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Also, in this issue of JBET, we are pleased to publish the Best Paper from the 2019 NABET Conference, "MORE QUALITY, LESS QUANTITY: DIVERSIFICATION AND RISK REDUCTION IN QUALITY PORTFOLIOS" by Richard Makowski of Gannon University, and Dr. Richard Hauser of Gannon University.

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COST SHIFTING AND UBTI REPORTING IN COLLEGES AND UNIVERSITIES

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ABSTRACT

This paper analyzes the reporting practices of Unrelated Business Taxable Income (UBTI) in colleges and universities, as well as examines evidence of cost shifting between related tax-exempt sources of income and unrelated taxable income in order to minimize or eliminate tax liability. Increasing commercial-type activities and programs in colleges and universities (among other nonprofit tax-exempt organizations) generates a growing amount of income unrelated to their core mission and, therefore, is taxable based on the tax code. To minimize tax liability on their growing unrelated income, colleges and universities are motivated to shift expenses from the regular tax-exempt operations and assign them as tax deductible expenses directly associated with the unrelated income. Using a sample of colleges and universities during years 2013-2015, significant evidence of cost shifting was found that leads to minimizing tax liability in colleges and universities.

INTRODUCTION

While the for-profit entities and their owners are generally subject to federal and state income taxes, Non-For-Profit organizations (NFPs) are generally tax exempt. Furthermore, nonprofit entities that are committed to pursuing charitable, educational, religious, or other public-benefitting purposes also enjoy a host of other tax benefits. Most prominently, the ability to receive tax-deductible contributions, and exemption from most other types of state and local taxes such as sales tax. However, many of the present NFPs have engaged in business-like activities, not essentially related to their core mission, and have generated significant amounts of income from these activities. The emergence of these hybrid activity organizations raises the question of whether the simple fact that they pursue public-benefitting goals should entitle them to any or all of the tax benefits they enjoy.

The overall economic activity conducted by NFPs with tax exemption designation has significantly increased over the last decades. Likewise, the universe of public charities has changed dramatically over the years. For example, in 1985, the IRS Master File listed approximately 335,000 active public charities and tax-exempt organizations under IRC section 501(c)(3). By 2004, this number had nearly tripled to 933,000. Not all public charities are included in this figure because most churches and certain other religious organizations do not need to apply for recognition of tax exemption, unless they specifically request an IRS ruling.

These organizations are exempt from taxes to help them advance and promote the general welfare of the society. However, increasing commercialism of NFPs has caused their income from sources that can be designated as Unrelated Business Taxable Income (UBTI) to grow at an annual rate of up to 30% (Foran and Theisen, 2000). This shift has caused continuous concern by the US Congress over the rapid expansion of NFPs commercial activities and the potential for unfair competition with other for-profit organizations that provide similar products and services.

In 1950, the US Congress added the UBTI provisions to the Internal Revenue Code requiring these NFPs to report and pay tax on income generated from conducting any activity that is deemed unrelated to their core charitable or non-for-profit mission. The main goal for enacting a tax on the UBTI is to create a fair competition plain field between these tax-exempt organizations and other for-profit entities that provide similar services or products.

There are more than 29 different types of tax-exempt entities in section 501(c) of the US tax code alone and by some counts more than 70 overall. The PGA Tour and the NFL are two of the largest 501(c)(6)s (Miller, 2014). According to the tax code (section 511), the income of the NFPs is considered UBTI if it meets three conditions: (1) It is income from a trade or business as defined in the Code, (2) the trade or business is regularly carried on by the organization, and (3) the conduct of such trade or business is substantially unrelated to the organization's performance of its tax-exempt function.

Unless the activity that generates the passive income is debt financed, the code excludes some types of income from the UBTI reporting requirements such as passive income including dividends, royalty, rent, interest, and capital gains. Current examples of UBTI in tax-exempt colleges and universities may include diverse revenue generated by athletic programs and operation of certain facilities such as dining rooms, bookstores, in addition to some sponsorship and advertising contracts. According to the current reporting requirements, NFPs with UBTI should report summary of

this income (both revenue and allocated expenses) in their annual tax return (Form 990) with details of these revenues, allocated expenses, net taxable income, and the tax liability on the tax return form (Form 990-T).

Both Congress and the IRS have paid increasing attention to the rapid growth of UBTI in tax-exempt organizations and the lack of compliance in reporting this income and paying the tax due on it. Congress has always expressed concerns about the rapid expansion of NFPs commercial activities and the potential for unfair competition due to their preferential taxation (Manzullo, 2001). For example, some introduced legislations have proposed repealing the tax exemption for professional sports leagues. Other proposed legislations have introduced new rules to tighten the UBTI reporting (especially for colleges and universities) including the following proposed provisions:

- Any sale or licensing by a tax-exempt organization of its name or logo (including any related trademark or copyright) would be treated as unrelated trade or business, and royalties paid with respect to such licenses would be subject to UBTI. That would have included many institutions that have affinity credit cards or license their name for apparel.
- A change in the rules for qualified sponsorship payments where mentioning of a sponsor's product lines would turn a mere acknowledgement that is not taxed into taxable advertising income.
- Organization officers, directors, or responsible employees would be penalized for the substantial understatement of the UBTI tax.

A recent IRS examination of UBTI reporting requirements in colleges and universities has revealed a widespread lack of compliance with the UBTI reporting rules that resulted in a significant underestimation of their taxable income and tax liability. The report uncovered that, for more than 40 percent of colleges and universities examined, activities that were effectively treated as related to the tax-exempt functions were determined, upon examination, to be unrelated activities that should have been reported on Form 990-T, and were subject to tax (IRS, 2013). The IRS examination of a sample of colleges and universities resulted in disallowance of more than \$170 million of reported losses in forms 990-T, and increase in UBTI by 90% as a result of disallowing improperly allocated expenses that were not connected to the unrelated business activities, and reclassifying income originally reported as income from exempt activities under unrelated taxable income.

The main goal of this paper is to examine compliance with the UBTI reporting requirements in non-for-profit and tax-exempt colleges and universities, as well as detect any signs of managing their taxable income to minimize or avoid paying tax on it. Using a sample of colleges and universities for the years 2013, 2014, and 2015, the study employs various statistical models to detect and isolate evidence of under-reported UBTI as a result of intentional allocation of tax deductions against the unrelated income as expenses that are "directly connected" to this reported income. Section II of the paper summarizes the prior literature and introduces the paper's expectations. Section III introduces the research design and methodology. Section IV presents the study sample and results, while Section V concludes the paper.

PRIOR LITERATURE AND STUDY EXPECTATIONS

Because of limitations on the availability of data required to conduct empirical research in this area, prior literature that analyzed the UBTI reporting in different NFPs and examined their cost shifting practice is limited. Some of the prior literature in this area has presented the common challenges in applying the UBTI requirements, definitions issued by tax courts, and the different factors that affect NFPs' reporting of their UBTI. In addition, some prior empirical research has tried to detect evidence of NFPs attempts to manage their reported UBTI in order to minimize or eliminate their tax liability.

In a theoretical modeling analysis, Bois et al (2004) suggests that the presence of agency problems inside organizations can explain the occurrence of material amounts of UBTI. They proposed that the more agency problems a NFP organization has, the larger the revenues derived from the production of ancillary output and activities unrelated to the organization's core mission. In their model, they used compensation as a proxy measure for the agency problem. Yetman (2003) developed the concept of production complementary between related and unrelated activities in NFPs and argued that the existence of such complementation increases the chances of UBTI and the amount of directly connected expenses that can be allocated to it. The level of such production complementation is expected to be much higher at specific types of NFPs, including colleges and universities. Furthermore, Yetman and Yetman (2009) concluded that a nonprofit is more likely to engage in a taxable activity and generates more taxable income when the activity provides higher profits relative to the non-taxable income and when donor aversion is relatively lower.

For the factors affecting NFPs' engagement in UBTI, Foran and Theisen (2000) reported that the main factors affecting UBTI are size, donations, type, Net Operating Losses (NOL), and activities similarity. They also reported evidence of the effect of engaging a paid CPA tax preparer. NFPs with paid CPA tax preparer are more likely to report near-zero taxable income indicating that the CPA firm assists its NFP client in managing their taxable income near zero (Omer and Yetman 2003).

Some prior literature also analyzed the trends in tax court cases with regard to UBTI reporting and calculation. For example, Levenson (1998) analyzed the case of the Mississippi State University Alumni Association regarding its affinity card income (TC Memo 1997-3970). Kenny (1998) presented the IRS guidance with regard to college golf courses that are made available for non-student members (Letter Ruling 9645004) where the IRS ruled that golf course fees from alumni and president club (and some from the spouses and children of students, staff, and faculty) don't come under the convenience exception in the tax code and are subject to UBTI. Fiore (2001) analyzed the IRS guidance about differentiating taxable advertising from nontaxable sponsorships in college sports activities. Furthermore, Schuster (2010) analyzed the advertising vs. sponsorship distinction in light of the famous NCAA tax court case (914 F.2d 1417).

Treasury regulation 1.512(a)-1 requires that allocation of expenses between income from related (exempt) and unrelated (taxable) activities should be done on a reasonable basis. However, the regulation gives little specific guidance as to what might be considered reasonable. Therefore, the allocation of indirect expenses is a gray area that provides a subtle opportunity for tax avoidance or evasion in the form of expense shifting towards the UBTI. Omer Yetman (2007) analyzed hand-collected data from Forms 990-T for their sample of NFPs and reported that about 19% of them misreported their UBTI. For the expense shifting research stream, Hofmann (2007) examined tax-motivated expense shifting by NFP associations and reported evidence of a significant positive amount of expenses shifted to UBTI by those associations. She found that approximately 20 - 21% of expenses reported as deductible expenses against the UBTI is a result of shifting or reclassifying common expenses as directly connected to the UBTI. Hofmann (2007) sent a mail survey to nonprofit organizations that reported UBTI to obtain data items from their Form 990-T. Therefore, the sample in Hofmann (2007) includes 399 observations from 126 organizations over the years 1994-1997.

This paper examines the cost shifting practice in colleges and universities and predicts that colleges and universities with unrelated business income will be motivated to allocate abnormal amount of expenses and assign them as directly connected to the taxable unrelated income in an effort to minimize or eliminate their tax liability.

RESEARCH DESIGN AND METHODOLOGY

Building on the methodology used by both Yetman (2001) and Yoder et al (2011), this paper will conduct empirical tests to examine the UBTI reporting and detect any evidence of expense shifting or allocation of excessive deductions against reported UBTI as directly related expenses. UBTI reporting in colleges and universities was analyzed and evidence of any systematic shifting or allocation of expenses to match the UBTI as reported in Form 990-T, especially for colleges and universities that reported taxable income close to zero or net taxable losses, was looked at in detail. Yetman (2001) has modeled expected investment expense as a function of gross investment income. This paper will employ a similar model to estimate expected expenses that are allocated to the reported UBTI as a function of different explanatory variables including gross UBTI, total income, total assets, and income from investments. The relation will be estimated with the following regression.

$$EXP_{it} = \alpha + \beta_1 UBTI + \beta_2 Income + \beta_3 Assets + \beta_4 Inv + \epsilon \quad (1)$$

Where:

- The dependent variable EXP_{it} is the total expenses allocated to the UBTI as directly connected to it,
- $UBTI$ is the gross UBTI as reported by the college in its filing with the IRS,
- $Income$ is the total revenue and donations reported by the college,
- $Assets$ is the natural logarithm of the total assets as reported by the college,
- Inv is the total investment income as reported by the college.

The regressions are estimated using all years in the balanced panel. Expected allocated expenses are the predicted value from the above regression. The unexpected amount of allocated expenses is estimated as the actual amount reported less the expected amount. Positive unexpected allocated expenses indicate additional general and

administrative expenditures have been allocated to match the reported UBTI, while negative unexpected allocated expenses indicate less general and administrative expenditures have been allocated to match the reported UBTI.

The paper also employs the model in equation (2) to test the relation between expense shifting, as represented by the amount of unexpected allocated expenses, and the probability that the sample NFP organization is being tax motivated using the following model:

$$UEXP_{it} = \alpha + \sum_{j=1}^n \beta_j X_j + \epsilon \quad (2)$$

Where;

- *UEXP* is the unexpected expenses allocated to the UBTI as directly connected (the error term in equation (1) above).
- *J* denotes to the array of explanatory variables that represent the characteristics of the NFPs that are more likely to manage their reported UBTI and minimize their tax liability by allocating more common expenses as directly connected to the unrelated business income. These variables may include items like the college's size, total revenue, unrelated income, and investment income.

STUDY SAMPLE AND RESULTS

As reported by Patton and Bishop (2009), programs that generate unrelated business income in college and universities (i.e., sports programs) always draw scrutiny by tax regulators and enforcement agencies. In 2007, the US Senate asked the CBO to analyze the athletic programs in college and universities in the context of the UBTI. As seen in the IRS 2013 final report, the IRS is always looking at colleges and universities UBTI. Therefore, this paper is using a sample of four-year colleges and universities with data available for years 2013, 2014, and 2015 as compiled manually by the GuideStar organization. The limited number of prior empirical studies in this area (i.e., Omer Yetman 2007) always relied on hand-collected data from Form 990-T which is not publicly available. After a subscription to the GuideStar database was obtained, a request was made to compile data items for all four-year colleges and universities for fiscal years 2013, 2014, and 2015. The final sample includes 3,521 observations of colleges and universities (and other organizations or associations affiliated with them such as alumni associations) over the three years period.

Table (1) provides a general description of the study sample. Out of the sample's observations of 3,521 colleges and universities (and their affiliates) in the 2013-2015 period, 1,144 of them (32.5%) have filed Form 990-T to report UBTI. Out of the 1,144 colleges and universities reporting UBTI, 349 of them (31%) have allocated expenses (as directly connected to the unrelated business income) just equal to the gross income resulting in a taxable income and liability of zero. Out of the observations reporting UBTI, 552 of them (48%) have assigned expenses as directly connected even more than the gross unrelated business income resulting in a net operating loss for tax purposes. Only 243 of the colleges and universities reporting UBTI (21%) have allocated less directly connected expenses than the gross income leaving some taxable income and resulting in a tax liability.

