothesis is the backbone (or at least several vertebrae) of the prevailing paradigm in modern economic theory. His idea holds that capital markets’ primary function is the allocation of ownership of the economy’s capital stock. Prices are to provide accurate signals for the optimum allocation of resources. In this case, firms can prudently make operational decisions and investors can choose among the securities that represent firms’ activities under the assumption that market prices of securities accurately “fully reflect all extant information” (Soros). This dynamic is epitomized by the adage ‘the market is a discounting mechanism’, which claims that all public information is built in to a stock price at any given time. This includes past, current, and future activities. For example, Goldman Sachs share price is currently trading at $164.07. Those who believe markets are

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fully efficient will explain that this price perfectly quantifies what Goldman Sachs is worth at the moment. Information that is priced into the share price includes discounted cash flows (dividends and future earnings), past performance, macroeconomic climate, management competence, competitive advantage, chances of interest rate hikes, anticipation of potential mergers & acquisitions, etc. EMH pundits are thus strong believers that consistent returns above the market average are not possible to achieve, since biases and thus mispricings do not exist in our capital markets.

‘Alpha’, return in excess of the market indices, is evidently impossible to achieve because all market participants use a formal process for making rational decisions, and thus price-value discrepancies are nonexistent. They consider all options available to them, think on each option’s outcome, and weigh how beneficial such an outcome will be to them or their portfolio. They will then ruminate on the possibilities of each of the options they considered. Finally, they will make a decision on which securities to buy or to sell. Cognitive biases do not enter the EMH picture. It is needless to say that believers of such a hypothesis do not believe in the existence of bubbles, because a bubble implies divergence between market prices and the real value of securities. Eugene Fama has been quoted saying “I do not even know what a bubble means.”5 He and followers of his tenets will explain that when a boom and bust sequence presents itself, there is legitimate economic rationale for the gradual rise and sudden plummet that does not include an

inflation and subsequent bursting of expectations. Such people hold that physical circumstances change throughout the chart formation to warrant the nature and sequence of events. Examples of such rationale include GDP growth, corporate earnings growth, productivity growth, optimal trade balance, increased profit margins, innovation, or any other physical progression of the corporations.

It may very well be the case that market prices are accurate reflections of such quantitative measures of progress. However, as we will see, the pervasive belief that there is a solely one-directional relationship between corporate performance and security prices is spurious. Markets are not fully efficient, and the independent and dependent variables in such an equation are actually interchangeable. As we will see, cognitive biases, or ‘Animal Spirits’ (Keynes; popularized by Greenspan) are significant contributors in advancing or regressing corporate “fundamentals”—the very fundamentals that mainstream economic theory holds as the basis by which the market participants rationally allocate ownership of corporate activity.

Section III. Critique: Behavioral Finance and the Role of Animal Spirits

Keynes coined the term ‘Animal Spirits’ in his “The General Theory of Employment, Interest, and Money”. In discussing the suspicious inclusion of total rationality in economic theory, Keynes holds: “of our decisions to do something positive, the full consequences of which will be drawn out over many days to come, can only be taken as a result of animal spirits—of a spontaneous
urge to action rather than inaction, and not as the outcome of a weighted average of quantitative benefits multiplied by quantitative probabilities.” Much of the capital allocation process is not one of objective calculation, but rather it is littered with ‘gut instinct’ and cognitive bias. People will often succumb to non-economic motives.

An epistemic missionary for Keynes’ teachings, Robert Shiller, with help from George Akerlof, took Keynes’ latent idea of animal spirits and translated it (translations from language to language are never perfect, or exactly as the original speaker intended) into a list of tenets in his book *Animal Spirits: How Human Psychology Drives the Economy, and Why it Matters for Global Capitalism*. These tenets include Confidence, Fairness, Corruption and Bad Faith, Money Illusion, and Stories. Corruption and Bad Faith and Stories will not be visited in this analysis. Corruption-driven events, like the Enron accounting scandal, will surely precipitate mass flight from any related market but are less important to our discussion. Our tendency to craft shoddy narratives out of randomness is surely an important consideration within cognitive biases, but the nature of the proof is so intangible (non-quantifiable, amorphous) that the *strong* and even *semi-strong* EMH supporters will scoff. Its relevance is indubitable, but the three other arguments are more convincing and lend themselves to constructive discussion in a realm between the poles.

**Section III-1. Confidence**

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The definition of the term confidence implies a deviation from objective evaluation. When people feel confident, they will go out and buy—stocks, bonds, cars, houses, etcetera. When they are not, they sell their assets. The Netherlands, a country frequently caricatured for its circumspection, was home to the first betrayal of guidance by confidence during the tulip bubble. A similar story unfolded during the South Sea Bubble when Isaac Newton, one of the most objectively calculating minds on the planet at the time, lost his shirt in the blowup. The notion that every time people are to make decisions they will consider all options and calculate the utility of each is preposterous. Even if they wanted to, there is no surefire way to identify the inputs; probabilities and outcomes. Thus, people resort to what feels right.

In Keynes’ writings, he discusses a metric that has been dubbed the Keynesian multiplier. The mathematics behind it are seemingly simple, but the implications vast. The logic goes as follows. An initial government stimulus will put money into spenders’ hands. People will go out and actually spend a portion of this money on goods and services, a percentage called the marginal propensity to consume. Because “one man’s spending is another man’s income” (Keynes), the exact same MPC (marginal propensity to consume) dollar amount will go into an earner’s wages. Part of the wages go towards an additional round of spending, the MPC^2. Round after round transpires. The sum of the effects of a single government dollar can be represented with the following formula: $1 + $MPC + $MPC^2 + $MPC^3 + $MPC^4 or 1/(1-MPC). The result is the Keynesian multiplier. Giving an otherwise incomprehensible occurrence meaning, the implications of the
metric helped to explain much of what had occurred during the Great Depression. The theory holds that a small dip in expenditure by first-stage recipients of government stimulus can have a greatly amplified future effect. If a small but real dip in consumption occurs in response to an overreaction to a stock market downtrend, such as the 1929 decline, then this serves as a de facto negative government stimulus. A depression can insidiously materialize as the multiple interrelated rounds of expenditure hits hack away at corporate sales numbers.

The Keynesian multiplier received unanimous acclaim and became the basis for Jan Tinbergen’s mathematical mappings of both the Dutch and US economies. Eventually, these intricate paradigms matured into the all-encompassing Project Link, which, comprised of thousands of equations linked together econometric models of every major economy. Such extensions of Keynes’ original formula have minimal provision for the role of animal spirits and Keynes was thus skeptical of them. The issue with such models is that they attempt to mathematically quantify abstruse phenomena by incorporating variables meant to represent fundamentals. However, confidence has a direct role, linked closely with the Keynesian multiplier, at least in its implications. Multipliers, such as the Keynesian multiplier, the money multiplier, and the fiscal multiplier, are considered and used with regard to conventional, visible variables. The multiplier concept just as well applies to intangible variables. “Thus there is not only a consumption multiplier, an investment multiplier, and a government expenditure multiplier, which represent the change in income that occurs when there is, respectively, a $1 change in consumption,
investment, or government expenditure. (Animal Spirits) There also exists (not in the models) a confidence multiplier, that indicates the change in income that follows a one unit change in confidence.

Using the Michigan Consumer Sentiment Index as a proxy for consumer confidence, studies have been conducted which attempt to determine the significance of confidence in the investment climate. Even when results suggest high levels of significance, they do not necessarily imply that animal spirits or confidence play a role because a proxy can only ever serve as an approximation for the desired measurement. Despite the complications, the research supports the claim that changes in confidence are correlated with changes in income, although the link is much stronger during economic downturn than it is during an upswing or any other average period. Olivier Blanchard characterized the 1990-1991 recession (sometimes referred to as the Kuwaiti recession, given the significance of oil price spikes in response to Kuwaiti invasion by Saddam Hussein) in such terms. The confidence index registered an otherwise inexplicable shock just prior to the recession. Blanchard figured such a hit represented the wave of pessimism that took hold of the American public following the invasion. The loss of confidence sparked a subsequent reduction in consumption. Wavering confidence naturally has serious implications for credit, a market mechanism that will be revisited later in the paper. In times of diminished confidence, lenders have little faith that they will recover their interest and principal and as a result, spenders wanting to consume find it difficult to secure the credit necessary. In turn, suppliers and retailers of goods have trouble building working capital they need to
innovate and create. Finally, the typically impactful government levers (quantitative easing, monetary policy, tax breaks) fall flat. 7

Section III-2. Fairness

Although markedly less significant to bubble formation than the previous section, an empirical consideration of fairness illuminates, perhaps in the most transparent way, the non-rational motives that people act on. Fairness’ importance to most economic theory can be explained by its positioning in the typical economics textbook: the last chapter. However, the extensive studies of fairness do indicate that concerns of fairness will trump a person’s objective rationality.

Study A: Danny Kahneman, an Israeli-American psychologist, in conjunction with economists Jack Knetsch and Richard Haler, built a study whereby they logged participants’ responses to a variety of vignettes, asking whether an action was acceptable or unfair. The first scenario is widely documented: A hardware store increases the price of snow shovels directly after a serious snow storm. Traditional economic theory supports such a move, as the increase in demand should correspond to an equally forceful increase in price. 82% of respondents, however, thought a price hike of 1/3 was

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unfair. The rationale: the hardware store has no increase in cost and is thus taking advantage of its customers.