Table (2) shows descriptive statistics of the main variables examined and tests of mean differences for these variables between the colleges and universities that reported UBTI and those that did not. With highly significant results across all tests, table (2) shows that colleges and universities with reported UBTI are significantly bigger than those without reported UBTI with higher total assets, total liabilities, and total revenue. Colleges and universities with reported UBTI have significantly higher investment income, which is one of the main candidates for unrelated business income. More importantly, Table (2) shows that colleges and universities that reported UBTI have significantly higher mean for accounting fees which is consistent with the general expectation that NFPs reporting UBTI tend to engage accounting firms and paid tax preparers with expertise in filing the UBTI and consultation experience to help minimizing taxes paid on unrelated business income.

Table (3) presents the correlation coefficients among the main variables of the study with all coefficients statistically significant at less than 1% level. The main highlight from table (3) is that colleges and universities that reported higher unrelated business income have higher expenses assigned to that income (the coefficient between UBR-T and EXP variables is .712) which resulted in significantly lower (zero or even negative) unrelated business taxable income (the coefficient between EXP and UBR-N variables is -.432). Another major highlight from table (3) is that both the assigned expenses variable (EXP) and the dummy variable indicating the reporting of net unrelated business taxable income of zero or negative (N-Z) are positively correlated with the accounting fees variable ACC (correlation coefficients of .483 and .207 respectively). The overall univariate results from table (3) confirm the expectations that colleges and universities with reported unrelated business income have generally allocated enough amounts of

expenses as directly connected to such reported income to offset it leading to either a zero or negative net taxable income (and no tax liability) in most of the cases.

The study also conducted a multivariate regression analysis to examine the cost shifting practices by colleges and universities that reported unrelated business income as indicated in equations (1) and (2) above. The results of estimating equation (1) to assess abnormal amount of expenses assigned to unrelated business income are reported in table (4), and the residuals of that regression are used as proxy variable for abnormal assigned expenses. The estimation in table (4) regression uses the explanatory variables total assets, total revenue, gross unrelated business income, and investment income to estimate the expenses assigned against the gross unrelated business income. The regression in table (4) shows an R-squared of .73 and F value of 742 which is significant at less than 1% indicating that the model is a reasonable estimate of the assigned expenses. Table (4) shows that the coefficients of all the explanatory variables are significantly positive at less than 1% level affirming the expectations that big colleges and universities shift increasing amounts of expenses to offset their reported unrelated business income.

The model in equation (2) is examining the cost shifting expectation that colleges and universities with reported unrelated business income have mostly assigned enough expenses to offset this income, resulting in the reporting of net taxable income of zero or a net operating loss. The model in table (5) examines the association between the abnormal assigned expenses as estimated by the model in equation (1) and the dummy variable of reporting net taxable income of zero or net operating loss (N-Z) among other explanatory variables. The coefficient of the variable N-Z is .198 and significant at less than 1% indicating that colleges and universities that shifted more abnormal expenses as directly connected to the reported unrelated business income were able to offset that income and eliminate their tax liability. Table (5) shows also that the quality of the engaged accounting firm (as indicated by accounting fees) is a significant factor in the cost shifting practice employed by the firm's nonprofit clients. The coefficient of the accounting fees variable is .125 and is significant at less than 1% level. Results in table (5) may also indicate that the agency problem may not be a significant factor in the cost shifting practice in colleges and universities contrary to the results of Bois et al (2004), or it might even be a mitigating factor. Coefficients of the variable of total compensation (which is often used as a proxy for the agency problem in nonprofit organizations as suggested by Bois et al, 2004 model) is negative and significant. The agency problem as suggested by Bois et al (2004) model may not be applicable to colleges and universities where director compensations are based on predetermined contractual agreements, and not directly connected to the overall financial revenues or outcomes of the organization.

SUMMARY AND CONCLUSION

There has been a notable increase in both the number of nonprofit tax exempt organizations and their engagement in unrelated business activities that generate increasing amounts of taxable income that should be reported in Form 990-T. Reporting the UBTI and compliance with its rules has been a growing concern for Congress and the IRS, and prior examinations showed a lack of compliance in reporting and calculating the taxable income and tax liability. If they report their unrelated business income, nonprofit organizations are motivated to shift enough expenses from the tax exempt income related to their mission into the unrelated taxable activities to offset their income.

This paper used a specially compiled data for colleges and universities during the years 2013-2015 to examine the cost shifting practice in this nonprofit segment. Results of the paper show significant evidence of cost shifting in colleges and universities, leading the majority of colleges and universities with unrelated business income to report zero taxable income or net operating loss with no tax liability. Results also show that cost shifting practice and minimizing tax liability is associated with engaging a paid accounting firm and the accounting fees amount paid. The paper results give some indication that the agency problem in colleges and universities may be different from other nonprofit organizations and may not be an explanatory variable with regard to UBTI reporting and cost shifting in colleges and universities.

Further research can focus on colleges and universities with active and nationally recognized athletic programs which is currently generating increasing amounts of income that naturally meets the UBTI criteria. Samples of this further research can include colleges and universities qualifying to the "Sweet 16" or the "Final 4" of the major college athletic programs over the last few years.

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Table (1) Study Sample Description

Sample Observations	3,521
Observations Reporting UBTI in Form 990-T	1,144
Observations Reporting UBTI = 0 (Expenses Assigned = Gross UBI	349
Observations Reporting UBTI < 0 (Expenses Assigned > Gross UBI	552
Observations Reporting UBTI > 0 (Expenses Assigned < Gross UBI	243

Table (2): Descriptive Analysis of Colleges with or without UBTI

Variable	UBTI	Mean	T-value	Standard Error
Investment Income	1	10,951,537	5.885***	1,579,545
	0	3,444,688		407,301
Total Revenue	1	352,303,628	11.851***	24,195,388
	0	110,904,383		8,001,894
Total Wages	1	124,056,808	8.937***	9,174,417
	0	48,146,643		3,781,763
Total Employee Benefits	1	18,410,662	8.369***	1,360,241
	0	7,417,697		610,625
Management Fees	1	1,183,933	2.697***	178,406
	0	702,139		86,467
Legal Fees	1	873,085	6.805***	80,216
	0	353,181		34,580
Accounting Fees	1	261,008	11.032***	13,968
	0	113,892		6,288
Lobbying Fees	1	78,526	5.874***	5,567
	0	33,913		5,054
Investment Fees	1	2,590,622	4.999***	391,193
	0	781,320		133,832
Total Assets	1	1,200,098,898	8.080***	137,172,919
	0	316,314,232		37,358,839
Total Liabilities	1	362,881,337	6.416***	50,210,054
	0	110,624,906		12,508,967

*** Significant mean differences at less than 1% level.

Table (3) Correlation Coefficients

	UBR-T	UBR-N	N-Z	EXP	INV	REV-T	ACC
UBR-T							
UBR-N	.325***						
N-Z	.144***	-.133***					
EXP	.712***	-.432***	.235***				
INV	.061***	-.449***	.115***	.392***			
REV-T	.353***	-.339***	.206***	.588***	.593***		
ACC	.323***	-.235***	.207***	.483***	.401***	.666***	
ASSETS-T	.269***	-.407***	.153***	.558***	.756***	.781***	.528***

*** Significant mean differences at less than 1% level.

UBR-T: is the gross unrelated business income

UBR-N: is the net taxable unrelated business income

N-Z: is a dummy variable that takes 1 for observations with zero or negative taxable income, and 0 otherwise

EXP: is the total expenses assigned to unrelated business income

INV: is the total investment income

REV-T: is the total revenue

ACC: is the total accounting fees

Assets-T: is the total assets

Table (4): Assigned Expenses Estimation

Variable	Standardized Coefficient	T-value
UBR-T	.536	30.347***
INV	.116	4.937***
REV-T	.273	10.494***
ASSETS-T	.176	5.824***
F value = 742***		
R-squared = .73		

Dependent variable is the assigned expenses to the unrelated business income

*** Significant mean differences at less than 1% level.

Variables as defined in Table (3)

Table (5): Examining for Cost Shifting Evidence

Variable	Standardized Coefficient	T-value
N-Z	.198	4.307***
Grants	.248	7.315***
Wages	-.345	-5.500***
ACC	.125	2.690***
LOB	-.063	-1.838*
F value = 15.988***		
R-squared = .14		

Dependent Variable is the abnormal expenses assigned to UBR in calculating the UBTI (the standardized residual from Equation 1)

*** Significant mean differences at less than 1% level.

* Significant mean differences at less than 10% level

Grants: is the total government grants

Wages: is the total compensations

LOB: is the total lobbying fees

Other variables as defined in Table (3)

A FEW STRATEGIES USEFUL FOR PROTECTING ECONOMIC SECURITY AGAINST ADVERSE EXTERNAL SHOCKS

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ABSTRACT

Three defensive strategies to protect nations from the disastrous consequences of speculative currency attacks are explored in this research. Speculative currency attacks include an intentionally malicious sell-off of a nation's currency to affect the currency exchange rate by depleting foreign reserves which leads to that nation's sudden currency depreciation. Based on the theory of feedback systems, the first strategy is to fictitiously divide a national economy into three sectors with purchasing powers of money in different sectors. The second strategy is developed using the control theory so that the performance indicator would approach the pre-determined objective and could withstand disturbances of environmental factors. The third strategy focuses on how a nation could possibly counter large-scale sudden flight of foreign investments in order to avoid the unnecessary disastrous aftermath. Illustrations and/or examples for the three strategies are provided.

INTRODUCTION

Forrest, Hopkins and Liu (2013) suggest that when a nation attempts to seek economic globalization, it concurrently welcomes foreign investments (Forrest, Hopkins & Liu, 2013; Forrest, 2014; Forrest, 2018). That influx of foreign investment enhances the economic expansion, which in turn creates economic opportunities associated with the new capital. However, as suggested by Forrest, Hopkins and Liu (2013), if a large proportion of the foreign investments later leave suddenly, the host nation likely suffers a significant and rapid economic decline (Forrest, Hopkins & Liu, 2013).

This paper examines self-protection strategies in order to avoid or to reduce the severity of potential economic collapse by employing the concept of feedback systems. Although findings are exploratory, an association between control theory and economics has previously been investigated (Chow, 1975; Shefrin and Thaler, 1981). Based on such research, theoretical results, economic policies and procedures for practical applications have been developed (Kendrick, 1981; McKinnon, 1993; Seierstad and Sydsaeter, 1986). Pindyck (1977) develops a control model for the American economy using control variables such as excess tax, government spending, and money supply, while Moe (1985) presents an empirical analysis of the National Labor Relations Board by using feedback control, and Kydland and Prescott (1980) develop recursive methods for designing an optimal taxation plan. Economic systems are generally nonlinear, thus various authors have used the economic model of predictive control (MPC) systems to design an economic estimator (Diehl, Amrit & Rawlings, 2011; Ellis, et al., 2014; Heidarinejad, Liu & Christofides, 2012; Rawlings, Angeli & Bates, 2012).

The literature examines theoretical continuity and practical discreteness of time in the operation and regulation of economies. Wu and Liu (2004) employ systems and control theories to simulate the operation of macroeconomic systems. Their simulation develops replaceable cyclic control and discrete successive input-control-decision models for macroeconomic systems. Another study by Chow (1976) explores a general production strategy based on monitors of consumption for dynamic input-output economic systems. Additionally, Yang, Zhang and Zhai (2004) develop an optimal economic adjustment scheme for the optimization of linear quadratic forms for optimal tracking of actual output compared to an ideal output. Finally, because economic systems are nonlinear and sometimes behave chaotically, Yao and Sheng (2002) develop a prediction feedback model to control for discrete chaotic systems.

Each theoretical model of the macroscopic economy is incomplete and suffers errors associated with parameters' estimation and signal interference from the environment. However, Xiao and Lu (2002) successfully analyze and optimally control a general macroscopic economic system. Furthermore, by making a quadratic performance index equivalent to the observed information of control, Wang and Wang (2006) transform the regulation issue of the macroscopic economy into one of solving for the optimal estimation of the controlled variable.

First, this paper enriches the literature by addressing self-protection against adverse movements of money through establishing three theoretical strategies, while showing their practical usefulness. The concept of feedback systems is fully utilized to illustrate how fiscal and monetary policies could both directly and indirectly work on altering the

performance of the economy. Next, the underlying motivation and significance of this research is discussed. This is followed by suggesting a defense strategy of focusing on exchange rates. Then the authors suggest how the concept of feedback can be employed in designing a different method of defense. Next, a third strategy is developed through partitioning the national economy into divisions. This paper concludes with recommendations for future research.

SELF-PROTECTION

The form of war has changed since World War II. Modern warfare has quietly shifted away from the one of direct military clashes to that of economic tactics. Fundamentally, currency plays an important role in all forms of modern warfare. Except for an absence of physical battlefields, the scale of such economic conflicts and potential benefits are no less than those of wars in history.

If a currency (or currencies) is employed as the weapon of mass destruction, then the related economic maneuvers can be considered the tactical operations of war. In this regard, each financial crisis can be seen as potential military escalation or power imbalance of a currency war. Currently, the world on average experiences about ten large scale financial crises each year resulting in the relevant countries change or loss of leadership. Casualty countries stay in the subsequent economic shadows for years and are potentially unable to ever fully recover. For example, although the British sterling crisis, Japan's "lost decade" of recession after the Plaza Accord, and southeastern Asia's financial crisis did not involve military conflict, the relevant countries suffered crushing economic losses. The related currency attacks made these countries pay a much greater economic cost than expected. Today, while most nations lack both the military infrastructure and need to resolve conflicts by employing conventional wars, they are able to more effectively achieve desired objectives by using means of currency maneuvers.

In terms of what could lead to currency attacks, Forrest, Ying and Gong (2018) establish that economic instability generally makes a country vulnerable as the target of currency attacks by entities employing international "hot money" for short-term gains on exchange and/or interest rates. Li and Zhang (2008) analyze the impact of capital account liberalization on economies and suggest that opening up a domestic market for direct investments in developing countries, or countries with economies in transition, will result in greater impact and instability than in developed countries. Additionally, Zhang (2003) examines the conduction of a financial crisis as the breakthrough point from one side. In another study, Li (2007) develops the currency substitution vector error correction (VEC) model and dynamically analyzes the extent of China's currency substitution and the relationship between its influence factors. Li (2007) concludes that the main factor with effects on Chinese currency substitution is the renminbi's (RMB's) nominal effective exchange rate in both the long and short-term. Frequent fluctuations in the nominal effective exchange rate will lead to currency substitution and even cause instability in the demand for money.