*Study B:* A similar study was conducted relating to a person’s willingness to pay for a beer on the beach on a hot day. A friend inquires as to what the subject’s reservation price is for a beer purchased at two different locations, a corner grocer and a swanky hotel. If people are perfectly rational, they will consider only the utility of a cold beer on a hot beach day, and their reservation price will remain fixed, regardless of the purchase location. It turns out that most subjects will forego the enjoyment of the beer if the grocer charges “too much”. This cannot possibly be because they are unwilling to sacrifice the extra money for the beer; they are ready and willing to pay it at the hotel. It must hold that the subjects believe it is *unfair* for the grocer to charge a price that is above their maximum.8

**Section III-3. Money Illusion**

In his 1928 book, *The Money Illusion*, Irving Fisher detailed a narrative of a woman who believed that her 1915 $50,000 bond was worth just as much years later. As is the case for many, she was unable to separate the nominal and real values of the security. Inflation had of course eroded her purchasing power. Natural Rate Theory holds that all labor contracts should reflect cost-of-living-adjustments, but only 19% of them do. Even of that minority, most

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only activate such adjustments when a certain inflation threshold is tripped. Furthermore, laborers resist wage cuts during times of deflation, despite their unchanged or even relatively (relative to the year prior, not their most recent paycheck) greater purchasing power. People fail to focus on the goods and services that can be acquired and instead tunnel in on the dollar amount. In the absence of money illusion, pricing and wage decisions are influenced solely by relative costs or relative prices, but such a dynamic rarely holds. Nominal values are usually in the spot light. Kindleberger (paraphrasing Minsky), in Chapter 3 of “Manias, Panics, and Crashes”, sheds light on money illusion’s capacity to catalyze a bubble. In an upturn, he reasons, consumer prices increase (as do wages) and while rates follow suit, they do not climb proportionally. Instead, they lag, which results in a declining real rate of interest. Lenders, who have been historically guilty of money illusion, ignore the decline in the real rates. Borrowers will typically recognize the disproportionate rises in the CPI and fed funds rate, and will capitalize. They buy additional stocks or real estate in the diminishing real rate environment. Equity and real estate protect investors from the low real discount rate while affording them a slice of the growing pie of animal spirit-induced profit. From here, one can see how mass money illusion proves as a key ingredient in the inflation of a bubble.

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Section III-4. The Case Against Rationality

Shiller and Akerlof handedly hammer home the point. Rationality is idyllic. The statement should be an axiom of economic theory by now, but it isn’t. The efficient market hypothesis is a great prescriptive tool that can be used to describe the workings of an economy in a very conceptual sense. It should be used as an instructive paradigm to how the market \textit{should work}, not how it \textit{does work}. However hard they are to quantify, cognitive biases do play a role and must be included in modern theory. Obtaining a profound understanding of the fluctuating role of irrationality in markets can provide a handsome return. Such has been the case with George Soros.

Section IV. Critique: Reflexivity

George Soros is a long-time hedge fund manager and chairman of Soros Fund Management. Prior to the dotcom bubble of 2000, Soros’ flagship fund, Quantum Fund, achieved average annual returns of 30% for over 30 years. Soros was known as the “man who broke the bank of England” ever since he earned $1 billion betting against the artificial buoying of the British sterling against the Deutsch mark. His consistent ability to outperform the market would suggest that he was either blessed with 30 years of positive fortuity or the markets’ inefficiencies did exist and could be capitalized upon. The latter seems more tenable. Soros designed his allocation strategies around the concept of ‘reflexivity’, or as some other like-minded, but more sociology-oriented experts have labeled
it, ‘performativity’. I believe it is proper to flesh out the principle in Soros’ verbiage as it is his interpretation that has guided him to great success as a manager.

In a situation that has thinking participants, there exists a two-way relationship between the participants’ thinking and the actual situation in which they are taking part. When Soros bet against the Sterling’s de facto pegged exchanged rate against the Mark, he was expressing an expectation that in the future, given the unsustainable deployment of currency reserves required, the fixed exchange rate could not continue and was thus not currently a reliable fundamental. His large-scale currency shorting was mirrored by imitators, which in turn, actually moved the currency in his desired direction. The equities market is another prime example of such a dynamic. In this realm, market prices are widely seen as a backward-looking reflection of market fundamentals. Market fundamentals are assumed to be ‘objective’ standards by which market participants base their allocation decisions. The market fundamentals are treated as the incontrovertible independent variable and allocation decisions are the dependent variable. Soros explains that, in reality, this is not the case.

He first invalidates the veracity and relevance of the theory of rational expectations. The belief in the theory is a primary driver


of subscription to the market efficiency school. The theory asserts that those who participate in markets structure their decisions around the assumption that other rational participants will reciprocate such objective rationality. However reasonable this sounds, there is one irrefutable dynamic at play that foils it: participants do not orient their actions on the basis of their actual best interests, but rather on their perception of their best interest. These two conditions are in fact not the same. Investors have an imperfect understanding and their allocation decisions have inadvertent consequences.12 "There is a lack of correspondence between expectations and outcomes, between ex ante and ex post, and it is not rational for people to act on the assumption that there is no divergence between the two." 13

Rational approaches to investment are few and far between, more easily achieved by systems than by man. Capital allocation strategies fall under two main veins of practice: technical analysis and fundamental analysis. Technical analysis makes abundant use of market patterns (charts) and concerns itself primarily with the supply and demand. Soros does not attack the practice of technical analysis, which can surely calculate probabilities, but has no consistent capability to predict real events. On the other hand, fundamental analysis is of great importance to Soros’ scrutiny, as it

is a purveyor of Equilibrium Theory. Equilibrium Theory explains that a stock has a fundamental value, which can be quantified by the earning power of the asset underlying, or can be determined through relation to fundamental value of other stocks in an exchange.\textsuperscript{14} The market price should never drift far from the fundamental value, and as it drifts, it will always return back into lock step with the intrinsic value. The existence of this dynamic makes fundamental analysis a useful road map for making lucrative investment decisions. This dynamic, however, does not accurately describe reality, as it operates upon the fallacy that there is a one directional connection between stock prices and the companies whose stocks are traded.

Stock valuation is a positive action that has an impact on the very corporate fundamentals that stock valuation is based upon. It is understood that the fortunes of companies determine the relative values of stocks traded on exchanges, but the chance that stock market accelerations and decelerations can affect the fortunes of these companies is discarded. The consensus view regarding the theory of price serves as a serviceable parallel to illuminate the backwards thinking. In economics, the indifference curve is supposed to be the map by which economists, corporate researchers, and analysts determine the relative degrees to which goods A and B are consumed. However, economic theory does not provide for the possibility that the way in which market spending unfolds affects

the indifference curve. In the stock market, “stock market valuations have a direct way of influencing underlying values: through the issue and repurchase of shares and options and through corporate transactions of all kinds—mergers, acquisitions, going public, going private, and so on.” Other manifestations of valuation’s influence are less outright: credit rating, consumer acceptance, management reputation etc. This reflexive relationship can be displayed through the conglomerate boom of the late 1960’s.

In the 1960’s, investors had developed a tacit universal preference for using earnings growth as their primary fundamental metric. Investors relied heavily on earnings per share growth, but paid little notice to the root of the earnings. They did not prioritize identifying the sources of revenue streams and evaluating their efficacy. At the start, the savvier corporations learned that they could produce earnings growth through corporate activity, mainly acquisition. If the market punished the corporations for such wasteful decisions, then the trend would never have materialized. However, the market had a hunger for earnings growth and rewarded companies who were able to boast quarterly EPS growth in their 10Q’s. By buying and pushing the stock of such companies higher, the companies were hoisted to an even more advantageous position. They could then offer their own highly priced equity shares as payment for acquisition of other companies. Early conglomerates that were able to leverage the investor obsession for


acquisition-fueled earnings growth were rewarded with outrageous Price-to-Earnings ratios. Many of the trailblazers in such a practice were objectively innovative companies, often involving a defense component. Examples include Textron, Teledyne, and Ling-Temco-Vought. The success of these first movers naturally attracted the greater fools. Just prior to the 1974 bear market, a company could achieve a historically high P/E ratio by merely promising shareholders their capital would be used for acquisition purposes. Somewhere along the lines, managers contrived adjusted accounting techniques that amplified the benefit of acquisitions. Eventually, the most uninventive corporations were able to prop up their stock prices through purchase. The bubble can best be exemplified by Ogden’s price-to-earnings ratio of 20 in the late 60’s. This was the apogee of cyclical irrationality, as Ogden’s primary business and earnings were derived from the sale and purchase of scrap metal. Figure 1 below shows the chart of Ogden Corp. (Ticker: OG) from 1961 to 1973. The thickest line corresponds to stock price while the lower thin line represents earnings per share. The higher thin line shows dividends.

Figure 1

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(Courtesy of Securities Research Company, a Division of Balson-United Investment Advisors, Inc., 208 Newbury St., Boston, MA 02116.)
It becomes very obvious that acquisitions and mergers had a strong impact on earnings and thus on share price.

Section V. Credit

At the core of the boom/bust phenomena is the reflexive, gradual expansion and sudden contraction of credit. The pattern is asymmetrical: the boom is lengthy and drawn out while the bust is catastrophic and abrupt. By contrast, when credit is not a part of the reflexive system, the system tends to follow a more equilibrium-oriented wave pattern. An example is the currency market. It makes very little difference whether GBP/USD spot is appreciating or depreciating, the exchange rate seems to follow a transverse wave pattern. Soros argues that the asymmetric trajectory is rooted in the reflexive relationship between the act of loaning and collateral (whatever determines the creditworthiness of a debtor, whether it is physically pledged or not). Collateral can entail a piece of property or an expected future income stream. Either way, just as equity is the asset being valued in stock investing, collateral is being valued in the credit systems. And just as was the case with equities and valuation, collateral valuation is rarely understood to be tied together with a positive act, the loan. Collateral valuation is in fact not a passive act that values accurately the underlying asset. The very act of lending may affect the collateral value, and such is the reflexivity of credit.

A powerful economy acts to enhance the asset values and income streams that serve as the means to determine creditworthiness. In the earlier stages of a reflexive credit
expansion, the credit in the system is minimal and its effect on collateral negligible. This explains why economies are slow to pull out of a recession. As the amount of debt in an economic system accumulates, total lending increases in importance and begins to have an appreciable effect on collateral values. The cycle continues to evolve until total credit cannot increase fast enough to continue contributing to economic progress. Collateral values fall and this erosion of value pulls negatively on economic activity, which reflexively pulls negatively on collateral values. Since collateral’s role is significant at this point, a decline in values may catalyze the liquidation of loans, which will accelerate the economic decline. This is the blueprint of a prototypical boom and bust.