Thus, when a nation attempts to accelerate its economic development, it will generally try to introduce changes, including liberalizing its capital account and/or loosening its monetary policies. Such efforts tend to create economic imbalances, which in turn encourage large inflows of foreign capital. While much of the foreign capital inflows are positioned strategically to take advantage of emerging opportunities for quick profits, it is critically important for the nation to strategically protect itself against all potential adverse effects of the inward movement of capital.

EXCHANGE RATE STRATEGY

Riding the present wave of economic globalization, nations from around the world loosen economic and monetary policies and welcome foreign investments with the goal to develop their economies. However, Forrest, Hopkins and Liu (2018; 2013) illustrate that if the foreign investments leave suddenly en masse, the host nation will likely experience a burst of the economic bubble that was created. A measure to counter such sudden departures of foreign investments is suggested next in order to avoid undesirable disastrous consequences.

For our purpose, let us model the relationship between the purchasing power P of money with the demand for money D and the supply S of money of a national economy as follows:

$$\frac{dP}{dt} = k(D - S), \quad (1)$$

where the variables P , D , and S are all assumed to be functions of time t , and $k > 0$ is a constant. Note: Although in general the left-hand side of this model should be nonlinear, we can theoretically approximate it by using the linear form given in equation (1) for the following reasons:

Series expansions of mathematics can be employed to linearize nonlinear forms; and

When movements of money are concerned with, we only need to focus on a small neighborhood of a particular time moment.

Allen and Goldsmith (1972) suggest that a stable society generally satisfies the following four conditions: 1) there is minimum disruption in ecological processes; 2) there is maximum conservation of materials and energy; 3) the recruitment of the population is equal to its loss; and 4) the social system makes individuals enjoy rather than feel restricted by the first three conditions. Let us divide a national economy of concern into three sectors E_i , $i = 1, 2, 3$, such that E_1 represents the goods, services, and relevant production needed for maintaining the basic living standard, E_2 those used to acquire desired living conditions, and E_3 those that are utilized for the enjoyment of luxurious living. Accordingly, the aggregate demand (D) of money and the purchasing power (P) of money are separated into three corresponding categories D_1, D_2, D_3 and P_1, P_2, P_3 so that D_i (P_i) is the demand (purchasing power) of money for the economic sector E_i , $i = 1, 2, 3$. Hence, according to Allen and Goldsmith (1972), to stabilize the national economy, P_1 should stay relatively constant, while P_2 decreases slightly, and P_3 drops drastically in order to attract and trap the additional money supply away from the economic sector E_1 .

If S_i stands for the money supply that goes into economic sector E_i , $i = 1, 2, 3$, then equation (1) can be rewritten as the following feedback system:

$$\dot{P} = Kz + Qx, \quad (2)$$

where $P = [P_1 \ P_2 \ P_3]^T$ stands for the vector of divided purchasing power of money, $\dot{P} = \left[\frac{dP_1}{dt} \ \frac{dP_2}{dt} \ \frac{dP_3}{dt} \right]^T$ is the Newtonian notation of vector derivative, $z = [z_1, z_2, z_3]^T = [D_1 - S_1, D_2 - S_2, D_3 - S_3]^T$ the state vector of the monetary system, $x = [x_1, x_2, x_3]^T$ the vector of the corresponding monetary policies that deal respectively with economic sector E_1, E_2 , and E_3 , and both $K = [k_{ij}]_{3 \times 3}$ and $Q = [q_{ij}]_{3 \times n}$ constant coefficient matrices with n being a natural number.

Once again as explained earlier, although the relationship between the purchasing power vector $[P_1 \ P_2 \ P_3]^T$ of money and the difference vector $z = [z_1, z_2, z_3]^T$ of the demand and supply of money is mostly nonlinear in real life, monetary policies in practice are introduced to alleviate the performance of the economy for the near future instead of, for example, ten years or one hundred years for now. Therefore, any such nonlinearity involved in the mathematical modeling here that exists over a long period of time can be linearized for the near term without loss of generality as follows:

$$\begin{bmatrix} P_1 \\ P_2 \\ P_3 \end{bmatrix} = R_{3 \times 3} \begin{bmatrix} D_1(t) - S_1(t) \\ D_2(t) - S_2(t) \\ D_3(t) - S_3(t) \end{bmatrix} + \begin{bmatrix} \varepsilon_1 \\ \varepsilon_2 \\ \varepsilon_3 \end{bmatrix} \quad (3)$$

where $R_{3 \times 3}$ is a 3×3 constant square matrix with real number entries, and $[\varepsilon_1 \ \varepsilon_2 \ \varepsilon_3]^T$ a random vector with a none zero mean, which generally captures the effect of noises on this linearized theoretical system. Taking mathematical expectation across equation (3), and substituting the result into equation (2) lead to

$$R_{3 \times 3} \dot{z} = Kz + Qx \quad (4)$$

If the categorized purchasing powers of money are determined by the categorized differences of demand and supply of money, then the coefficient matrix $R_{3 \times 3}$ is invertible. That is, we can rewrite equation (4) as follows:

$$\dot{z} = Az + Bx, \quad (5)$$

where to simplify the symbolic expression, we let $A = R^{-1}K$ and $B = R^{-1}Q$.

Similar to the concept of consumer price index (CPI), let us introduce an economic index vector $y = [y_1 \ y_2 \ y_3]^T$ satisfying that the index y_i measures the state of the economic sector i , $i = 1, 2, 3$. By making use of these economic indices, the national economy of our concern can be modelled as follows by employing equation (5):

$$S: \begin{cases} \dot{z} = Az + Bx \\ y = Cz + Dx \\ z(0) = 0 \end{cases} \quad (6)$$

where $z = [D_1 - S_1 \ D_2 - S_2 \ D_3 - S_3]^T$ represents the state of the economic system, A , B , C , and D are all constant 3×3 matrices such that D is non-singular, x the policy inputs, and y the vector describing the respective economic performances of the three economic sectors. The meaning of non-singularity of D is that each introduction of monetary policies does have direct effect on the performance of the economy, as the case in real life.

According to the theory of general feedback systems developed by Lin (1994), the 3-dimensional system in equation (6) can be decoupled into three independent 1-dimensional systems of the same form as follows:

$$S_i : \begin{cases} \dot{z} = Az + B_i x_i \\ y_i = C_i z + D_i x_i, \quad i = 1, 2, 3, \\ z(0) = 0 \end{cases} \quad (7)$$

where both the input x_i and output y_i are all one-dimensional with B_i being the i th column of B , C_i the i th row of C , and D_i a non-zero constant.

This decoupling of the system S into three component systems S_1 , S_2 , and S_3 implies that when monetary policies are established individually and respectively for each of the economic sectors E_1 , E_2 , and E_3 , there is at least one way to design a feedback mechanism so that the overall performance of the economy can be controlled through individually adjusting each of the economic sectors E_1 , E_2 , and E_3 , even though the sector specific policies most definitely have joint effects on the economy. Figuratively, the general feedback mechanism can be depicted as in Figure 1, where what is shown by Lin (1994) is that there is a feedback component system S_f that makes the diagram commute. Figure 2 shows what the original system S becomes after applying the feedback component system S_f , where $n = n_1 + n_2 + n_3$ such that the policies x_1, x_2, \dots, x_n are partitioned into three subsets $\{x_{11}, x_{12}, \dots, x_{1n_1}\}$, $\{x_{21}, x_{22}, \dots, x_{2n_2}\}$ and $\{x_{31}, x_{32}, \dots, x_{3n_3}\}$ with policies $x_{11}, x_{12}, \dots, x_{1n_1}$ directed to economic sector E_1 , $x_{21}, x_{22}, \dots, x_{2n_2}$ to E_2 , and $x_{31}, x_{32}, \dots, x_{3n_3}$ to E_3 . Additionally, the three systems S_1 , S_2 and S_3 are relatively independent of each other.

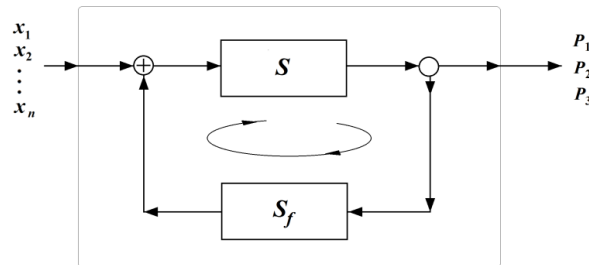


Figure 1. The general feedback mechanism

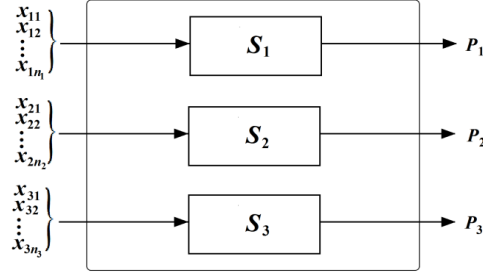


Figure 2. Systemic structure after decoupling

To conclude this section, let us use the theory above to design a strategy that may protect a nation's economic integrity in the case where a significant amount of foreign investments turn out to be an aggressive act, by suddenly withdrawing from the host nation. For this purpose, the previous theory suggests the following countermeasure. To protect the nation against a potential economic turmoil, as caused by sudden departure of foreign investments, the government could simultaneously do the following: (1) maintain a stable exchange rate, (2) increase the money supply; and (3) divide the economy into three sectors E_1 , E_2 , and E_3 , as described earlier. In doing so, the sector specific CPI for E_1 evolves stably as possible, while the specific CPI for E_2 outpaces that of E_1 by a large amount. And the government manages to trap most of the additional money supply in E_3 . The proposed theoretical model above indicates that by managing the market reactions appropriately within each of the economic sectors E_1 , E_2 , and E_3 , these sectors can be insulated from each other to a large degree. And when sector E_1 evolves stably compared to the historical pattern, the nation can most likely avoid any concerns about maintaining the desired societal stability and peace.

FEEDBACK STRATEGY

A second strategy considers how to design economic policies based on system feedback so that the chosen performance indicator would approach the pre-determined objective. Our model suggests that a feedback controller could automatically regulate the economy's supply and demand. Therefore, we design such feedback controls that may withstand disturbances of the economy. In our developed model, variable x_1 is the state of the economy that will be regulated, variable x_2 reflects the environment interference on the economy, and u and y are respectively the control vector that represents either fiscal or monetary policies and output vector (the performance of the economy). Thus, our economic model can be written as follows, where the reasoning described in the previous section also applies here to explain how linear differential equations are employed (Forrest, Hopkins & Liu, 2018).

$$\begin{cases} \frac{dx_1}{dt} = A_1x_1 + A_3x_2 + B_1u, \\ \frac{dx_2}{dt} = A_2x_2, \\ y = C_1x_1 + C_2x_2 \end{cases} \quad (8)$$

where A_i, B_1 , and C_j , $i = 1,2,3$, $j = 1,2$, are constants. The underlying idea of this system is shown in Figure 3.

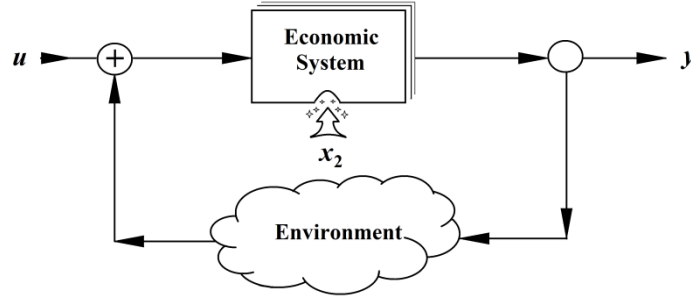


Figure 3. An environmental shock on the economic system

When there is an environmental, financial disturbance to the economy, the economic regulator adopts policies in the hope of reducing any deviation of the state variables from the targeted values. The strength the adopted policies affect the economy is roughly proportional to the deviation of the observable state variables. Such proportionality is known as the pure gain of the adopted policies. The observed values of the state variables for the original economy, and changes to them due to external factors – such as shocks – are then employed as inputs to control the strength of the adopted policies. The so-called feedback gain is defined as the product of control policies gain and the input value. When changes in the state variables are used as input, the product is known as pure feedback gain. Thus, both variables x_1 and x_2 are employed as feedback to design a feedback controller of pure gains as follows:

$$u = K_1 x_1 + K_2 x_2, \quad (9)$$

which satisfies the requirement to regulate the output: $\lim_{t \rightarrow \infty} y(t) = 0$, where matrices K_1 and K_2 need to be determined. Substituting equation (9) into equation (8) produces the following closed loop system

$$\frac{dx_1}{dt} = (A_1 + B_1 K_1) x_1 + (A_3 + B_1 K_2) x_2. \quad (10)$$

Results of control theory indicate that if the elements of A , B , and C of the economy, or the interference input x_2 change, as long as the real parts of the eigenvalues of the state matrix $A_1 + B_1 K_1$ in equation (10) stay negative, then the control strategy contained in equation (9) guarantees that the controlled variable will approach its target.

In particular, to design a feedback controller in the form in equation (9), we first solve for K_1 so the characteristic values of $A_1 + B_1 K_1$ are located at the n pre-determined locations in the left-half open plane. Second, the matrix equation system is solved by the expressions of

$$A_1 X - X A_2 + B_1 U = A_3 \text{ and } C_1 X = C_2 \text{ for } X \text{ and } U,$$

which are computed as $K_2 = K_1 X - U$. The resultant expression $u = K_1 x_1 + K_2 x_2$ is the desired pure gain feedback controller, where the first term is the state feedback, and the second term represents interference feedback. The first term stabilizes the closed loop system, while the second term removes the effect of the environmental disturbance while adjusts the output.