Section V-1. Kindleberger’s *Manias, Panics, and Crashes:* “Anatomy of a Typical Crisis”

In Kindlebergers’s second chapter, he proposes Minsky’s novel, but assiduously researched approach for looking at the typical boom and bust. His concepts go hand in hand with those of Soros’ reflexivity. The emphasis is on credit. He argues that the events that lead to a crisis start with a ‘displacement’, or some kind of exogenous positive shock to the system. Assuming the interruption is sizeable, the consensus analyst outlook and profit possibilities will improve in at least one sector of the economy. Businesses and firms will open lines of credit in an attempt to capitalize on the anticipated profits across the gamut of investments. Growth will accelerate and the circular feedback loop will begin, starting with the mustering up of a long-forgotten sense of optimism. Previously, this optimism has come in forms such as ‘Japan as Number One’
and ‘The New American Economy’, Ezra Vogel’s didactic novel and Bruce Bartlett’s condemnation of Reaganomics, respectively. In the US, the displacement of the 1920s was the rapid expansion of automobile production, the widespread accessibility to electricity and the telephone, and development of a vast highway network. The displacement in early 1980s Japan was the financial liberalization and subsequent appreciation of the yen. As stated prior, profit opportunities improve in at least one sector of the economy: Towards the end of the 1990s, corporate profits accounted for 10% of GDP. In the early 1980’s, this ratio was 3%. The 1/3 difference in corporate profit growth and GDP growth contributed to an increase in stock prices.

The expansion of credit fuels the boom in Minsky’s paradigm. In the centuries before the facility of banking was established, namely the seventeenth and eighteenth, personal credit or vendor financing enabled the speculative mania (Dutch Tulip Bubble). The efforts of new banks to increase market shares leads to further credit expansion because established banks do not want to lose turf. Such irrational levels of competition were experienced in the 1970’s when European banks began to poach Latin American business, infringing upon the U.S. Banks’ territory. Increases in the effective demand for goods and services continue. Positive feedback develops as the increase in investment leads to national income growth and that in turn induces additional investment so that the national income increases again. Minsky notes that at this point, ‘euphoria’ may set in. Investors purchase goods and securities to profit from the capital gains associated with anticipated appreciation as opposed to the income generation. The policymakers will at this
time recognize that something extraordinary is happening economically and while they lived through and remember previous manias, ‘this time is different’. 19

Minsky’s diagnosis really comes down to his three-part taxonomy: hedge finance, speculative finance, and Ponzi finance.

- A firm is in the hedge finance group if it anticipated operating income is more than sufficient to pay both the interest and scheduled reduction in its indebtedness.
- A firm is in the speculative finance group if its anticipated operating income is sufficient so it can pay the interest on its indebtedness but must use the cash from new loans to repay part or all of the amounts due on maturing loans.
- A firm is in the Ponzi group if its anticipated operating income is not likely to be sufficiently large to pay all of the interest on its indebtedness on the scheduled due dates; to get the cash the firm must either increase its indebtedness or sell some assets.

The term Ponzi simply refers to a non-sustainable pattern of financial activity. Borrowers can only meet their payment requirements to pay high rates on their loans if they obtain cash from new loans. Since terms of such loans often involve rates as high as 30 percent to 40 percent, the arrangement requires a continuous injection of new money at an accelerating rate. Minsky holds that as a speculative boom transpires, investors will transition from one finance group to the next, taking more and more risk in

pursuit of more and more profit. Towards the pinnacle of the bubble, the Ponzi finance group will be vastly populated. 20

The result of the continued process leads to ‘overtrading’, in Adam Smith’s terms. The ‘euphoria’ referenced above brings with it unrealistic expectations for future growth. “In the late 1990s Wall Street security analysts projected that U.S. corporate profits would increase at the rate of 15 percent a year for five years. (If their forecasts had been correct, then at the end of the fifth year the share of U.S. corporate profits in U.S. GDP would have been 40 percent higher than ever before.)”21 Loan losses realized by lenders decline and they become more optimistic and reduce minimum down payments and margin requirements. The proliferation of Mexican, Brazilian, and Argentinian external debt epitomizes this irrational domino effect. The three countries’ held $125 billion of debt in 1972 and $800 billion ten years later. Bank loans to these nations and total external debt of these nationals grew at 30 percent at 20 percent per annum, respectively. The cash that Latin and South American nations reeled in from new lending covered the interest payments due on outstanding loans, so they had no issue making interest payments. The influx of foreign money led to domestic currency appreciation, which in turn led to further influx. The very


act of lending was altering the fundamentals that lenders evaluated when deciding whether to lend. Naturally, at some point, the net new loan amounts would fall below a necessary threshold to service interest payments, and the domestic exchange rate would plummet. The invariable default cost lenders an estimated $250 billion. Lenders had failed to consider how interest payments would be paid when lending stopped. The nations held admirable, but misleading credit ratings, as they always managed to fulfill their payment obligations on time. A similar narrative took place in the 1980s Japanese boom, when real estate prices increased tenfold and stock price by a factor of six or seven. The rates of return achieved by real estate investors was about 30 percent per year. Investors previously invested in other endeavors such as making steel or automobiles, wanted a slice and borrowed to enable the desire. Real estate prices were appreciating much quicker than were rents. Just as Latin and South American countries ran out of loans to service their debt, net rental income eventually declined below interest payments on money borrowed to finance real estate speculation, resulting in a ‘negative carry’ for the borrowers. 22

The context for Minsky’s three-part taxonomy is a two-stage speculation development. In the first stage, the soberer one, households, firms, and investors respond to a shock (Minsky’s ‘displacement’) in a reasonable and rational manner. In the second, an anticipation of capital gains (as opposed to income-generation

and output) overpowers any initial, conservative intent. “The first taste is for high interest, but that taste soon becomes secondary. There is a second appetite for large gains to be made by selling the principal.” Investors in the 1830s United States initially purchased lots (of land) to expand their domain of arable land, hoping to cultivate and exploit the high price of cotton. Soon motivations evolved and land was purchased in order to be sold after some time period had passed. Capital gains were the sole motivation. In the 1850s, cultivators both utilized and speculated in land. In calmer economic times, they purchased more lots than they planted on as a hedge against the declining value of planted acres. During booms, however, these sound insurance plans were abandoned for speculative attempts to profit from capital gains. Farms were heavily mortgaged to buy additional land, which was also mortgaged to add to the capital gains-seeking empire.

Section VI: Conclusion

In nearly every case of boom and bust, logical investment evolves into irrational speculation. Essentially, there is a reversal between the objective and the process, and ultimately the objective became the process. Lenders are so excited about the process that they develop myopia and are unable to recognize the importance of the question: Where will borrowers get cash to pay interest if we stop providing new loans? Lenders loan using what they think is a rational evaluation of borrower collateral. Borrowers take out loans to purchase assets they think are safe and profitable. It is nearly impossible for anyone but the ‘smart money’ to be reflective enough to realize they are active participants in a mania. Even if Eugene
Fama is correct to some degree, events like Black Monday, 1987, are very hard to explain using his framework. Animal spirits, not program trading, are the culprit. Confidence had vanished from the system in a matter of hours and given way to Torschlusspanik, or ‘door-shut-panic’. 23

The efficient market hypothesis is not a sufficient framework to explain the boom and bust phenomena that has characterized markets since the beginning of time. It fails because it is a prescriptive, ideal, and perfectionist model. The reality is that mistakes are part of any human-driven process of cognition and participation. Market prices constantly veer away from intrinsic values. In fact, they veer so far away that it is worth questioning whether the term ‘intrinsic value’ (based on “fundamentals”) should remain in economic verbiage.

Section VI-1. Relevance to Today

With the increasing prevalence of system trading, short-term market inefficiencies seldom exist. Animal spirits are, in a way, slowly being sucked out of the system as the average investor chooses passive indexing instead of a more actively managed portfolio of individual equities. Furthermore, institutions have begun to favor computers heavily in their processes. Many systems are relied on for indicators that will be submitted to a human for final review. In some shops, the systems are directly in charge of allocation decisions. Either way, cognitive biases are, seemingly,

being systematically suppressed. However, it could be argued that as trading becomes more efficient, the role of animal spirits actually increases. Financial instruments, based on the underlying asset, are diversifying and proliferating, acting as checks and balances, ensuring the market prices are even more accurate. Investors can rarely maintain the learning levels required to fully understand the extent of the security options. It does not matter how objective and rational people are in their investing. Without a comprehensive understanding of the instruments they are investing in, animal spirits’ role is revived. Bubbles will continue to occur as a result of ignorance. Market ignorance will never deplete; it will simply change forms.

**Works Cited**

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Forecasting Gold Prices Using U.S. Macroeconomic Indicators

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Abstract

This paper attempts to extend the literature on modeling gold prices by studying a unique set of variables using data from 2000 to 2015. I construct a family of forecasting models which I then refine based on the significance of multivariate linear regression results. The best model carries a predictive capacity of around 30%, and the most powerful indicators from the variables used are the USD-GBP exchange rate and the S&P 500 stock market index.

Introduction

Not unique to the United States, gold has been widely considered to be a safe haven in tumultuous economic times and a stable investment option otherwise (Baur and McDermott 2010; McCown and Zimmerman 2006). In fact, McCown and Zimmerman show that gold behaves like a zero-beta asset – “it has approximately the same mean return as a Treasury Bill and bears no market risk.” Empirically speaking, gold can be considered as an excellent investment option in general, but like any asset, fluctuates in price even if there is a general
trend over time. To illustrate this point, one can observe that the price of gold increased from under $300 in March 2000 to around $1,250 per troy ounce in March 2016 – an annualized growth rate of about 10%. However, after hovering around $1,750 in September 2012, gold prices fell to less than $1,300 by July 2013 – an annualized growth rate of around -30%. In addition, since falling from its peak in October 2012, the precious metal has still not recovered to $1,700 by the time of this writing. Clearly, there tends to be a positive trend in the price of gold over time, but this trend does not support the argument that gold is a good buy at any time. In other words, there are better times to buy and sell than others, just as is the case for virtually any asset or commodity.

24 About 42 months since its peak high
Given the role of gold in global trade and investment portfolios, there have been extraordinary incentives for economists and forecasters to model the movement of the yellow metal’s market value. Indeed, scholarly attempts to do so have been made for decades using a variety of approaches (Baker and Van Tassel 1985), from multivariate linear regression models (Ismail, Yahya and Shabri 2009) to neural network analyses (Parisi, Parisi and Diaz 2008). However, since the Great Recession began in the fourth quarter of 2007, many have questioned the future stability of macroeconomic conditions and asset prices, particularly in the United States. For
example, Quiggin (2009) argued quite strongly that the onset of the
oft-repeated “worst financial crisis since the Great Depression”25
marked a clear end to the Great Moderation period. This is not to say
that he was correct in his judgment; in fact, many of his predictions
turned out to be false, like when he thought the recession would
actually end, and many economists including Coibion and
Gorodnichenko (2008) and Clark Todd (2009) made strong,
empirical arguments to conclude that the macroeconomic stability
enjoyed since the mid-1980s would continue despite the recession in
2007-09.

Still, there remains a question in terms of how structures may be
changing and how the interplay between any set of variables may then
be evolving over time. The purpose of this research, therefore, is
twofold – first, to extend the literature on modeling gold prices by
studying a unique set of explanatory variables and second, to analyze
the forecasting results for more recent data. The use of more recent
data is always exciting as a measure to test, refine, and update
established results, but may be of particular importance in this case
where many hypothesize that the fundamentals of U.S.
macroeconomics may have shifted in the 2007-2015 timeframe.
Indeed, Figure 1 elucidates that the price of gold did not follow a
visually stable trend between 2000 and 2015, although it did do so for
discrete segments of the period.26

26 2000-2003 was relatively flat. 2003-2008 growth rate was strong.
2009-2012 growth rate was strong. 2012-2015 growth rate was
negative.
To forecast the price of gold, I use monthly U.S. macroeconomic data from February 2000 to October 2015. This time period was chosen to include two recession periods\(^{29}\) and to include periods of relative stability, growth, and decline in gold prices. All data come from the Federal Reserve Bank of St. Louis or Yahoo! Finance, and have been chosen based on economic theory, literature review, and the author’s independent hypotheses.

Each explanatory variable was chosen to capture a specific aspect of the economy. In addition, only common variables were considered.

### Table 1 - Expectation of results

<table>
<thead>
<tr>
<th>Positive (+) Correlation with Gold</th>
<th>Negative (-) Correlation with Gold</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Unemployment</td>
<td>• NASDAQ</td>
</tr>
<tr>
<td>• T-Bill yield(^{27})</td>
<td>• SP500</td>
</tr>
<tr>
<td>• Recession</td>
<td>• Interest rate spread</td>
</tr>
<tr>
<td></td>
<td>• US exchange rate (stronger dollar, lower gold)(^{28})</td>
</tr>
</tbody>
</table>

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\(^{29}\) March-November 2001 and December 2007-June 2009
with the intent to produce a model relevant for all levels of investors, and with the hypothesis that the major indicators would bear the most significant effect on gold futures – limited, of course, by how well gold futures can be reasonably predicted under any circumstances.\textsuperscript{30} For a full description of each variable, please see Appendix A.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gold</td>
<td>Dependent</td>
<td>Monthly average of closing values; London Bullion Gold, USD per troy ounce</td>
</tr>
<tr>
<td>3 month T Bill</td>
<td>Independent</td>
<td>3 month U.S. Treasury Bill rate</td>
</tr>
<tr>
<td>NASDAQ</td>
<td>Independent</td>
<td>NASDAQ closing index value, monthly average</td>
</tr>
<tr>
<td>SP500</td>
<td>Independent</td>
<td>Closing value of S&amp;P 500 on the last trading day of each calendar month</td>
</tr>
<tr>
<td>USUK</td>
<td>Independent</td>
<td>USD to GBP exchange rate, monthly average</td>
</tr>
<tr>
<td>Unemployment</td>
<td>Independent</td>
<td>U.S. seasonally adjusted unemployment rate (U-3)</td>
</tr>
<tr>
<td>Interest Rate</td>
<td>Independent</td>
<td>10-year interest rate (minus) 1-year interest rate</td>
</tr>
<tr>
<td>Spread</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\textsuperscript{30} Given the efficient market hypothesis (EMH), a strong predictive capacity is virtually impossible and certainly unsustainable over time.
Methodology

I. Sampling and Logic

To produce a forecasting model, the sample data of 189 observations is divided into two periods, one being the estimation sample and the other as the forecast sample. The logic is to take a sizeable dataset and see how well a model built from one part of the data can predict a subsequent segment of the data. Since the results are already known, the model can be easily analyzed by comparing what the model predicts with the actual data. Based on how strong the results are, we can then make judicious use of the model to make predictions beyond the present. Consider Figure 2 to visualize this process.
(1) Develop Model using actual data (2000-2015)

(2) Predict future activity based on Model strength

Figure 2 - Visualization of Forecasting Logic
For this study, I break the data by using the February 2000 to September 2008 timeframe as the estimation sample (104 observations) and October 2008 to October 2015 as the forecast sample (85 observations). The transition point was determined based on the gold price trend over the full sample period (see Figure 1), and chosen right in the middle of the 2007-09 recession period with the hope of capturing high volatility in both samples. This is done based on the hypothesis that it would make the resulting models more robust to unpredictable, sudden, and sharp bursts of volatility.

II. Variable Transformations

A unit root test confirms what one can visually observe in Figure 1 – that the gold price in our sample is not stationary and so cannot be used as is. In fact, this is true for most of our variables, and so it is necessary to take differences of each variable that has a unit root to ensure that the data are statistically reliable for regression purposes. This conversion is done for gold, 3-month T-bill rate, unemployment rate, USD:GBP exchange rate, NASDAQ, and S&P500 index values by the following method:31

\[ Gold\_Difference = 100(\log(Gold)) - \log(Gold(-1)) \]

Although unlikely, it is still possible that a unit root exists even after taking first differences, and so the transformed variables are

31 Gold(-1) refers to the previous gold value data, i.e. the gold price value from the previous month. These transformations reduce the number of observations in each data series by 1.
tested for stability a second time. The results, however, show that all unit root problems have been mitigated when testing at the 5% significance level, and so we proceed with regression analyses.

III. Regression Reliability

Once regressions are run, it can be tempting to accept the results as they appear but it is imperative to make sure that the results are reliable. To do so, each regression output is analyzed by two key measures – heteroscedasticity using the Breusch-Pagan test and serial correlation using the Lagrange Multiplier test. Both tests carry a null hypothesis of no problem – that is to say, there is no heteroscedasticity or autocorrelation in our results unless proven otherwise. Since we cannot reject the null hypothesis at the 5% significance level for either test, we conclude that our results are stable and reliable, allowing us to then proceed with analyzing a set of potential forecast models.

IV. One-Step Ahead & Recursive Forecasting

Once it is established that the variables do not have unit roots and that the regression results are free from heteroscedasticity and autocorrelation, the models can then be compared by analyzing the root mean squared errors (RMSE values) and mean absolute errors (MAE values) in their residuals. Generally speaking, the model with lower RMSE and MAE values is better, although it is still necessary to test whether a lower value is statistically significant. This is done by using the Morgan-Granger-Newbold (MGN) test and, more
specifically for this research, the Diebold-Mariano (DM) test to compare RMSE and MAE values.

Each of the above processes is then repeated for recursive forecast estimates, a method by which the estimate sample expands iteratively to include forecast sample data points.

Results

Figure 3 - Stability Testing, One-Step Ahead Forecast (Model 1)
Note that there is some instability in the data as pointed out in Figure 3. There are several minor points where the model estimate (blue line) breaches the 95% confidence interval (dotted red line), but there is one major occurrence in June 2006. The exact reason for this breach is unclear but to solve it, I introduce a dummy variable that takes the value of 1 when in this ‘crisis’ period and the value of 0 otherwise. After feeding this dummy into the regression model, the problem seems to go away (see Figures 3 and 4). The results are still not perfect but since the breaches are no longer visually shocking, the dummy is probably an adequate solution. For completeness though, Figure 5 shows clean stability results based on the cumulative sum control (CUSUM) method, confirming that the model parameters are indeed stable and reliable.
With the dummy variable\textsuperscript{32} introduced, we can now observe the regression results for the full model (Figure 6). The results indicate a predictive capacity of around 32\%, with an $R^2$ value of 0.371 and an adjusted $R^2$ value of 0.318. We can also observe that the 3 month T-bill rate, interest rate spread, unemployment rate, and recession dummy are not statistically significant, while the stock markets and USD-GBP exchange rate are highly significant. Given that each variable probably affects gold prices but that we do not necessarily know which indicators are trivial, I develop and observe refined models by filtering out the least significant variables one at a time. It is also important to note here that the value of a variable is not limited

\textsuperscript{32} The dummy to account for June 2006 is labeled as ‘D_FINCRIS’
by its p-value but also by its coefficient – a highly significant variable with a very low coefficient may be less meaningful than a less significant variable but with a much larger coefficient.

Through the process of dropping variables based on statistical significance, we end up with a total of six models, the results of which are summarized in Table 3.
Model 2 appears to be the best since it carries a noticeably higher adjusted $R^2$ value than the rest and its info criteria are only slightly higher than the lowest values among the six regression results. At the same time, Model 5 and 6 carry very similar adjusted $R^2$ values as Model 1 or 2, highlighting the role of the USD-GBP exchange rate and S&P 500 index in predicting gold prices. It is also noteworthy that all six of the models are comparable and any can be used with a fairly similar expectation of results.