For example, assume that the state equation of a small economy is

$$\frac{dx_1}{dt} = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} x_1 + \begin{bmatrix} 1 \\ 2 \end{bmatrix} x_2 + \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} u$$

with the environmental interference equation and the output equation being respectively:

$$\frac{dx_2}{dt} = 0 \text{ and } y = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} x_1.$$

Then, it is possible to design a pure gain feedback controller as shown in equation (9).

In particular, in reference to equation (8), it is established that

$$A_1 = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}, A_2 = 0, A_3 = \begin{bmatrix} 1 \\ 2 \end{bmatrix}, B_1 = 0, C_1 = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}, C_2 = 0.$$

From these expressions, it is possible to calculate $K_1 = [k_{ij}]_{2 \times 2}$ so that $A_1 + B_1 K_1$ has poles -2 and -2 which in fact can be any negative numbers. Specifically,

$$A_1 + B_1 K_1 = \begin{bmatrix} 1 + k_{11} & k_{12} \\ k_{21} & 1 + k_{22} \end{bmatrix} = \begin{bmatrix} -2 & 0 \\ 0 & -2 \end{bmatrix},$$

from which it follows that

$$K_1 = \begin{bmatrix} -3 & 0 \\ 0 & -3 \end{bmatrix}.$$

Second, the matrix equation system

$$A_1 X - X A_2 + B_1 U = A_3 \text{ and } C_1 X = C_2$$

is solved for X and U . In particular, the following system is solved for X and U

$$\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} X + \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} U = \begin{bmatrix} 1 \\ 2 \end{bmatrix}$$

$$\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} X = 0.$$

This gives: $X = 0$, $U = [1 \ 2]^T$, and $K_2 = K_1 X - U = -[1 \ 2]^T$. So, the desired pure gain feedback controller is

$$u = \begin{bmatrix} -3 & 0 \\ 0 & -3 \end{bmatrix} x_1 - \begin{bmatrix} 1 \\ 2 \end{bmatrix} x_2.$$

Therefore, it is shown that when a control-theory model of the economy of our concern is established and the appropriate parameters of the model are determined, a feedback economic strategy can be designed to make the state of the economy approach the pre-determined objective without being adversely affected by external disturbances or shocks.

PARTITIONING THE ECONOMY INTO DIVISIONS STRATEGY

A third strategy which partitions an economy into divisions attempts to address how a nation could possibly design countermeasures against sudden large-scale flight of foreign investments. Experience from recent large-scale negative economic events from around the world clearly indicates a lack of understanding and adequate response to avoid or limit the negative economic impact when a large-scale flight of foreign capital appears suddenly.

To develop a model that partitions an economy into divisions, let w be the vector $[W_1, W_2, W_3]^T$ of categorized fiscal and/or monetary policies, grouped accordingly into three categories as described in previous sections:

W_1 = policies that provide the population with the basics of meeting the standard of basic living;

W_2 = policies that provide the population with ways to acquire desired living conditions; and

W_3 = policies that provide the population with means to enjoy luxurious living conditions.

Akin to the concept of overall balance in international payments, let $z = [z_1, z_2, z_3]^T$ be an economic index vector such that z_i measures the state of the economic sector E_i , $i = 1, 2, 3$. When purchasing power rises, people generally purchase more foreign assets and foreign products. Thus, the overall balance of international payments will drop because foreign exchange expenditures increase. When purchasing power declines, people generally sell more domestic assets and products; so the overall balance of international payments increases because foreign exchange revenue increases.

Chen, Ying and Forrest (2017) develop the following systemic model with polynomial lag variables,

$$\begin{cases} \dot{x} = Ax(t) + \sum_{i=1}^n A_i x(t - h_i) + Bw(t) + B_1 u(t) \\ z = Cx(t) + \sum_{i=1}^n C_i x(t - h_i) + Dw(t) + D_1 u(t) \\ x(t) = \varphi(t), t \in [-\bar{h}, 0] \end{cases} \quad (11)$$

where z represents the state of the national economy, w_1 , w_2 , and w_3 the positive and/or negative effects of the fiscal and monetary policies on the performance of the economy directly or on the currency demand and supply to have an impact on the economy indirectly. Here $u(t)$ is a random vector with a non-zero mean. Economic development can theoretically be considered as a continuous process, therefore the current change in the money stock is determined by the current monetary policies, money stock, and the previous money stock. Furthermore, the current performance of the economy is also determined by the current fiscal and monetary policies, money stock, and the previous money stock.

To develop this, let x be the 3×1 matrix $[D_1 - S_1 \ D_2 - S_2 \ D_3 - S_3]^T$ of the categorized differences of demands and supplies of money of the three economic sectors E_i , $i = 1, 2, 3$. Then Chen, Ying and Forrest's (2017) study of the systemic model of the national economy in equation (11) indicates that this separation of the economy into these three sectors can help properly manage the market reaction to fiscal and monetary policies. When the policies have positive effects on the economy, people will consume more in every economic sector with the rising purchasing power of their income. Therefore, foreign exchange expenditure increases. When the policies have negative effects on the economy, people tend to sell more in every economic sector with the declining purchasing power of their income. Hence, foreign exchange revenue increases.

To demonstrate how this model works, consider a one-dimensional case to illustrate. In such a one-dimensional case, the three economic sectors described above now become one sector. Substituting the demand and supply of money,

let x be an exchange rate, and the same symbol w represent the vector $[w_1 \ w_2 \ w_3]^T$ of categorized fiscal and monetary policies. The first equation in (11) implies that the current exchange rate is not only determined by the current fiscal and monetary policies, but also by previous policies. By fitting actual data into this model, Chen, Ying and Forrest (2017) finds that when the recent financial crisis occurred during 2008 – 2010, the Chinese government maintained the exchange rate of its RMB against the US dollar at around 6.8 by implementing a series of policies. Based on the systemic model structure for the second-order lag, the degree of the model fitting that contains parameters for policy implications increases 16.8% from that of the model without any parameters for policy implications. This fact supports the effectiveness of the introduced policy parameters.

When z is identified as the overall balance of international payments, the second equation in (11) indicates that balance is determined by the current and the previous exchange rates. Once again, Chen, Ying and Forrest (2017) find that the degree of model fitting that contains parameters for policy implications is more effective than that of the model lacking a parameter for policy implications. This implies that policy parameters are useful and necessary in the process of model fitting. Additionally, the model considered in this section implies that z is also determined by the current fiscal and monetary policies directly, and previous policies indirectly. Thus, the nature of changing z is determined by quantitative continuous-deferred policies.

One of many potential applications of this strategy is in the internationalization of a currency. In such a process, policies of the national government become a key factor. For example, Britain was the first to develop modern financial institutions. British National Order in 1694 passed a bill to establish the world's first central bank. During the years from 1816 to 1819, the British government introduced various policies about Mint and exchange, and implemented the first gold standard. Consequently, from the middle Ages to the 19th century Britain became the "sun" Empire with a financial system that dominated the world (Yu and Xie, 2011). Similar roles played by various governments can be found with the internationalization of the US dollar, Japanese yen, German mark, the Euro, and currently the Chinese Renminbi.

CONCLUSION

This paper presents three different ideas on how a nation may protect its economic integrity against currency/economic attacks and disturbances of external factors. Corresponding to the great number of different ways of investing money, there should be a similar number of ways one could protect their economic well-being. There is a paucity of research that examines how to protect the financial wellbeing of an economic system, at the individual household, region, or national levels.

Due to the complexity of any national economic system, economic changes occur constantly, making it difficult for policy makers to introduce effective control strategies so that the stability of the economy can be maintained. To face this challenge, this paper presents strategies of self-defense against adverse effects of external influences by employing the concept and theory of feedback systems. Other than developing the theory, examples are used to illustrate how the theory could be employed in practice. This paper demonstrates both theoretically and practically that the established strategies should serve as effective tools, making the regulated economic indices approach the ideal targets, even under the influence of environmental disturbance.

Additional research is crucial to examine defense solutions against adverse effects of factors that are external to the economic system of concern. First, it is theoretically limiting if the study of economic interactions only focuses on the dynamics between two countries. Such study should cover a larger dynamic system involving many mutually reciprocating feedback countries. Second, the following is still an open problem: How can one improve the accuracy of assessing and quantifying the impact of different policies on the economy? The complexity of domestic and international fiscal policy in the modern era is daunting. However, the new battlefield of economic and fiscal opportunism and hostile actions demands developing effective defense strategies.

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MORE QUALITY, LESS QUANTITY: DIVERSIFICATION AND RISK REDUCTION IN QUALITY PORTFOLIOS

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ABSTRACT

The research presented in this paper aims to construct Warren Buffett-style, concentrated portfolios based on two main criteria, size and quality, in order to investigate the diversification and risk reduction in concentrated, quality portfolios. We construct the concentrated index portfolios with companies that are leaders in quality following the method of Asness, Frazzini, & Pedersen (2018). Our research indicates that for any number of stocks in a portfolio, quality portfolios have less risk than portfolios constructed with random stocks. Consistent with the prior literature on the quality factor and the low volatility effect, we find that our low-risk, quality portfolios have higher risk adjusted mean returns than the diversified market portfolio. Finally, we show that the risk of a portfolio constructed based on quality, does not decrease monotonically as the number of quality stocks is increased. Instead, we find that the risk of quality portfolios is minimized at about 10 stocks and that increasing the number of stocks in the quality portfolio actually increases the standard deviation and beta risk. We refer to this increase in risk of the quality portfolios with an increasing number of stocks as the quality dilution effect. While Buffett has long argued that holding a large number of stocks about which he knows nothing seems risky to him, we believe that our research is the first to provide empirical evidence for Buffett's assertion.

INTRODUCTION

Warren Buffett's success over the past decades has sparked a wave of research, which has sought to explain his success and find ways to duplicate it. While researchers praise Buffett's ability to predict future returns and pick stocks accordingly, they can trace some of his success to following a strict investment discipline. For instance, the stocks Buffett buys tend to be rather mature and large-cap companies. In addition, they display higher levels of safety and appear to have certain quality attributes (Frazzini, Kabiller, & Pedersen, 2018). Since the number of stocks that fit into these criteria is limited and too many companies would dilute the quality aspect, Buffett chooses to invest in only a small number of companies. Benello, Van Biema, & Carlisle (2016) quote Buffett saying that "if it's your game, diversification doesn't make sense. It's crazy to put money in your twentieth choice rather than your first choice... [Berkshire vice-chairman] Charlie [Munger] and I operated mostly with five positions." Therefore, in order to mimic Buffett's performance, the portfolio construction would need to match two criteria. The portfolio would need to be a concentrated portfolio of large company stocks that are of high quality. DeAngelo, & Skinner (2004) show that earnings, as well as dividends concentrate in fewer, large companies, which further supports the selection of such for a concentrated portfolio.

The second criteria a stock has to meet in order to be considered a feasible option for a Buffett-type portfolio is high quality. Many papers have been written on the definition of a quality stock. Some assume that quality simply equals profitability. However, a more complex quality model (Asness, Frazzini, & Pedersen, 2018) has found a quality factor that seems to explain Buffett's excess returns. This quality factor consists of profitability but also includes measures of growth, as well as the safety of the company. A portfolio built on this quality factor has shown to earn excess returns over the Fama and French five-factor model and a six-factor model that also includes the momentum factor (Asness, Frazzini, & Pedersen, 2018). Using his concentrated portfolio of quality stocks, Buffett has produced market-beating returns avoiding "over-diversification".

In contrast to Buffett's concentrated investment strategy, traditional portfolio theory advocates a diversified portfolio with a large number of stocks to eliminate unsystematic risk. While the prior literature shows that a significant portion of the risk reduction occurs within the first 20-50 stocks [depending on the study], virtually all of the prior research indicates a monotonic decline in portfolio risk as the number of stocks in the portfolio approaches the market portfolio. Another key foundation of the diversification effect is the random selection of stocks to minimize the covariance between stocks in the portfolio.

The research presented in this paper aims to construct a Buffett-style portfolio based on the two main criteria discussed above – size and quality. Only the largest companies in an S&P sector are considered for the concentrated portfolios.

In addition, we construct the portfolio with companies that are leaders in quality. Our research indicates that for any number of stocks in a portfolio, quality portfolios have less risk than portfolios constructed in the prior research with random stocks. Consistent with the prior literature on the quality factor and the low volatility effect, we find that our low-risk, quality portfolios have higher risk adjusted mean returns than the diversified market portfolio. Finally, we show that the risk of a portfolio constructed based on quality, does not decrease monotonically as the number of quality stocks is increased. Instead, we find that the risk of quality portfolios is minimized at about 10 stocks and that increasing the number of stocks in the quality portfolio actually increases the standard deviation risk. We refer to this increase in risk of the quality portfolios with an increasing number of stocks as the quality dilution effect. While Buffett has long argued that holding a large number of stocks about which he knows nothing seems risky to him, we believe that our research is the first to provide evidence for Buffett's assertion.

LITERATURE REVIEW AND HYPOTHESES

Concentrated Portfolio Strategy

One of the hypotheses of this paper is that a smaller number of shares, selected for a Buffett-style quality portfolio, can provide less risk than a randomly selected diverse portfolio. The large-company stocks in Buffett's portfolio are safe (measured by low beta and low return volatility) and of high quality. Quality companies are often defined as profitable, stable, growing, and dividend paying. This tells us that while 80% of Buffett's portfolio remains in private companies, the publicly traded companies held by Buffett are larger, older, and more mature companies. According to findings in the dividend literature (Baker, 2009), older, more mature firms are cheaper (in terms of market-to-book), safer (less return volatility), and more likely to pay a dividend than younger firms. This premise leads to our first hypothesis:

H1: The Buffett-style portfolios constructed in this paper, which are based on a concentrated quality strategy, have less total return volatility than portfolios constructed of randomly selected stocks.

Factor Investing and Quality Factor

Piotroski (2000) argues that less than 44% of large, mature companies actually earn a positive return in any given year; therefore, it is not enough to find mature, large companies. Instead, one has to separate "winners," those companies which will have a positive return, from "losers," those which will not have positive returns. By using a binary score and buying the companies with higher scores, Piotroski demonstrates that one can increase returns. Consequently, academic research supports Buffett's success— that is one can obtain high returns by selecting stocks of large mature companies, when such companies are of higher quality (or those considered winners). The issue then becomes defining quality.

Wang & Yu (2013), Liu (2015), and Novy-Marx (2013) all report the ability of profitability to predict future stock returns. Novy-Marx (2013) finds that profitability has roughly the same predictive power as the book-to-market, or the HML factor described by Fama & French (1993). If profitability provides a return premium while having lower risk levels than other factors, then it can be considered a sorting method to separate "winners" from "losers" and to identify quality. Bouchaud, Ciliberti, Landier, Simon, & Thesmar (2016) found that quality measures based on profitability alone are under-utilized in stock price forecasting. Asness, et al. (2018) identify a more evolved quality factor. Similar to Bouchaud, et al. (2016), they use profitability to identify quality, but they also enhance the quality factor with a growth and a safety component. Asness, et al. (2018) combine profitability measures, growth rates, and safety measures to rank stocks from highest to lowest quality. A portfolio buying the high-quality stocks and shorting those of lower quality shows excess returns even with a six-factor model. The success of Buffett and the success of portfolios based on the quality factor in the prior literature suggests our next hypothesis:

H2: The concentrated, large cap portfolios based on a quality strategy constructed in this research will earn an excess return for the levels of risk taken.

Diversification and Risk Reduction

Since the objective of this paper is to investigate the risk reduction in concentrated Buffett style portfolios, we seek to develop two key features of the research – (1) the randomly selected, diversified portfolio as a benchmark and (2) a

quality index portfolio where the number of quality firms in the portfolio can be simulated. Evans and Archer (1968) developed the basis for the methodology and definitions for most investigations between the risk of a portfolio and the number of securities in that portfolio. Evans and Archer's (1968) results indicate the standard portfolio theory relationship that risk decreases asymptotically with an increasing number of randomly selected firms. Elton and Gruber (1977) provide an analytical expression for the relationship between portfolio risk and the number of securities (which are randomly selected). Statman (1987) converts the Elton and Gruber (1977) results to standard deviations of annual returns which serves as a benchmark for our simulations. Although researchers vary in the optimal number of securities in a portfolio based on somewhat different portfolio marginal analysis, nearly all studies agree that increasing the number of randomly selected securities in a portfolio decreases the portfolio risk.

In contrast Asness et al., (2018) rank stocks by quality and find the characteristics of the high-quality stocks differ from the low-quality stocks to the point where they refer to the low-quality stocks as "junk". Given the quality definition and ranking by Asness et al., (2018) low quality stocks are less profitable, less safe, and have slower growth. In a ranked quality portfolio, increasing the number of securities in the portfolio *reduces* the quality of the overall portfolio. Our premise is that at some point, the benefits of eliminating the unsystematic risks will be lost to the reduction in quality by the "junk" firms. We refer to this reduction in quality with increasing firms in a quality ranked portfolio as the quality dilution effect. Contradictory to a randomly generated portfolio that achieves risk reduction (albeit at a diminishing rate), we propose that increasing the number of firms in a quality portfolio at some point actually increases the risk of the portfolio. Our final hypothesis then is:

H3: Due to the quality dilution effect, the total risk of the ranked quality index portfolios does not decline asymptotically with an increasing number of lower ranked firms.

DATA AND METHODOLOGY

Variables and Data

To study the effect of increasing the number of securities in a quality-ranked index portfolio and test our quality dilution hypothesis, we developed a quality index portfolio, which we refer to as the Makowski-Hauser Quality Index [herein the MHQI]. To construct the MHQI, we essentially follow the method of Asness et al. (2018) to construct a quality factor and a quality score. The MHQI portfolio of n stocks is constructed from the n stocks with the highest quality scores. Statman (1987) conversion of the Elton and Gruber (1977) results to standard deviations of annual returns serves as a randomly selected portfolio benchmark for our simulations. We retrieved the annual historical financial data and total return data from FactSet Research Systems Inc.'s database for the 2005 -2018 time period, although earnings data dated back to 2000 for computation of the 5-year growth rate. Table 1 lists the variables and definitions for the raw data measures retrieved and the corresponding computed quality measures.

Table 1.
Variables and Definitions

<i>Variables</i>	<i>Definitions</i>
<i>Data Retrieved from FactSet</i>	
<i>Profitability Factor Measures</i>	
<i>Asset Turnover</i>	Sales / Total Assets
<i>ROA</i>	Return on Assets
<i>Safety Factor Measure</i>	
<i>Leverage</i>	Total Liabilities / Total Assets
<i>Growth Factor Measure</i>	
<i>Growth in Earnings</i>	5-Year Growth in Net Income
<i>Annual Returns</i>	Annual Return for Company X in year t+1
<i>Computed Variables</i>	
<i>zProf</i>	z-Score of Profitability, Profitability Score
<i>zGrowth</i>	z-Score of Growth, Growth Score
<i>zSafety</i>	z-Score of Safety, Safety Score
<i>Quality Score</i>	z-score of (zProf + zGrowth + zSafety)

Factors

The quality factor consists, as suggested by Asness, et al. (2018), of three components: Profitability, growth, and safety. For this investigation, sales over total assets and return on assets are the profitability measures used in the quality score calculations. We follow the measure of growth applied by Asness, et al. (2018) and use a five-year growth rate of earnings, where the growth rate considers the total growth of earnings over the five-year time span. We utilize a function of leverage for the safety factor.

Quality Score

The factors then need to be standardized in order to allow a ranking of the companies. The formula for the standardization of any measure is given as

$$z = \frac{x_i - \mu}{\sigma}$$

where X_i is the value of the factor for company x in a given year, μ is the mean of the factor in the sample for a given year, and σ is the standard deviation of the factor in the sample for a given year. Following Asness et al., (2018) the standardized scores for each component of the quality score are combined for each considered company. Company X 's quality score is calculated by summing the z -scores of each component and once again, standardizing the sum using the following formula

$$Quality(x, n) = \frac{\sum\{zProf(x, n), zGrowth(x, n), zSafety(x, n)\} - \mu\{\sum[zProf(n), zGrowth(n), zSafety(n)]\}}{\sigma\{\sum[zProf(n), zGrowth(n), zSafety(n)]\}}$$

where $Quality(x, n)$ is the quality score for company x in year n , $zProf(x, n)$ is the profitability-score of company x in year n , $zGrowth(x, n)$ is the growth-score of company x in year n , and $zSafety(x, n)$ is the safety-score for company x in year n ,

$\mu\{\sum[zProf(n), zGrowth(n), zSafety(n)]\}$ is the mean of the sum of the profitability, growth, and safety-scores in year n , and

$\sigma\{\sum[zProf(n), zGrowth(n), zSafety(n)]\}$ is the standard deviation of the sum of the profitability, growth, and safety scores in year n .

Quality Index

The quality factor allows us to rank the companies in each year by quality. The portfolio simulation ranks the top-quality companies per year regardless of sector, where the highest n quality ranked stocks become the n -stock quality index portfolio. Following the method of Archer and Evans (1968), the securities in the MHQI portfolio are equal weighted. The portfolios are rebalanced at market open on July 1st of every year. Financial data of companies with a fiscal year end date before the 31st of March of the year is used in the portfolio construction. Any data of companies with a fiscal year end data past March 31st is used in the following year quality score calculation. In doing so, we avoid the construction of an explanatory model and mitigate endogeneity (since we are evaluating future returns based on past financial quality data). Ensuring that all data is available at the time of quality score calculation avoids any information bias. The companies in consideration, as well as the quality score for each company is re-evaluated annually. Thus, the emerging portfolio is rebalanced on an annual basis. Finding the annual returns for the holdings in the portfolio for the year $t+1$, we are able to calculate a portfolio return. From the simulated portfolio returns, we compute the portfolio risk measures, which enables us to test the research hypotheses.

Investible Quality Index Portfolios

It is advantageous to consider existing, investible portfolios that follow a quality index strategy. One such portfolio is the iShares Edge MSCI USA Quality Factor ETF – QUAL. This portfolio tracks the MSCI Quality Index. As of September 2019, the portfolio has 125 holdings (Morningstar, Inc., a). The index calculates the quality score based on three variables: return on equity, debt-to-equity and earnings variability (MSCI Index Methodology, 2013). A company with the highest return on equity, while simultaneously having the lowest debt-to-equity ratio and the lowest earnings variability is assigned the highest quality score in this index. Following Asness, et al. (2018), the three variables are standardized in order to make them comparable. Contradicting the work of Asness, et al., the MSCI index assigns the overall quality score by averaging the z-scores of the three variables. Finally, portfolio weights are assigned by multiplying quality scores with the market capitalizations of the stocks. The ETF was started in 2013 and over the last five years, QUAL has shown a lower standard deviation than the S&P 500. (Morningstar, Inc., c).

Another portfolio based on a quality index strategy is the Invesco S&P500 Quality ETF – SPHQ, which tracks the S&P 500 Quality Index (USD). Quality scores are calculated using return on equity, an accruals ratio, and the financial leverage of the company. The overall quality score is calculated by averaging the standardized values of the three components. The values are winsorized at 4 and –4 and finally the quality score is computed by transforming the new values into a scalable version of the data. The highest 100 quality scores make it into the portfolio and weights are assigned by multiplying the quality score and the float-adjusted market capitalization (S&P Dow Jones Indices, 2018). Over the 10 years ending in September 2019, SPHQ has outperformed the S&P 500 with a lower standard deviation and higher Sharpe ratio (Morningstar, Inc., b). After reviewing the two investible quality index portfolios with the longest histories, we believe that our MHQI methodology is sufficiently comparable to other quality index portfolios.

EMPIRICAL RESULTS

Portfolio Concentration

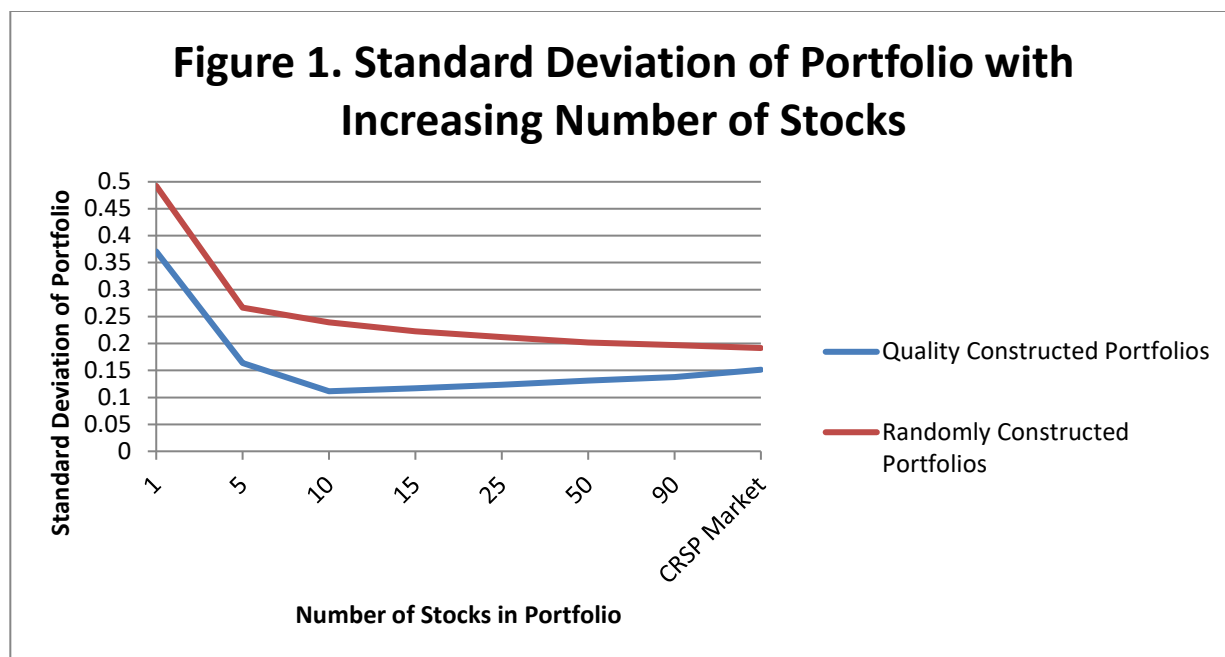
Portfolio Simulation Risk

Table 2
Simulation results for increasing the number of firms in the quality index portfolios.

Number of Stocks in portfolio	Benchmark Portfolio Constructed by Adding Random Stocks		Quality Portfolio Constructed by Adding Ranked Quality Stocks		
	Standard Deviation of Annual Portfolio Returns ¹	Ratio of Portfolio Standard Deviation to Standard Deviation of a Single Stock ¹	Standard Deviation of Annual Portfolio Returns	Ratio of Portfolio Standard Deviation to Standard Deviation of a Single Stock	Ratio of Quality Portfolio Standard Deviation to Random Portfolio
1	49.236	1.00	37.1	1.00	0.75
5	28.165	0.57	16.4	0.44	0.58
10	23.932	0.49	11.1	0.30	0.46
15	22.466	0.46	11.7	0.32	0.52
25	21.196	0.43	12.4	0.33	0.59
50	20.203	0.41	13.1	0.35	0.65
90	19.742	0.40	13.8	0.37	0.70

¹ Source: Statman from Elton and Gruber. Statman converted Elton and Gruber weekly variances to standard deviation of annual returns. We interpolated Statman's table for results at 5, 15, 25, and 90 firms.

Table 2 indicates that our simulation does show that the Buffett-style portfolios constructed in this research, which are based on a concentrated quality strategy, have less total return volatility than cocentrated portfolios constructed of randomly selected stocks, which supports hypothesis H1. The simulation results show that the concentrated quality index portfolios have about 50 – 75% of the standard deviation of annual returns as the concentrated portfolios constructed of randomly selected stocks. Figure 1 presents the standard deviation results in the format similar to Evans and Archer (1968).



Our results are consistent with the prior dividend policy literature, which shows that higher-quality, dividend paying stocks have lower volatility than non-paying stocks. Table 3 details the simulation results for increasing the number of firms in the quality index portfolios.