To help identify the best model, we can finally observe each of the six models in their one-step ahead static forecast graphs and recursive forecast graphs, along with their RMSE and MAE values. It appears that the recursive results are consistently superior to the static forecast results, which makes intuitive sense given the nature
of how gold prices change, both in terms of volatility and how closely gold is linked to stock markets and macroeconomic data. This is particularly relevant in a high-speed trading environment where information is easily accessible and immediately relayed to markets.

The graphs in Figure 8 appear to suggest that Model 2 presents the best fit with the actual data, although it is probably impossible to determine the best model and the best method (recursive or static) just by studying the graphs. We therefore collect, compile, and analyze the RMSE and MAE data for each model over both forecast methods to conclude which model is the most accurate and efficient.

<table>
<thead>
<tr>
<th>One-Step Ahead Forecast Residual Errors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>RMSE</td>
</tr>
<tr>
<td>MAE</td>
</tr>
</tbody>
</table>

Table 4 - Static Forecast RMSE & MAE
With the results in Tables 4 and 5, we can empirically analyze how each forecast model compares with one another. There are two key observations from this information – first, that the recursive results are always \(^{33}\) better than the one-step ahead residual error results and second, that Model 6 appears to be the best one overall. Of course, it is then imperative to test whether or not the difference between these results are statistically significant, and we observe the MGN and DM test results in Table 6 where the null hypothesis \(H_0\) is that the compared models have equal predictive accuracy. Since only Model 4 and Model 5 are statistically significantly different from the null hypothesis, we conclude that Models 4, 5, and 6 should all be considered.

\(^{33}\) Always better with the exception of Model 4 RMSE
### Figure 7 - Model 2 Regression Results

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>1.659670</td>
<td>0.485064</td>
<td>3.442166</td>
<td>0.0009</td>
</tr>
<tr>
<td>D_3M</td>
<td>-0.044586</td>
<td>0.033410</td>
<td>-1.334513</td>
<td>0.1852</td>
</tr>
<tr>
<td>D_NASDAQ</td>
<td>0.125075</td>
<td>0.063314</td>
<td>1.975479</td>
<td>0.0511</td>
</tr>
<tr>
<td>D_USUK</td>
<td>0.844436</td>
<td>0.165051</td>
<td>5.116215</td>
<td>0.0000</td>
</tr>
<tr>
<td>D_DSP</td>
<td>-0.295173</td>
<td>0.099274</td>
<td>-2.973312</td>
<td>0.0037</td>
</tr>
<tr>
<td>SPREAD_10_1</td>
<td>-0.421485</td>
<td>0.274488</td>
<td>-1.536531</td>
<td>0.1279</td>
</tr>
<tr>
<td>RECESSION</td>
<td>-0.591845</td>
<td>0.940509</td>
<td>-0.629281</td>
<td>0.5307</td>
</tr>
<tr>
<td>D_FINCRIS</td>
<td>-12.25123</td>
<td>3.277098</td>
<td>-3.738437</td>
<td>0.0033</td>
</tr>
</tbody>
</table>

- **R-squared**: 0.367589
- **Adjusted R-squared**: 0.321475
- **S.E. of regression**: 3.221957
- **Akaike info criterion**: 5.251658
- **Schwarz criterion**: 5.455673
- **Hannan-Quinn criterion**: 5.334067
- **F-statistic**: 7.971422
- **Durbin-Watson stat**: 1.665467
Figure 8 - Static Results (Red) and Recursive Results (Green) plotted against Actual data (Blue)
Discussion

i. 3 month T-bill rate

As an astute observer may notice, despite taking first differences\textsuperscript{34}, the 3 month T-bill rate does not appear to be stationary as can be seen in Figure 9 (see Appendix B for all graphs). It is critical to determine here whether or not a unit root does, in fact, remain. Fortunately, as the results in Figure 10 clearly show, there is no such error remaining in the data even though the graph in Figure 9 can raise legitimate concerns. One possibility to explain the sharp variations that occur particularly during 2008 is that the volatility may be attributed to the drastic and unprecedented decrease in Treasury Bill rates following the onset of the recession in December 2007.

\textsuperscript{34} See Equation 1 for the exact method
ii. Variables and Time Lags

While all of the chosen variables carry some dimension of predictive capacity, this study does not go on to include time lags and study the dozens of possible permutations. The use of differences may lead one to think that the data from previous months are inherently included in each empirical analysis, but this is only true at the surface level since the differencing is done for both dependent and independent variables. However, the framework for such a study has
been included in this paper and I encourage an extension of this work by observing how various combinations of time-lagged independent variables can improve the accuracy of predicting future gold trends. The use of lags is not necessarily going to improve the model fit, but is certainly worth investigating given that the price of anything can be influenced by previous data, current data, and estimated future data. Investors, for instance, tend to consider both the past performance of an industry or company as well future expectations in order to maximize their expected return on an investment over time.

iii. Results and Literature

There have been numerous model proposals to forecast the price of gold, each with a different level of accuracy and model fit. For example, Ismail, Yahya, and Shabri (2009) present a model with an adjusted $R^2$ hovering around 90%, almost triple what this study was able to generate despite using similar variables. While their results may look far more appealing – imagine the investment potential with an asset price prediction accuracy of 90%! - there are several factors which they seem to have overlooked. First, they only use a few months in their estimation sample which is not nearly enough to make a conclusion that is stable or robust against a variety of market conditions. Second, their few months are not random, but taken from 2003 – a period of remarkable stability in gold prices, further rendering their results as lacking when facing all-weather conditions. And third, they use the level price of gold as their dependent variable which may be possible for their very stable data, but cannot be done when observing a larger dataset given the clear existence of a unit root. Indeed, I was able to produce a model with
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an adjusted $R^2$ of 0.89 as well when using a particular sample of months in 2003 and 2004, with the maximum timeframe being March 2003 to September 2004 (18 observations). Unfortunately, such a model is only accurate for extremely specific conditions and is therefore not a reliable tool for generalized applications in the real world.

Conclusion

Gold has carried universal value for millennia, but has become quite a volatile commodity after the United States formally moved away from the gold standard under President Nixon in 1971. Since then, many economists and forecasters have attempted to model the future trend of gold given its role as a strategic investment asset. The findings of a predictive capacity of around 30-32% may seem weak, but if we assume the efficient market hypothesis, a strong model fit is either statistically wrong or will be unsustainable.\(^{35}\) The results in this paper are, therefore, probably very realistic. At the same time, however, the models presented in this paper can almost definitely be augmented with the inclusion of time lags.

While each variable can be considered important based on theory and usually by regression analysis as well, the two most important variables are the USD-GBP exchange rate and the S&P 500 index.

\(^{35}\) Assume a model fit of 90%. If everybody can predict the price of gold with 90% accuracy, they can all use it to their advantage and make tremendous profits. Of course, this is not sustainable and the EMH claims that something will change such that the model can no longer predict at such a high accuracy.
Surprisingly, the significance of the recession is weak, despite a decent sample size (18 of 104 observations in the estimation period have a recession) and the logical expectation that the price of gold would increase in more uncertain economic times. This argument is even supported by the negative sign with the recession coefficient in each model. Clearly, further research is warranted that may build off of the framework in this paper, but studies a different set of variables – in particular, some more exchange rates and different interest rate spreads.\textsuperscript{36} Combining this recommendation with time-lagged variables may yield substantially superior results and it is hoped that further studies will be done to challenge, support, or add to the findings in this paper.

\textsuperscript{36} Including multiple exchange rates and interest rate spreads in the same regression may cause multicollinearity

Figure 11 - Model 4 Regression Output
References


Appendices

A. Glossary of Terms

3 Month Treasury Bill Rate
The 3 month T-bill rate is the return on U.S. government-backed bonds with a three month or thirteen week maturity period. Data are not seasonally adjusted.

Gold
The gold variable is compiled by observing the international price of London Bullion Gold in U.S. Dollars. The averages from each day’s closing price are collected for each calendar month.

Interest Rate Spread
The interest rate spread is calculated by taking the difference between the 10 year interest rate and the 1 year interest rate during the same time period. All data are for the United States.

NASDAQ
The NASDAQ variable is measured by aggregating the closing values of the NASDAQ composite index for each trading day in a calendar month to then be converted into monthly averages.

Recession
The recession variable is a dummy, taking the value of 1 when the U.S. is in an economic recession, and a value of 0 otherwise. Data are recorded on a monthly basis.

SP 500
The SP500 variable is measured by observing the closing index value of the S&P500 composite index on the last trading day of each calendar month.

Unemployment Rate
The seasonally adjusted unemployment rate (U-3) in the United States as provided by the Bureau of Labor Statistics (BLS).

B. Graphs of Variables
C. Static Forecast Results

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Abstract
This descriptive correlational study attempted to determine, using a modified Grable & Lytton financial risk tolerance scale, the average financial risk tolerance score of the Bahamian labor force. Secondly, this study set out to identify and examine, if any, the relationships that exist between financial risk tolerance and a Bahamian individual’s scope of financial knowledge, their use of a financial advisor and demographic factors such as age, gender, marital status, educational background and employment status. Data was collected from 300 Bahamians between the ages of 18 and 65 located within the geographical boundaries of the Bahamas using a simple random sampling method. An online questionnaire consisting of a slightly modified version of the Grable-Lytton financial risk tolerance scale along with questions regarding the research’s independent variables was used for data collection. Various descriptive statistics and Pearson’s correlation coefficient were used to analyze the data collected. The findings from this research indicated that: 1) Bahamians are risk neutral, possessing an average level of financial risk tolerance; 2) a positive relationship exists
between all of the independent variables tested and financial risk tolerance.