Table 3
Simulation Results for Increasing the Number of Firms in the Quality Index
Portfolios

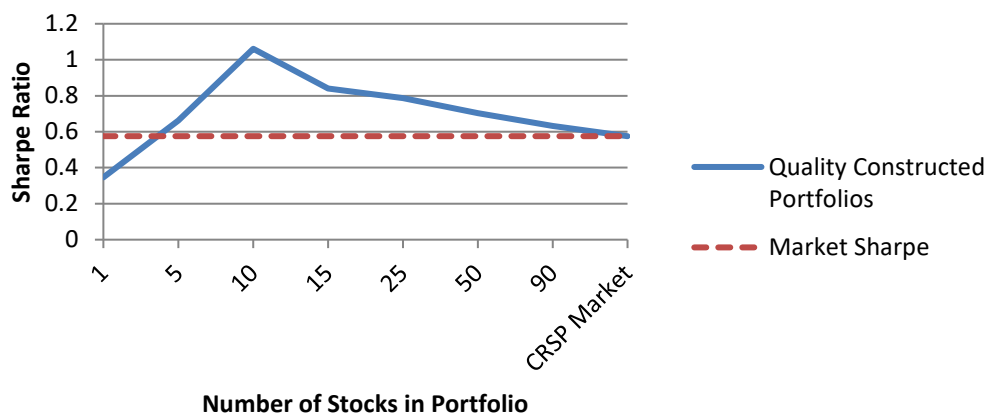
	Market	Makowski-Hauser Quality Index Portfolios						
Year	CRSP Market	90	50	25	15	10	5	1
2005	0.094	0.116	0.137	0.087	0.039	0.050	0.060	0.171
2006	0.195	0.212	0.196	0.184	0.172	0.196	0.224	0.263
2007	-0.124	-0.063	-0.022	-0.016	0.061	0.115	0.127	-0.436
2008	-0.251	-0.244	-0.241	-0.209	-0.204	-0.196	-0.296	-0.513
2009	0.154	0.147	0.156	0.155	0.111	0.102	0.160	0.766
2010	0.319	0.309	0.296	0.325	0.327	0.313	0.429	0.335
2011	0.037	0.055	0.116	0.134	0.174	0.164	-0.001	0.117
2012	0.221	0.212	0.201	0.192	0.187	0.144	0.027	0.128
2013	0.251	0.238	0.229	0.218	0.167	0.181	0.301	0.672
2014	0.074	0.045	0.016	0.063	0.058	0.106	0.126	0.027
2015	0.015	0.049	0.053	0.070	0.124	0.177	0.149	-0.040
2016	0.197	0.141	0.158	0.132	0.154	0.175	0.160	-0.159
2017	0.158	0.098	0.093	0.134	0.074	0.132	0.054	0.086
2018	0.044	0.065	0.070	0.058	0.093	0.160	0.166	0.544
Mean	0.099	0.099	0.104	0.109	0.110	0.130	0.120	0.140
St.Dev	0.151	0.138	0.131	0.124	0.117	0.111	0.164	0.371
Geomean	0.088	0.090	0.096	0.102	0.104	0.124	0.108	0.077
Return/St.Dev	0.653	0.717	0.793	0.882	0.941	1.167	0.733	0.378
Number of Firms	~ 4000	90	50	25	15	10	5	1
Avg. Qual Score	-	0	0.657	1.212	1.591	1.886	2.322	3.145
Beta	1	0.883	0.864	0.840	0.828	0.807	1.205	1.726

Portfolio Returns

Portfolio Return Results

Table 3 presents the risk and return characteristics for the concentrated MHQI portfolios. Confirming hypothesis H2, our results show that increasing the number of firms reduces the mean return of the quality index portfolios monotonically until the full sample return converges to the mean CRSP market return for the period. Without adjusting for risk, the concentrated quality index portfolios have as much as 60% higher mean return than the CRSP market mean return. Due to the lower risk of the MHQI portfolios, the risk adjusted return is as much as 80% higher than the CRSP market risk adjusted return. Figure 2 below shows the MHQI portfolio Sharpe Ratios against the Sharpe Ratio of the CRSP Market.

Figure 2. Portfolio Sharpe Ratio with Increasing Number of Stocks



From Figure 2, we can see that any MHQI portfolio with 5 – 50 stocks has a higher Sharpe ratio than the CRSP market. These results confirm the prior literature on the excess returns with the quality factor as well as the prior literature on the low volatility effect. The key insight here is that a concentrated (between 5 and 50 securities), quality portfolio with less risk actually has a greater risk adjusted mean return than the fully diversified CRSP market. Since the focus of this research is to investigate the risk reduction of the Buffett-style, quality portfolios, we will return the focus of the discussion to portfolio risk. Our point here was only to demonstrate that the concentrated quality portfolios did not sacrifice return for risk reduction.

Portfolio Return Factor Regressions

Since examination of total risk via standard deviation is only one risk measure, we investigated the beta of the portfolios. The portfolio return factor-regressions are considered with both single-factor regression and six-factor regression and the regression results are summarized in Table 4 below. Given the better fit of the six-factor regression model (as determined by the adjusted R^2), we utilize the market betas from the six-factor regression model for subsequent calculations. On a market risk basis, we find that concentrated MHQI portfolios have a beta lower than the diversified market for portfolios of more than 5 stocks, with a minimum market beta of 0.81. Figure 3 displays the declining beta in the quality portfolios as well. To demonstrate again that returns are not sacrificed for the lower beta risk, we present the quality portfolio Treynor ratios in Figure 4. The Treynor ratio plot follows the results for the beta, with the quality portfolios having greater Treynor Ratios than the diversified market for quality portfolios of more than 5 stocks.

Table 4.
Multi-factor and Single-Factor Regression Results for the Annual Quality Index
Portfolio Returns

Regression Coefficients with p-values in parentheses							
Panel A. Multi-Factor Regression Results							
	90	50	25	15	10	5	1
MktRF	0.883	0.864	0.840	0.828	0.807	1.205	1.726
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.002)	(0.118)
SMB	-0.175	-0.223	-0.056	-0.388	-0.606	-0.502	-1.236
	(0.175)	(0.177)	(0.548)	(0.095)	(0.007)	(0.324)	(0.525)
HML	0.084	0.279	-0.098	-0.081	-0.125	-0.102	-0.003
	(0.490)	(0.100)	(0.303)	(0.696)	(0.458)	(0.834)	(0.999)
RMW	0.168	0.554	0.383	0.789	0.757	1.433	0.146
	(0.426)	(0.065)	(0.040)	(0.056)	(0.028)	(0.120)	(0.964)
CMA	0.282	0.236	0.501	0.580	0.232	-0.155	1.460
	(0.113)	(0.275)	(0.004)	(0.069)	(0.318)	(0.814)	(0.575)
MOM	0.073	0.111	0.125	0.141	0.131	0.157	-0.238
	(0.111)	(0.068)	(0.005)	(0.083)	(0.050)	(0.369)	(0.721)
Cons	0.007	0.007	0.011	0.004	0.028	-0.035	-0.016
	(0.512)	(0.593)	(0.229)	(0.840)	(0.096)	(0.434)	(0.927)
Adj R-Squared	0.976	0.957	0.983	0.904	0.932	0.718	0.165

Panel B. Single Factor (CAPM) Regression Results							
	90	50	25	15	10	5	1
MktRF	0.882	0.819	0.785	0.657	0.577	0.807	1.636
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.002)	(0.008)
Cons	0.010	0.021	0.029	0.041	0.068	0.038	-0.014
	(0.289)	(0.129)	(0.031)	(0.073)	(0.011)	(0.292)	(0.875)
Adj R-Squared	0.956	0.903	0.910	0.688	0.582	0.537	0.413

Figure 3. Portfolio Beta with Increasing Number of Stocks

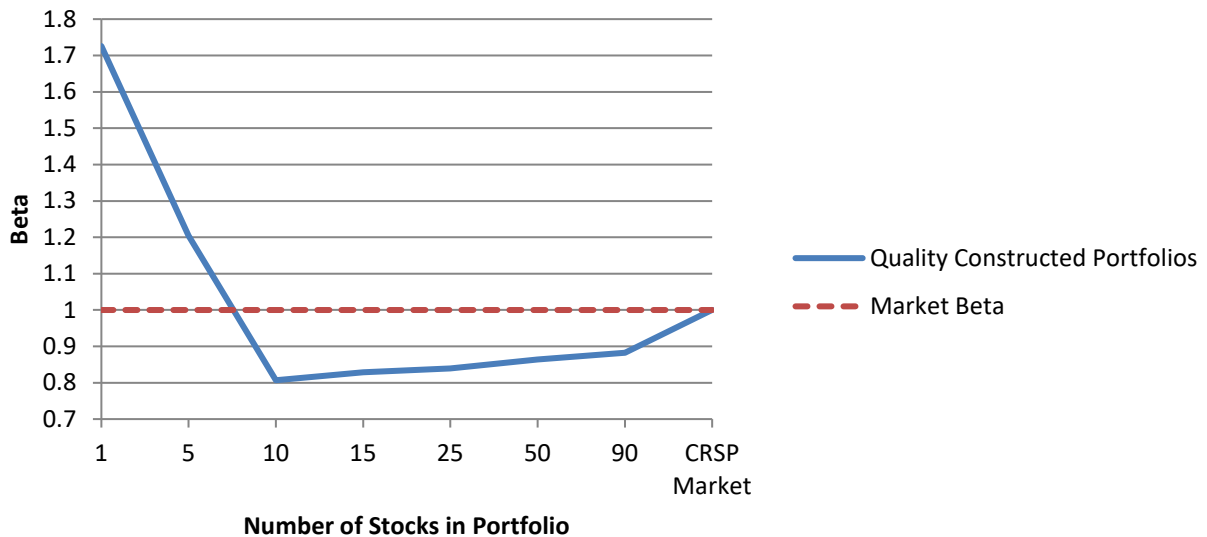
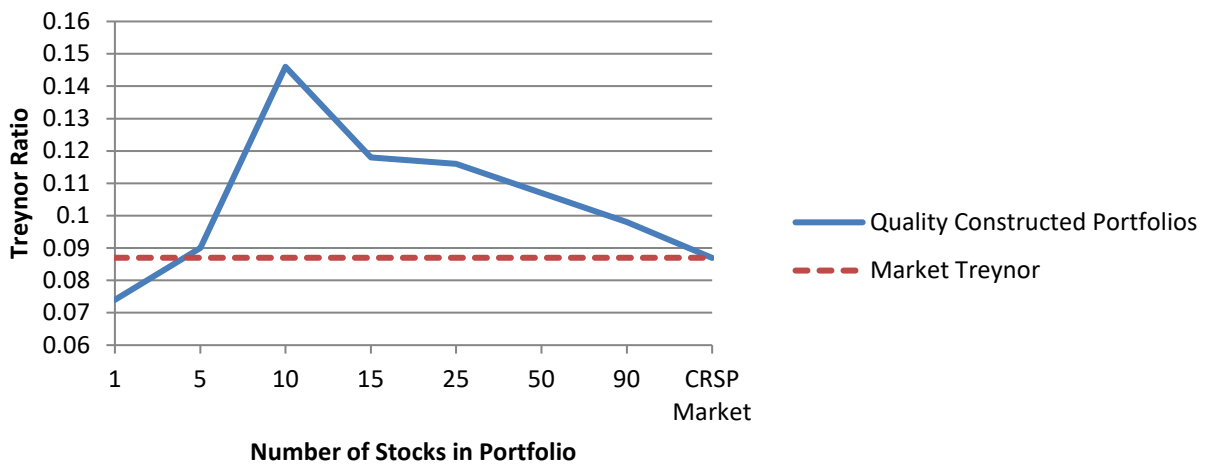


Figure 4. Treynor Ratio for Portfolios with Increasing Number of Stocks



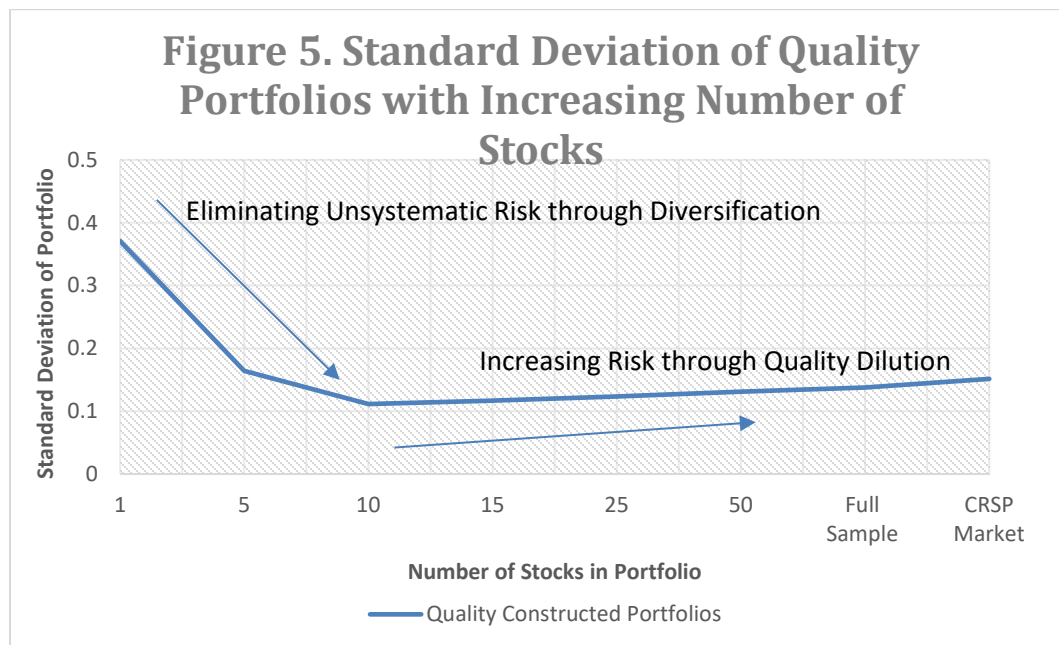
The multi-factor regression allows us to test for a six-factor alpha, and also gives insight on the additional risk loadings of the portfolio. The MHQI portfolio with 10 stocks is able to generate a six-factor alpha, which is significant at the 90% confidence interval. The MHQI portfolio with 10 stocks indeed beats the market significantly in terms of average returns with lower standard deviation and lower beta. As a result, the MHQI 10 stock portfolio generates a CAPM and a six-factor model alpha, which confirms H1 and H2. Since the sample population for the portfolio construction is built using the biggest companies in each of the industry sectors, it comes as no surprise that the portfolio shows

highly significant positive loading on the market, and highly significant negative loading on small capitalization stocks. The MHQI 10 stock portfolio also weighs heavily on profitable companies. A high positive load in the robust minus weak (RMW) factor acts as assurance that the quality factor, which relies heavily on profitability metrics, actually loads a risk premium from profitable companies.

Quality Dilution Effect

To summarize the results at this point, we have extended the existing literature on the quality factor and the low volatility effect to show that these phenomena also occur in concentrated quality index portfolios. However, the most significant finding of this research is the empirical evidence for the quality dilution effect. From the data previously presented in Tables 2 and 3, as well as Figures 1 and 3, it is clear that after about 10 quality stocks adding additional stocks to the quality portfolio increases the risk. Whether we measure the risk as standard deviation of annual returns or the portfolio beta, the conclusion remains that we find a point where further diversification of the quality portfolio actually *increases risk*. Furthermore, with the increase in risk after about 10 quality stocks, the risk adjusted return declines. Table 3 as well as Figures 2 and 4 show a clear optimal risk adjusted return at about 10 quality stocks and then risk adjusted return performance declines toward the CRSP market risk adjusted returns. The fact that we see a minimum risk (or corresponding maximum risk adjusted mean return) for a quality constructed index portfolio supports H3.

The premise for a minimum risk with a quality index portfolio can be seen graphically in Figure 5. When the quality index portfolio has less than 10 stocks, the standard principle of diversification works and unsystematic risk is eliminated. However, as ranked quality stocks are further added to the portfolio, each additional stock has a lower quality ranking, reducing the overall quality score as can be seen in Table 3. With the reduced overall quality score, the portfolio loses the characteristics of high-quality stocks, namely lower risk. In the limit as the number of stocks is increased in the quality portfolio, the risk reverts to the asymptotic limit of the CRSP market risk. We refer to this effect of increasing risk with additional quality ranked stocks as the quality dilution effect. Note in Figure 5, that the tradeoff between the risk reduction with increasing diversification and risk increase with quality dilution leads to a minimum risk in the quality constructed index portfolios, with the minimum risk occurring at about 10 stocks. This minimum risk furthermore sets the optimal number of stocks in a quality constructed index. At the optimal number of about 10 quality stocks, the total risk of the quality index portfolio is 46% of the risk of a randomly selected portfolio of 10 stocks. Moreover, the beta of the 10 stock quality portfolio is 20% lower than the fully diversified market beta.



CONCLUSION AND IMPLICATIONS

The research set out to investigate three hypotheses related to the diversification and risk reduction of quality-constructed portfolios. The results show that portfolios made up large-company, high-quality stocks *have less total return volatility than portfolios constructed of randomly selected stocks*. In addition, the research also confirms that the concentrated large-cap quality index portfolios constructed in this paper *outperform the market and earn an excess return for the levels of risk taken*. With these results, we have extended the existing literature on the quality factor and the low volatility effect to show that these phenomena also occur in concentrated quality index portfolios.

However, the most significant finding of this research is the empirical evidence for the quality dilution effect, which refers to the effect of *increasing risk* as the number of quality ranked stocks is added to the portfolio. The tradeoff between the risk reduction with increasing diversification and risk increase with quality dilution leads to a minimum risk in the quality constructed index portfolios, with the minimum risk occurring at about 10 stocks. This minimum risk inflection point furthermore sets the optimal number of stocks in a quality-constructed index. The minimum risk inflection point occurs [with a significant reduction in risk over the diversified market portfolio] whether we define risk in terms of standard deviation or beta.

The implications of this research are profound on the understanding of concentrated quality portfolios. Our research shows that quality constructed portfolios can actually have too much diversification. Although Warren Buffett has asserted “over-diversification” for years, our research offers empirical support to Buffett’s claim. However, even beyond the construction of quality index portfolios, most portfolio managers do not randomly add stocks to a portfolio. While it is outside the scope of this research, this “dilution” effect may occur in actively managed portfolios where a portfolio manager adds stocks in a “ranked” fashion. This research may lead to further investigations to determine if adding “junk” to a portfolio truly achieves the diversification and risk reduction desired. Not surprising, Buffett being the “Oracle of Omaha” has had it correct all this time.

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ECONOMIC ASSESSMENT OF THE IMPLEMENTATION MEASURES OF EUROPEAN WATER FRAMEWORK DIRECTIVE

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ABSTRACT

In this article we analyze the measures against pollution in river basins that follow the European Water Framework Directive (European Commission, 2000) and propose a methodology for assessing their economic effectiveness. Compared to other similar studies (Berbel et al., 2018), the presented methodology has been developed and tested in rivers where water pollution is a result of mining activities. In terms of economic theory, the methodology can be summarized as follows: The cost effectiveness analysis used to select the optimal mix of costs is integrated into the cost-benefit analysis to assess the cost-effectiveness of the proposed measures. The methodology has been tested on a case study of the East Aegean Region and recommendations for the region have been made for the next five-year period of the Directive.

INTRODUCTION

Water is an indispensable resource for human beings. It can also be considered as a complex economic good and a key driver of sustainable growth and development (Goswami & Bisht, 2017). The European Water Framework Directive (WFD) sets out the principles guiding the policies of the European Union (EU) Member States as well as the choice of economic instruments for controlling the use of water resources on the base of methods for economic assessment and adopting the *Principle of Recovering Full Cost* and the *Polluter Pays Principle*.

According to the WFD, the European Union's water quality objectives were to be achieved by 2015. Potential extensions of the deadline are allowed either for reasons of technical feasibility or because of a disproportionate cost (European Commission, 2000; Article 4, paragraphs 4, 5, 7). These reasons justify the possibility of extending the deadline for achieving *Good Environmental Status* (GES) by 2027. If the costs are disproportionate, lower targets may be established, to achieve *Acceptable Ecological Status*.

The European Commission has developed several methodological rules to carry out an economic analysis (European Commission, 2009). These rules offer various assessment tools, depending on the different strategies and policies of the individual EU member states (Brouwer, 2008). The evaluation itself supports the process of political decision-making and provides the necessary transparency (Voulvoullis et al., 2017). However, the general nature of the rules does not define the practical procedures, which each country could use to assess the benefits and costs associated with a list of necessary measures (Jensen et al., 2013). In an attempt to resolve this problem, a number of articles appeared, including Postle et al. (2004), Berbel et al. (2011), and Jensen et al. (2013). They offer rules and criteria for economic evaluation that (at least to some extent) limit the influence of the subjective factor. Specific for the cost-benefit analysis presented here is the focus on the individual sources of pressure on the water bodies without taking into account the multiple impacts of the applied measures. Martin-Ortega et al. (2013) fairly criticized this approach suggesting the economic analysis to include such elements as the spatial and temporal scale of the evaluation, the cost-benefit sharing, and uncertainty.

Analyzing the WFD methodological guidelines and the good research practices, in this paper we propose a methodology to assess the cost-effectiveness of the measures for restoring the ecological status of water bodies. As an illustration, we consider its application in the case study of the East Aegean Region. The methodology was tested in mining and ore processing regions, but could also be applied to other regions and water areas.

Although it is not possible to construct a generic framework, most empirical studies on the cost-effectiveness of WFD implementation contain three mandatory elements:

- (1) Economic assessment methods necessary to quantify the social, economic, and environmental effects;
- (2) Comparative criteria and threshold values; and
- (3) Spatial scale of the analysis (water body, part of a water body, pool, sub-basin, administrative district or a particular region) (Ward, 2009).

Our study addresses these three elements.

The paper is organized as follows: the next section describes the methodology for the economic assessment of measures for implementation of WFD. Then the case study of its application in the East Aegean Region is considered. Finally, the limitations of the methodology are discussed.

METHODOLOGY FOR ECONOMIC ASSESSMENT OF WFD IMPLEMENTATION MEASURES

The most commonly used methods for economic evaluation of large investment projects for environmental purposes are cost effectiveness analysis (CEA) and cost-benefit analysis (CBA). The CEA compares the monetary values of the costs and the physical benefits of the measures taken (i.e., the costs are compared with the reduced level of pollution), while the CBA compares the cost-benefit monetary costs (i.e., costs are compared to the direct and indirect benefits of the improved environmental status). CEA avoids the discrepancies related to the monetization of some intangible assets, such as the environment, and is therefore a preferred tool in the comparative analysis of alternative measures. As the CBA method is assessing not only costs, but also tangible and intangible assets, it is appropriate for an overall assessment of the economic effectiveness of the adopted measures or combinations of measures.

The preferences of European researches to the CEA method probably are due to the fact that the evaluation of benefits has encountered a number of difficulties. However, in some studies in the UK, Scotland, France (Seine and Normandy), the Netherlands, and Denmark, the CBA method was used. To reduce the effort needed to assess the benefits, economists use two strategies. The first one includes limiting the application of CBA for those water bodies for which CEA results conflicts with the expectations of local stakeholders. The second one is based on the assessing of benefits in other studies with similar objectives and similar conditions. The first strategy was implemented by Postle et al. (2004) in England and Interwies et al. (2005) in Scotland, while the second strategy, also known as the Benefit Transfer Method (TM), was used by Laurans (2006) and Jensen et al. (2013) in France and Denmark, respectively.

For efficient using of CBA and/or CEA methods reliable benchmarks and thresholds are needed. The results of the CBA are presented as a difference or a cost-benefit ratio. An investment project is economically viable when the difference is greater than zero or the ratio is greater than one. In general, the results of the CBA and CEA approaches should lead to the same conclusions. However, the CEA results are strongly dependent on the conditions under which the comparison is performed. Therefore, through additional indicators different perspectives of obtained results are examined. For example, the cost of implementing the measures could be compared with the benefits from lower level of environmental pressure in the area of the whole region, as well as the financial capabilities of the economic players who are expected to meet the costs (Berbel et al., 2018).

According the CEA method, the cost of achieving GES (Good Ecological Status) is effective if it is lower than the respective threshold. If the cost is over the threshold, it is necessary to either reformulate the time horizon (European Commission, 2000; Article 4 (4)) or recommend measures with less ambitious environmental objectives (European Commission, 2000; Article 4 (5)). Ordinarily, the economists associate the thresholds to household budget. Therefore, the thresholds usually range from 2.5% to 4% of the per capita income (Borkey, 2006, p. 12). However, as we mention above the WFD does not define either the type of indicators or the level of the appropriate thresholds, leaving the choice exclusively at the discretion of the local authorities (Voulvoulis et al., 2017).

The lack of information and/or the high level of uncertainty of some key technical and economic indicators may justify lower thresholds than those normally required in the CBA. Such adjustments increase the role of the subjective factor, thus compromising the confidence in the assessment method. One of the ways to overcome this problem is to combine the indicators of the two methods – CEA and CBA. In such cases, the policy prescriptions should be directed toward intervention in areas with best assessments from both methods.

The choice of evaluation methods and benchmarks is complemented by the choice of the most appropriate scale of economic analysis. According to the Common Implementation Strategy of the WFD (European Commission, 2003), the water body is the reference unit for achieving the target water status and represents the minimum scale at which each EU Member State has to identify the sources of pollution and measures for surface and groundwater rehabilitation. However, the “optimal scale” of the analysis is not defined either in the official recommendations or in the other empirical studies. Therefore, the scale of analysis is a key factor in the final assessment of the economic efficiency. For example, costs which are too high for a particular body of water may be acceptable at a higher scale of analysis.

The larger areas generally allow for otherwise inexpensive economies of scale, as well as for more accurate assessment of the local conditions. It is therefore important to identify such regions that are homogeneous both in terms of natural and of socio-economic conditions. In relation to this, Stemplewski et al. (2008) recommended that water bodies are aggregated into sub-basins. According to the authors, it is within this framework that the technical problems related to the scale of analysis are minimized and, at the same time, consistent evaluations are obtained.

The approach in our methodology can be summarized as follows. The effectiveness of WFD measures is assessed in terms of target water status and is limited to pre-selection of the measures by which this status can be achieved in the most effective way. There are two parallel analyses – of cost and of benefits. The cost estimate is calculated after selecting the set of measures and calculating their unit value and total value. After that, the measures are revised until the minimum level of expenditure is reached, i.e., the level at which no more savings are possible. The value of the benefits is assessed on the basis of an a priori classification of the positive effects of reaching the target status. The benefits and costs of the individual water body are assessed; then the benefits and costs of a part of a water body, or of a combination of parts of underground and surface water bodies are assessed. After that, a staged aggregation is undertaken to cover the entire water area. Efficiency analysis is performed at each level using CEA (Cost Effectiveness Analysis) and CBA (Cost Benefit Analysis) methods.

The presented methodology is appropriate to assess the proportionality of the costs and the technical inability leading to a temporary derogation. The latter is often interpreted as a compromise to efficient measures, the realization of which will take longer to reduce the pollution to the desired levels. The proportionality/disproportionality assessment depends from the desired status of water and the chosen measures against pollution. Proportionality means measures leading to the objective status in a cost-effective manner.

APPLICATION OF THE METHODOLOGY FOR THE EAST AEGEAN REGION

As an illustration of the methodology, its application to the case study of the East Aegean Region is presented below.

Water Status in the East Aegean Region

Regional Inspectorates of Environment and Water (RIEWs) determine to what extent individual economic sectors (agriculture, communal, and industrial) are responsible for the various forms of pressure (qualitative/quantitative, point/non-point) over the water bodies in the country. As a rule, the majority of point sources of pollution are due to the industrial sector which generates organohalogen and metal pollutants. Agriculture and livestock cause diffusion pollution (nitrogen, phosphorus, pesticides) and may have quantitative impact (over-exploitation of water resources). Morphological changes, in turn, are mainly associated with the extraction of inert materials.