According to the Nassau Guardian (2013), startling statistics released by The Central Bank of The Bahamas showed that 95% of Bahamian dollar personal savings accounts have a balance of less than $10,000 and that the average account balance was a mere $704. This troubling fact coupled with the largely successful gaming industry in The Bahamas and the vast number of Bahamians participating in the business of gambling would lead any individual to conclude, based on the concept of financial risk tolerance, that Bahamians are a risk-loving population. The general preference by most citizens to distribute funds into an industry that thrives on the concept of risk rather than to deposit these same funds into safe and secure savings accounts makes a clear reference to the classic definition of a risk loving individual.

Regarded as one of the most important components of investing, the behavioral concept of financial risk tolerance seeks to determine an individual’s perception of financial risks. In a more accurate definition, financial risk tolerance is said to be the maximum amount of risk that an individual is willing to accept, when making a financial decision (Grable, 2000). Based on an individual’s reaction to financial decisions with varied levels of underlying risk, he or she can be systematically categorized as risk averse, risk neutral or risk loving. Individuals that are categorized as risk averse seek to avoid as much risk as possible and prefer to invest in low risk investments that
yield low returns such as savings accounts, certificates of deposits and government bonds. Alternatively, being classified as risk loving indicates that the individual seeks investments that possess a higher level of risk which present higher returns, such as junk bonds, mutual funds and stocks. The final categorization describes individuals that are risk neutral and are generally not influenced by the amount of risk that the potential investment bears and tend to hold a rather diverse portfolio. Essentially, an individual’s level of financial risk tolerance will inherently affect or guide their investment decisions.

An investor’s level of financial risk tolerance and attitudes toward different investment options is a major behavioral factor taken into consideration within the financial sector. A majority of professionals such as investment managers and financial advisors, within the various financial markets, use the concept of financial risk tolerance to better guide their clients’ investment decisions. As investors and financial professionals are constantly attempting to mitigate adverse reactions to market fluctuations, these individuals need valid and reliable estimates of risk tolerance (Gilliam, 2010). This is because there are no absolutes in the economic universe and there must always be preparations made for the future, on behalf of clients. These financial professionals seek to determine the best options for clients to gain the highest return possible based on the amount of risk that the client is willing to take on. Despite this, the importance of assessing financial risk tolerance varies among professionals.

Although numerous academic studies devoted to the concept of financial risk tolerance have been completed and published, no attempts have been made to study financial risk tolerance within the
context of The Bahamas. Essentially, this study attempted to fill this noted void by seeking to measure the average financial risk tolerance score of the Bahamian labor force, in an attempt to determine whether the average Bahamian is risk averse, risk neutral or risk loving, while simultaneously investigating the demographic and other generally unexplored factors which affect this behavioral measure. Demographic variables such as age, gender, employment status, educational background and marital status were studied to determine their relationship, if any, on an individual’s level of financial risk tolerance along with generally unexplored factors such individual financial knowledge and the use of a certified financial advisor.

**Literature Review**

**Financial Risk Tolerance & the Grable and Lytton Risk-Tolerance Scale.**

Financial risk tolerance is defined as the amount of risk that an investor is willing to take on when presented with investment options that yield varying outcomes (Chattopadhyay & Dasgupta, 2015; Kuzniak, Rabbani, Heo, Ruiz-Menjivar, & Grable, 2015). Inversely related to the concept of risk aversion, the behavioral financial concept of financial risk tolerance has been used by financial planners and others to determine the investment strategies most suitable to achieve the goals of investors (Gilliam, Chatterjee, & Zhu, 2010). Investors with a readily high level of risk tolerance will generally accept greater financial risks and invest in financial instruments within the ‘high risk – high return’ categories. On the other hand, individuals who are interested in investing and are less risk tolerant tend to gravitate towards making investment decisions that are less risky within the ‘low risk – low return’ categories.
There have been several attempts at creating a definitive system to determine risk tolerance, however, in 1999, Grable and Lytton developed and published a 13 question financial risk tolerance scale to allow researchers and financial advisors the ability to evaluate an individual’s risk tolerance level (Kuznia et al., 2015). The scale is one of the most useful and reliable methods of determining risk tolerance levels to this day. In an effort to further test the reliability of the scale, Kuzniak et al. (2015), conducted a review of the scale and concluded that it is indeed reasonably effective in measuring investor financial risk tolerance.

H₁: On average, based purely on the observation of their financial activities, Bahamians are a risk loving population.

Researchers have completed numerous academic studies to investigate the demographic and non-demographic factors that help determine the financial risk tolerance levels of investors. Of these factors the most frequently investigated include age, gender, education level, marital status, income levels, financial knowledge, and wealth (Gibson, Michayluk, & Van de Venter, 2013).

**Age**

Several academic studies have been conducted to investigate the effect of individual’s age on their level of risk tolerance with the general consensus that as an individual’s age increases their level of risk tolerance decreases. Yao, Sharpe, and Wang, (2011) studied the aging effect on individual risk tolerance and concluded that risk tolerance decreases as individuals age. This conclusion followed through in numerous other investigations into the effect of age on financial risk tolerance to further prove that an increase in age results in a decrease in financial risk tolerance and that there is a slightly
significant relationship between the variables (Chattopadhyay & Dasgupta, 2015; Çağlayan & Abdieva, 2014; Gumus & Dayioglu, 2015; Gibson et al., 2013; Hallahan, Faff, & McKenzie, 2011). However, there has been research that contradicts the prior conclusion that there is an inverse and slightly significant relationship between age and individual financial risk tolerance (Larkin, Lucey, & Mulholland, 2013; Ayuub, Saleem, Latif, & Aslam, 2015; Anbar & Eker, 2010).

H2: An individual’s age is negatively correlated to his/her level of financial risk tolerance level.

**Gender**

Gender has been extensively studied as a leading demographic factor that has an effect on individual financial risk tolerance. Previous research has concluded that an individual’s financial risk tolerance level is dependent on his or her gender, where males have been proven to be more risk tolerant than females (Anbar & Eker, 2010; Larkin et al., 2013; Çağlayan & Abdieva, 2014; Ayuub et al., 2015; Gumus & Dayioglu, 2015; Gibson et al., 2013; Hallahan et al., 2011; Gilliam et al., 2010). Research by Chattopadhyay and Dasgupta (2015) disputed the general theory that males are more willing to accept financial risks than females, concluding that females, in India, are more risk tolerant than males.

H3: The gender of an individual is positively correlated with their level of financial risk tolerance.

**Educational Background**

The level of education that an individual investor has obtained is said to have an impact on the amount of financial risks that he or she is willing to accept. Generally, individuals that are more educated
are more knowledgeable about the risks involved in making financial decisions and will act accordingly, compared to a less educated investor. Hallan et al. (2011) investigated whether or not there was any relationship between the highest level of education obtained by an investor and their level of financial risk tolerance and concluded that the risk tolerance scores of individuals increased corresponding to the higher level of education obtained. This conclusion followed through in several previous studies as well, proving that there is a positive relationship between education and financial risk tolerance (Chattopadhyay & Dasgupta, 2015; Larkin et al., 2013; Gilliam et al., 2010; Gibson et al., 2013; Gumus & Dayioglu, 2015). Contradictory evidence was found by Ayuub et al. (2015), proving that there was no relationship between the level of education obtained and financial risk tolerance.

H₄: An individual’s educational background is positively correlated to his/her level of financial risk tolerance.

**Relationship Status**

Relationship or marital status is considered one of the more frequently studied demographic factors that may have an impact on an individual’s level of financial risk tolerance. The assumption used in studying this variable is that compared to individuals who are married or cohabitating with another individual who may seek greater financial stability, non-married individuals are more willing to take risks with their investment funds. Due to financial responsibilities, financial risk tolerance levels are higher for single individuals (Anbar & Eker, 2010; Chattopadhyay & Dasgupta, 2015; Ayuub et al., 2015). However, these findings have been contradicted and research has
found that relationship status has no impact on an individual’s level of financial risk tolerance (Larkin et al., 2013; Gumus & Dayioglu, 2015).

**H₅:** Married or cohabitating individuals have significantly lower levels of financial risk tolerance compared to single or non-married individuals, indicating a negative correlation.

**Employment Status**
Individuals that are currently employed generally are considered to have higher levels of financial risk tolerance than those who are unemployed due to the access to a regular source of income. On the other hand, individuals that are unemployed are more cautious with their limited funds and prefer to make safer investments. Based on previous research employed individuals possess a higher level of financial risk tolerance compared to unemployed individuals (Chattopadhyay & Dasgupta, 2015; Larkin et al., 2013).

**H₆:** The employment status of an individual is positively correlated to their financial risk tolerance level.

**Financial Knowledge**
Based on the premise that educating an individual would generally increase their level of awareness and ability to make sound decisions, it could be derived that the amount of knowledge within the area of finance that an individual possesses would have some effect on their level of financial risk tolerance. Previous research has identified a significant relationship between an individual’s level of financial risk tolerance and the amount of financial knowledge that he or she possesses (Grable & Joo, 2004; Gibson et al., 2013). Although there has been limited research done on the effects on financial knowledge on an individual’s level of financial risk
tolerance, however, Davey (2004) found no significant relationship between the two variables, essentially confirming that increasing financial knowledge does not increase financial risk tolerance.

H7: The greater the amount of financial knowledge that an individual possesses, the higher their level of financial risk tolerance, depicting a positive correlation.

Financial Advisor

Generally, obtaining advice from a professional would increase an individual’s level of confidence when making a decision. Based on previous research, this generalization holds true when referring to the idea of financial risk tolerance. Although there has been limited recent research done on the relationship between an individual’s level of financial risk tolerance and the use of a financial advisor, Bemasek and Shwiff (2001) found that individual’s tended to increase the level of financial risk that they were willing to take on after consulting with a financial advisor. However, Hung and Yoong (2009) found that, unless individuals actively seek the advice of a financial advisor, consulting with a financial advisor has no significant bearing on an individual’s level of financial risk tolerance. Contradictory to the previous findings, Van de Venter and Michayluk (2007) concluded that the advice obtained from a financial advisor has no impact on an individual’s level of financial risk tolerance.

H8: If an individual obtains advice from a financial advisor, his or her level of financial risk tolerance will increase, indicating a positive correlation.

In relation to the discussion presented previously in the review of literature, a conceptual framework of the information is depicted in Figure 1.
Methods

To study the variables under investigation, a descriptive correlational research was carried out. The targeted population of this research consisted of the entire Bahamian labor force which, according to the Department of Statistics of The Bahamas (2015), was made up of 212,195 Bahamian citizens between the ages of 18 and 65 that were present within The Bahamas during the period when the data collection instrument was distributed. At 95% confidence level and a 5% confidence interval the calculated sample size required 383 respondents, however, only 300 individuals were tested due to time and budget constraints.
In order to collect the necessary data for analysis in this research, an electronic questionnaire consisting of a total of twenty-five questions was created. This questionnaire was designed, pilot tested and modified, based on the feedback received during the pilot testing, to produce the final version that was distributed. Testing of the questionnaire for validity was carried out both practically, through pilot testing, and theoretically by the fact that a majority of the questions used were questions lifted from, although edited slightly, popular sources in finance relevant to the variable being tested. The questionnaire was also tested for reliability using Cronbach’s $\alpha$, where the calculated $\alpha$ was 0.57.

The first thirteen questions of the questionnaire were aimed at evaluating the risk tolerance levels of respondents and are varied in style. These questions, obtained from the Grable-Lytton financial risk tolerance scale, were edited slightly to allow for better comprehension in a Bahamian context. Questions fifteen through twenty focused on testing individual financial knowledge. The remaining questions were aimed at gathering information on the remaining independent variables relative to the study which included demographic characteristics and responses concerning financial advisors.

Data Collection

The final draft of the survey was entered into an online survey response program followed by a viral social media campaign undertaken to ensure distribution of the survey to as many Bahamians as possible. Along with a short introduction, a link to the online survey was broadcasted to various contacts on social media platforms. To further ensure a higher level of participant responses, a
$100 incentive was offered to be randomly awarded at the end of the research.

Following the initial two-week social media campaign, two individuals were hired and trained as assistants to issue business cards, simultaneously with the continued social media campaign over a two-week period, that contained a link to the survey that could be entered into any web browser. Prior to issuing a card, the assistants were instructed to ask whether the potential respondent was between the ages of 18 and 65 and whether or not the individual was a citizen or legal resident of The Bahamas. These questions were asked to ensure that the individuals participating in the research were indeed part of the survey’s target population.

**Data Analysis**

A thorough review of all of the attempted online questionnaires was done and all questionnaires containing unanswered questions were rejected and removed from the data for analysis. The data was edited for inconsistent responses, where respondents do not follow through on their responses to similar questions, indicating that the responses were not given truthfully or to the best of the respondent’s ability.

The information retrieved from the data collection process was coded on a numerical basis, beginning at 1, where each possible response was assigned a numerical value, for ease of analysis. Questions 1 through 13 had been coded in previous research due to these questions being used in an established scale. The data that was retrieved from the online survey program was downloaded directly into a spreadsheet, and the actual coding process was completed.
Measures such as mean, range and standard deviation were used for the analysis of the data retrieved. To accurately determine the relationships that existed between the variables, the strength and direction of each independent variable and the dependent variable was calculated using Pearson’s correlation coefficient.

Results and Discussions

Descriptive Statistics

Based on a surveyed population of 300 participants, the characteristics of respondents are shown in Table 2. The sample was overpopulated by females, representing 72% of the surveyed population. In relation to the ages of the surveyed population, the group most represented were individuals aged 18-24, accounting for nearly 55% of the responses. It should be noted that whilst the 18-24 age group, the youngest group surveyed, dominated the responses, the oldest group, consisting of individuals aged 55-65, only accounted for 4% of the survey responses; a mere 12 individuals. This obvious disparity in the age of participants could be attributed to the fact that older individuals are less inclined to use social media and online resources when compared to younger citizens.

Single individuals dominated the respondent population, a total of 175 respondents, while widowed/separated/divorced participants represented the least active response group with a mere 15 respondents. As with most of the demographic characteristics of this research the response rate of the various groups were generally unevenly skewed. However, this overpopulation of single individuals could once again be related to the dominance of younger individuals in the respondent population, as younger individuals tend to shy away
from the traditional rules of relationships and dating. Response patterns reflected a higher proportion of individuals having obtained a high school diploma as the highest level of education completed. These individuals represented 41.7% of the surveyed population compared to only 1.3% of individuals having only completed some high school, the lowest participant category.

In relation to employment, 55% of the surveyed population identified as being employed full-time, 10.3% were employed part-time and 34.7% acknowledged being unemployed at the time of completing the survey. 89.3% (268) of the surveyed population admitted to not using a financial advisor during the data collection phase of this research.

Individual financial knowledge was scored on a scale of 0 to 6 and respondents were categorized as either having minimal, average or a good amount of financial knowledge based on the amount of correct responses to six general questions concerning everyday financial matters. The survey resulted in respondents with an average amount of financial knowledge being the most represented categorization, accounting for 52.7% of the population. This was followed by 32.3% being categorized as having a good amount of financial knowledge and only 15% as having a minimal amount of financial knowledge.

A cross tabulation was constructed and displayed in Table 1, to identify the trends between respondent age and their individual amount of financial knowledge. Based on these results, it would appear that the level of individual financial knowledge moved further away from minimal and average as the age of respondents increased. This could be due to the fact that older respondents would generally
have had much more experience with financial matters than their younger counterparts and are therefore more knowledgeable.

Table 1. Cross tabulation of age and financial knowledge

<table>
<thead>
<tr>
<th></th>
<th>Minimal</th>
<th>Average</th>
<th>Good</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>18-24</td>
<td>27</td>
<td>95</td>
<td>42</td>
<td>164</td>
</tr>
<tr>
<td>25-34</td>
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<td>35-44</td>
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<td>45-54</td>
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<td>11</td>
<td>21</td>
</tr>
<tr>
<td>55-65</td>
<td>-</td>
<td>4</td>
<td>8</td>
<td>12</td>
</tr>
<tr>
<td>Total</td>
<td>45</td>
<td>158</td>
<td>97</td>
<td>300</td>
</tr>
</tbody>
</table>

Financial Risk Tolerance

According to H1 of this research, on average, Bahamians are a risk loving population. This assumption however was disproven by the survey results which proved that, on average, Bahamians are a risk neutral population. This generalization of the Bahamian labor force allows for the assumption to be made that Bahamians are not concerned with the underlying risks involved when making financial decisions.

Age

Based on this study’s review of literature, age has generally been proven to possess a negative correlation with financial risk tolerance where, as the age of an individual increases their level of financial risk tolerance decreases (Chattopadhyay & Dasgupta, 2015; Çağlayan & Abdieva, 2014; Gumus & Dayioglu, 2015; Gibson et al., 2013; Hallahan, Faff, & McKenzie, 2011). This generalization lead to the study’s H2 where an individual’s age is negatively correlated to
his/her level of financial risk tolerance. Correlation results from this study, shown in Table 3, show that age holds a weak (0.12) but positive relationship with financial risk tolerance. Due to test results resulting in a weak relationship among the variables, these figures cannot be used as a reliable estimate of the general population. However, these results indicate, within the boundaries of this research, that in the Bahamian labor force as age increases so does individual financial risk tolerance levels. The results gathered from this study fall more in line with several studies, also mentioned in the review of literature, that found financial risk tolerance to be positively correlated with age (Larkin, Lucey, & Mulholland, 2013; Ayuub, Saleem, Latif, & Aslam, 2015; Anbar & Eker, 2010).

**Gender**

$H_3$ hypothesized that the gender of an individual is positively correlated with their level of financial risk tolerance. This assumption was based on the results found in previous studies which concluded that the male population is inherently more risk tolerant than females (Anbar & Eker, 2010; Larkin et al., 2013; Çağlayan & Abdieva, 2014; Ayuub et al., 2015; Gumus & Dayioglu, 2015; Gibson et al., 2013; Hallahan et al., 2011; Gilliam et al., 2010).

Based on the results of the correlation test we can say with some degree of certainty that gender is positively correlated with financial risk tolerance, although the strength of the relationship is weak (0.19). The relationship between these variables therefore cannot be generalized for the general public due to the weak correlation. This would indicate, however, that within the scope of the surveyed population, males are indeed more tolerant to financial
risks than females and would possess higher financial risk tolerance scores.

**Educational Background**

Previous studies that sought out to identify the relationship between an individual’s educational background and his or her level of financial risk tolerance have concluded that education and individual financial risk tolerance are positively correlated (Chattopadhyay & Dasgupta, 2015; Larkin et al., 2013; Gilliam et al., 2010; Gibson et al., 2013; Gumus & Dayioglu, 2015). Similarly, H4 of this research assumed that an individual’s educational background is positively correlated to his or her level of financial risk tolerance.

After running a correlation test on the results gathered, it was found that educational background and financial risk tolerance are positively correlated but also that the relationship was relatively weak (0.10). This weak correlation result again indicates the unreliability of these results in generalizing the entire Bahamian labor force. These results show that in the context of this research, the higher the level of education completed by an individual, the more tolerant he or she is to financial risks. As stated previously in this paper’s review of literature, these results could be due to the fact that the more educated an individual may be the more confident he or she may feel in making financial decisions due to better understanding of the risks presented.

**Relationship Status**

H5 stated that married or cohabitating individuals have significantly lower levels of financial risk tolerance compared to single or non-married individuals, indicating a negative correlation. This hypothesis was developed based on the conclusions of previous research where researchers concluded that single individuals are far
more risk tolerant than married or cohabitating individuals (Anbar & Eker, 2010; Chattopadhyay & Dasgupta, 2015; Ayuub et al., 2015).

Results from testing the Bahamian population signaled a complete shift from previous research. Based on the correlation test completed, relationship status does possess a positive relationship with financial risk tolerance, although fairly weak (0.11). Again, due to the weak correlation results, it cannot be said that these results mirror that of the Bahamian labor force as a whole. However, it would be safe to conclude that within the constraints of this current research, married and cohabitating individuals are far more financially risk tolerant than single individuals.

**Employment Status**

Previous research has generalized the notion that employed individuals are far more tolerant to financial risks than those that are unemployed, leading to H₆ which indicates that the employment status of an individual is positively correlated to their financial risk tolerance level (Chattopadhyay & Dasgupta, 2015; Larkin et al., 2013). Correlation results from this study solidified the findings from previous studies by showing a positive relationship between employment status and financial risk tolerance levels.

Although the results showed a relationship between the two variables, it was deemed weak (0.15) and therefore cannot be used as a generalization for the entire population. However, it can still be safely concluded that unemployed individuals, within the boundaries of this study, are more risk averse than individuals that were employed during the time of this research.

**Financial Knowledge**
Reflecting previous research, $H_7$ stated that the greater the amount of financial knowledge that an individual possesses, the higher their level of financial risk tolerance, depicting a positive correlation. Researchers had previously concluded that possessing a larger amount of financial knowledge would lead to a higher level of financial risk tolerance among individuals (Grable & Joo, 2004; Gibson et al., 2013). This notion was reflected in the Bahamian labor force as results gathered showed a weak (0.04) positive relationship between financial knowledge and financial risk tolerance. A weak correlation such as this one cannot be deemed reliable for generalizing the overall results of the study to the entire Bahamian labor force. Based on these results, it can be safely concluded that, within the boundaries of this research, increasing an individual’s amount of financial knowledge should result in an increased level of tolerance for financial risks.

**Financial Advisor**

This research’s final hypothesis, $H_8$, assumed that if an individual obtains advice from a financial advisor, his or her level of financial risk tolerance will increase, indicating a positive correlation. Bemasek and Shwiff (2001) had previously concluded that individuals that make use of a certified financial or investment advisor tend to possess a higher level of financial risk tolerance.

Correlational tests from this study showed that, as indicated in previous studies, a positive relationship exists between financial risk tolerance and the use of a financial advisor. Although very weak (0.09) the results show that using a financial advisor increases an individual’s tolerance concerning financial risks, within the context of this study.
<table>
<thead>
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<th>Variable</th>
<th>Frequency</th>
<th>Percent (%)</th>
<th>Scale Data</th>
<th>Cronbach’s α</th>
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<tr>
<td></td>
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<td>Mean (Average RTS)</td>
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<td>84</td>
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<td>3.95</td>
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<td>Age</td>
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<tr>
<td>Unemployed</td>
<td>104</td>
<td>34.7</td>
<td>25.04</td>
<td>3.61</td>
</tr>
<tr>
<td>Relationship Status</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>175</td>
<td>58.3</td>
<td>25.50</td>
<td>3.92</td>
</tr>
<tr>
<td>Partnered</td>
<td>57</td>
<td>19.0</td>
<td>26.91</td>
<td>4.08</td>
</tr>
<tr>
<td>Married</td>
<td>53</td>
<td>17.7</td>
<td>26</td>
<td>3.94</td>
</tr>
<tr>
<td>Separated/Divorced/Widowed</td>
<td>15</td>
<td>5.0</td>
<td>27.47</td>
<td>2.96</td>
</tr>
<tr>
<td>Educational Background</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Some high school or less</td>
<td>4</td>
<td>1.3</td>
<td>25.5</td>
<td>3.20</td>
</tr>
<tr>
<td>High school diploma</td>
<td>125</td>
<td>41.7</td>
<td>25.44</td>
<td>3.93</td>
</tr>
<tr>
<td>Vocational/Trade certification</td>
<td>29</td>
<td>9.7</td>
<td>26.34</td>
<td>3.67</td>
</tr>
<tr>
<td>Associate’s degree</td>
<td>55</td>
<td>18.3</td>
<td>26.45</td>
<td>3.66</td>
</tr>
<tr>
<td>Bachelor’s degree</td>
<td>67</td>
<td>22.3</td>
<td>26.01</td>
<td>4.11</td>
</tr>
<tr>
<td>Graduate degree/PhD</td>
<td>20</td>
<td>6.7</td>
<td>27.15</td>
<td>4.49</td>
</tr>
<tr>
<td>Financial Advisor</td>
<td>Yes</td>
<td>32</td>
<td>10.7</td>
<td>27</td>
</tr>
</tbody>
</table>

Table 2. Descriptive and reliability statistics for respondents by variable.
<table>
<thead>
<tr>
<th>Financial Knowledge</th>
<th>No</th>
<th>268</th>
<th>89.3</th>
<th>25.83</th>
<th>4.00</th>
<th>14-37</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimal (0-2)</td>
<td>45</td>
<td>15.0</td>
<td>26.2</td>
<td>3.86</td>
<td>19-35</td>
<td></td>
</tr>
<tr>
<td>Average (3-4)</td>
<td>158</td>
<td>52.7</td>
<td>25.47</td>
<td>4.04</td>
<td>14-37</td>
<td></td>
</tr>
<tr>
<td>Good (5-6)</td>
<td>97</td>
<td>32.3</td>
<td>26.63</td>
<td>3.77</td>
<td>16-36</td>
<td></td>
</tr>
</tbody>
</table>

Table 3. Correlation of financial risk tolerance score and independent variables

<table>
<thead>
<tr>
<th>Financial risk tolerance score</th>
<th>Financial Advisor</th>
<th>Financial Knowledge</th>
<th>Gender</th>
<th>Age</th>
<th>Educational Background</th>
<th>Relationship Status</th>
<th>Employment Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Financial risk tolerance score</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Financial Advisor</td>
<td>0.0909</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Financial Knowledge</td>
<td>0.0439</td>
<td>0.0378</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td>0.1940</td>
<td>-0.0471</td>
<td>0.0088</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>0.1261</td>
<td>0.1406</td>
<td>0.2202</td>
<td>0.0253</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Educational Background</td>
<td>0.1041</td>
<td>0.0964</td>
<td>0.1905</td>
<td>0.0552</td>
<td>0.3679</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Relationship Status</td>
<td>0.1147</td>
<td>0.1138</td>
<td>0.1160</td>
<td>-0.0657</td>
<td>0.5691</td>
<td>0.1763</td>
<td>1.00</td>
</tr>
<tr>
<td>Employment Status</td>
<td>0.1578</td>
<td>0.0758</td>
<td>0.0471</td>
<td>0.2160</td>
<td>0.3292</td>
<td>0.2535</td>
<td>0.1963</td>
</tr>
</tbody>
</table>
Limitations and Delimitations

Several limiting factors were noted concerning the completion of this research. Firstly, due to the fact that this study and its accompanying paper were completed within a fourteen-week semester, time presented itself as a major limitation. Also, keeping in mind that the researcher was a college student, access to funds was rather minimal forcing the research to be completed within a budget and therefore resulted in another limitation of the study – limited financial resources. In addition, there was a third limiting factor, the fact that it was nearly impossible to control whether or not participants in the data collection phase responded to the questions truthfully or not, which would have led to flawed results. Finally, the researcher’s restricted ability within the field of research, being only an amateur researcher with limited research skills, presented the study’s final limitation.

The major noted delimitation of this research was the reduction of the calculated sample population from 383 Bahamians of working age (18 – 65) to 300 individuals. This reduction in the sample size was due to factors such as the limited time to complete the research, a restricted budget and a high level of unwillingness by potential respondents to complete the questionnaire.

Conclusion and Recommendations

The need for financial planners and investment managers to be able to construct a portfolio that not only meets the needs of clients but also matches their level of financial risk tolerance has increased even more following the financial crisis of 2008. This study attempted to identify the variables that affected individual financial risk tolerance to serve as a guide for individuals to better determine financial risk tolerance levels. Acknowledging the fact that this study
was the first of its kind to be attempted on the Bahamian population allowed for a fresh perspective on this important issue within the scope of behavioral finance.

Results from this study showed that the variables under investigation: age, gender, employment status, relationship status, educational background, financial knowledge as well as the use of a financial advisor are all positively correlated with financial risk tolerance, although the strength of the relationships are weak. It can also be concluded, within the boundaries of this research, that Bahamians are a risk neutral population with an average financial risk tolerance score of 25.96.

An individual’s age, having been identified as possessing a positively correlated relationship with financial risk tolerance, should be used by investment advisors to construct more tailored portfolios for clients. This calculated relationship indicates that individual financial risk tolerance increases with age. Essentially, financial professionals should begin to market securities with higher levels of underlying risks to older individuals and vice versa, which could result in higher profits for firms as clients would be better matched with securities that suit their needs.

A positive correlation between gender and financial risk tolerance also shows that financial professionals should mold portfolios to suit the needs of clients using gender as an indication of their financial risk tolerance levels. Based on these results, this would mean that higher risk securities such as stocks and derivatives should be marketed and selected for male clients at a higher frequency than females.
Financial professionals should also present riskier securities to individuals that make use of financial advisors and have higher levels of individual financial knowledge, as these variables also have positive relationships with financial risk tolerance. Therefore, as these variables increase so does financial risk tolerance, indicating an increased level of acceptance for taking on high risk securities.

Finally, individuals that have obtained a higher level of general education, are employed and are married or partnered should be advised by financial professionals to take on riskier securities when compared to their counterparts who are more likely to engage in activities that are essentially low risk resulting in low rewards.

Based on these results, investment managers should be better able to guide the financial decisions of their clients to produce portfolios better suited to each individual and in turn allow for larger returns. The government of The Bahamas can also use the results of this research to detect patterns unique to Bahamians concerning financial decisions to identify any areas that may need government intervention such as increased financial education.

Further research on this subject matter, within the Bahamian context, is greatly needed. Individuals willing to take on this challenge should make it a point to increase the sample size and aim to test a more diverse sample, compared to that which was used in this research. Creating a more substantial respondent population would allow for increased reliability of the results obtained and a greater ability to generalize the future results for the entire population. Taking on such a task would require an increased level of assistance and government involvement could be helpful to reach a broader demographic.