The functional purpose of each body of water could be classified as drinking water, bathing water, and fish/shellfish water. Bathing water in the East Aegean basin is generally of good ecological quality, while fish/shellfish water is declining in quality as a result of the outgoing natural processes. The impact of various factors threatens the fish/shellfish water and worsens the quality of drinking water in most plain areas in the region.

Before assessing measures for different water bodies, we have to assume one of the two hypotheses about interconnections between them:

- (1) The water body interacts with (almost) all water bodies in the area and its restoration is part of the aggregate restoration of the river basin or one of the three geographic areas in the region.
- (2) The water body only interacts with adjacent water bodies, so its assessment focuses on an individual aggregate within the basin. In this case, the cross influence of the impact from the connected aggregates is also taken into account.

An intermediate variant of the two extreme hypotheses is an aggregate comprising surface water bodies and groundwater flowing these bodies.

In the preliminary study of contaminated by mining enterprises water in the East Aegean region, presented in the subsection. *Estimates of the benefits of anti-pollution measures from mining and ore processing*, the intermediate

hypothesis was accepted. Such a choice is justified, because the impact on the water bodies in this specific case is carried out by point sources of heavy metals and each measure is directed to a specific source of pollution (von Schiller et al., 2017). Unfortunately this approach ignores the possible diffusion of heavy metals (Yanger, 2001).

To simplify the methodology, we assume two degrees of ecological status – “lower” and “good or better.” In most district management plans of the Basin Directorates, however, the ecological status of the water bodies, and hence the assessment of the benefits of the measures taken, is carried out on a five-level Likert scale.

The plurality of complementary/substitute measures is determined by the sources of pressure that would affect with highest probability the environmental status of water bodies in the region. The choice of the measures is coordinated with all the stakeholders, including the Regional Environment Agency managers and water protection programs. The process of selection excludes those already adopted under other related directives (e.g., the Nitrate Directive, 2020 or the Habitats Directive, 2020).

According to the Basin Directorate of the city of Plovdiv, nutrients, pesticides, heavy metals, morphological changes and over-use of water are the main threats to the water resources in the East Aegean region. The degree of impact varies: 44% is the threat of nitrogen and phosphorus concentrations, 3% of pesticides, 5% of heavy metals, 6% of water scarcity, and 15% of morphological changes.

The strongest pressure on the environmental status of water bodies in the region are the nitrogen and phosphorus from the agriculture and utilities sectors and, to a lesser extent, the industrial point-sources of pollution. The utility sector also worsens the ecological status of water mainly in urban areas.

In farming, pollutants are managed with voluntary savings (e.g., fertilizers are replaced with manure; see Rural Development, 2020) and mandatory restrictions on the use of fertilizers in nitrate vulnerable zones (Nitrate Directive, 2020) are being addressed. Additional restrictions are imposed by the measures of implementing of the program for extensive development of this sector. Actually, the reduced intensity lowers the nutrient content of both surface and groundwater bodies (Macgregor and Warren, 2016). As for the pesticides, following Directive 2009/90 (EC), three types of measures for recovering chemical status of water bodies have been taken: (1) a ban; (2) dosing; and (3) substitution.

In the utilities sector, improvement was made in the efficiency of the existing treatment plants. This improvement activity facilitates the reduction of landfill waste.

The industrial sector, including the mining enterprises, is the major source of quality pressure. Depending on the distribution of different categories of chemicals, construction of new treatment plants for heavy metals and hydrocarbons, as well as re-cultivation of the industrial zones contaminated with organohalogen, is recommended. The extraction of inert materials from the nearby rivers is a source of morphological changes. Therefore, the industrial sector is also a potential threat for water scarcity (the main source of quantitative pressure, however, is the agriculture). In such cases, the measures include the construction of sewage treatment plants and distribution networks for drainage water.

Rules for Assessing the Costs and Benefits of the Proposed Measures

In the proposed methodology, the costs and the benefits are involved not in their net present value, but in their annuity equivalents. Annuity values are interpreted as single or total costs and benefits averaged over one year. In this manner, the difficulties in comparison of measures that would produce future effects without initial costs are avoided.

The costs in the methodology are estimated in the same way as the way they are reported when activating measures for achieving GES in each particular sector. This means that all transfers (taxes or subsidies) from one economic sector or player to another can be excluded, and there is no distinction between financial and economic costs. Such an approach is compatible with the *Polluter Pays Principle*, but it is preferred because there is a lack of sufficient data on the actual impact of the multiple measures (who pays for what) and hence it is impossible to carry out more accurate analyses.

In cost estimation procedures, key factors are the consumer price index, the cost of the capital, and the time horizon representing the operational life of the investment. In most economic analyses of the WFD, cost of the capital of 2.5-4% is assumed. Because of the higher risk and risk premium, we increased this rate to 5%. This higher rate was also recommended by the European Commission for the period 2009-2015. It is also assumed that the European practice should be analyzed in a 30-year time horizon. According to the economics theory, the rate and the time horizon should correctly reflect the opportunity cost to achieve GES for future generations.

Most of the data needed for evaluation of investment projects are available from previous publications as well as from the technical information provided by the Basin Directorate of East Aegean Region. In the utility sector, a unit cost for the modernization of the treatment plants and the construction of new sewage systems was estimated. In the industrial sector, including the case of heavy metal pollution, the average annuity cost of construction of modern wastewater treatment plants with different capacity was determined.

A serious barrier to accurately assessing the measures is the inability of obtaining comparable results for the different sources of pollution. A commonly used method for solving this problem is employing corrective procedures. The nitrogen and the phosphorus from nutrients, for example, are measured in P-equivalents, with the nitrogen value divided by ten to account for its lower ecological (eutrophication) effect.

For the assessment of unit costs in the construction or reconstruction of sewage treatment plants, a similar approach applies to mining and chemical industries. Heavy metal compounds are converted into comparable units thanks to the freshwater Aquatic Eco-toxicity Potential Index (fAETP). This index was introduced by Huijbregts et al. (2000), with the idea that all substances should be presented in terms of one reference substance. For heavy metals one unit of 1,4-dichlorobenzene (para-dichlorobenzene) equals one unit of fAETP. Based on this, the relative weights of 181 elements are determined. The fAETP values of the most common ones are as follows: para-dichlorobenzene=1; mercury=1700; cadmium=1500; lead=9.6; zinc=920; copper=1200; nickel=3200; chromium=28; arsenic=210 (Van Soesbergen et al., 2008).

The unit costs per cubic meter of purified water are obtained by dividing the total cost by the annual flow (0.04 €/m³ in microfiltration, 0.05 €/m³ in precipitation). The flow rate of the treatment plants is 5000 m³/day for chemical industry companies or 1000 m³/day for metallurgic industry companies. The estimates of the cost per cubic meter depend on the total costs and on the level of functionality of the basic technology.

The ultimate goal of the Basin Directorates in Bulgaria is to develop a comprehensive catalog of measure and unit costs for their implementation, including a specialized catalog on pollution from mining and processing plants and we believe that our work is a contribution to this goal.

Benefits assessments are carried out in accordance with Annex I of Guide No 20 (European Commission, 2009). Several categories of values (use value, non-use value, side effects from other sectors, and cross-effects from other environmental projects) are listed in the Guide. Systematic analysis of all aspects of the benefits requires an extremely large and costly study. Moreover, some of the benefits listed are difficult to present not only in monetary terms but also in physical terms. Only the categories of use and non-use values are evaluated in the presented methodology, using additional checklist for some categories.

In a similar way as in the cost analysis, several important assumptions were accepted in the benefit analysis:

- (1) First, when assessing the non-use value, it is assumed that the benefits are generated only when the water bodies reach a good status. In economic terms it means that the effects of the range outweigh the effects of scale. This assumption justifies the two-level status of water: unsatisfactory status and satisfactory status. However, with this assumption we miss the opportunity to analyze intermediate levels of status improvement.
- (2) The second assumption is related to the economic effect of substitution. This effect suggests that the estimated value of the water body depends on the presence of substituting water bodies. In economic theory with the increase of the substitution opportunities, the value of the product decreases. In the case of water bodies, this is true when non-use values are site specific. In the present methodology, however, the non-use value refers to the whole area and it is apportioned to the separate water body depending on its relative share in the total water reservoir of the region. Therefore, such substitution effects do not occur (they are equal to zero).

- (3) The third assumption is about the effect of the distance: an increase in the distance changes the established correlations. However, our methodology does not take into account this effect, although in some cases there are deviations in the assessment of the benefits (Bateman et al., 2006).

Some assumptions have been made regarding the method of assessment of the non-use value – the so-called benefit transfer (BT) method. With this method, estimates of the non-use values in the explored area are calculated on the basis of the results of investigations in other areas. Such adaptation processes usually generate distortions. The closer the two areas from socio-economic point of view, the smaller the distortions. Ideally, the areas would be from the same country. Due to the lack of studies of the WFD in Bulgaria, for the assessment of the benefits in the East Aegean Region through the BT method, the results of the studies of the Northern Italian region of Emilia-Romagna are used. When using the BT method, it is assumed that there is no distortion of the estimates.

Technically, the assessment of the non-use value requires methods based on the interpretation of the economic perceptions (or subjective values). This calls for multiple (and therefore extremely expensive) interviews. The BT method saves these inconveniences by transferring existing estimates of non-market values from one location to another. However, the authors have intentions to develop of a catalog of the benefits from WFD measures for water bodies in Bulgaria.

As a rule, the use value is assessed for each individual sector that benefits from improving the water quality. The assessment depends on the functional use of the water resources (drinking, bathing, fish/shellfish water) and the indirect damage caused by over-consumption of water. In Bulgaria's water basins, pollutants are mainly detrimental to the quality of drinking water. Regarding the benefits, the achievement of GES leads to reducing the cost of water treatment for bringing it to drinking standards and to reducing the costs related to solving the problem of water shortages in long periods of drought.

Estimates of the Benefits of Anti-Pollution Measures from Mining and Ore Processing

Use benefits are assessed through the savings made. The achievement of GES saves the treatment of nutrient-contaminated water as well as the emergency response caused by water scarcity. The unit costs for denitrification and purification of water contaminated with organohalogen (bioremediation) were provided by the Basin Directorate of Plovdiv. The unit costs associated with emergency interventions are determined on the basis of available data in the region for the past 10 years.

Table 1

Measures	Pressure	Units	Ave. Value
Non-use value			
Recovery value	Point	PP/household	8.11
Ecological value	Diffusive	PP/household	5.58
Use value			
Savings from drinking water treatment costs	Point	€/mc	0.09
Saving from drinking water treatment costs	Diffusive	€/mc	0.80
Saving from emergency interventions in case of drought costs	Qualitative	€/mc	0.79

Average estimates of the benefits for GES in the East Aegean region

As mentioned above, the values for the Emilia-Romagna region (Galioto et al., 2013) have being adjusted to assess the non-use benefits of the measures against water pollution in the East Aegean region. Following Navrud and Ready (2007), the propensity to pay (PP) for Bulgaria is calculated after a correction that takes into account the income differences between East Aegean region and Emilia-Romagna region.

$$PP_B = PP_I (Y_B / Y_I)^{\beta}, \quad (1)$$

where PP_B and PP_I represent the propensity to pay in Bulgaria and Italy, respectively; Y_B and Y_I are the income levels in the two countries, and β is the elasticity vs. the income of the demand for environmental goods. For the various eco-friendly goods, the elasticity typically has values less than one. For the new EU member states, the elasticity versus the income is 0.5 and this value is used in the present study. According to the World Bank (2015), in 2015 the GDP per capita based on purchasing power parity (PPP) is €15,731 for Bulgaria and €35,075 for Italy.

From formula (1) it follows that the transformation coefficient of Navrud and Ready $(Y_B / Y_I)^\beta$ of the Emilia-Romagna region for the East Aegean region is 0.67. Because of the lower ecological status in Bulgaria, the effectiveness of the measures is increased by 14%, or 0.14 (Mattheiß et al, 2012). Therefore, the coefficient of Navrud and Ready should be adjusted to 0.81.

As the object of this study is the pollution of water bodies from mining and ore processing, it is necessary to define the relative share of the measures taken as part of the total benefits. Following Younger (2001), we will assume that 67% of the deteriorated water quality in Europe's mining regions is due to point sources of pollution and 33% to diffuse pollutants. Therefore, it is reasonable to assume that in the mining regions of Bulgaria, the annual benefits of the measures against the point sources of pollution from mining enterprises are 67% of the total benefits.

The East Aegean region, which has 2,250,000 residents, has 48 underground water bodies with a total annual water extraction of 250 million cubic meters. From this data, a hypothetical average groundwater body can be defined which provides drinking water to 46,875 residents and has a water extraction of 5.2 million cubic meters.

The total annual extraction of drinking water (underground and surface) in the region is 270 million cubic meters. Before being directed to the distribution network, 11.61 million cubic meters of them are purified from nitrogen and phosphorus, 1.35 million cubic meters are purified from organohalogens, and an average of 1.62 million cubic meters of water per year are provided in cases of drought. Considering the use benefits of 1 cubic meter, the total value for the whole area is €10,689,300 per year ($11.61 * 0.8 + 1.35 * 0.09 + 1.62 * 0.79$ million).

The non-use benefits are calculated as the number of households is multiplied by €13.69. (See Table 1.) Assuming that the average household is composed of 2.3 people, it follows that the number of households in the area is 978,261 ($2,250,000/2.3$). Thus, the area-wide estimate of the non-use benefits is €13,392,393 ($978,261 * 13.69$).

The total value of the benefits is €24,081,693 per year ($13,392,393 + 10,689,300$) and per capita benefits are €10.7 per year ($24,081,693/2,250,000$).

If the body of water is in a mining region, 67% of these values are due to the measures against point pollution by mining enterprises. In other words, €16,134,734 total and €7.17 per capita are the annual benefits of these measures.

Following the recommendations that the cost-benefit ratio must exceed 1.2, the last calculations also show that the cost of implementing measures against point pollution from mining companies should not exceed €6 per year per resident and €281,250 per year for all residents using drinking water from this body of water.

Assuming that operating costs are 10% of the total costs (Mattheiß et al, 2012), from the last amount it follows that for the implementation of the measures for the conditional water body an investment of €253,125 and an operating cost of €28,125 per year are needed. For the 30-year period at a 5% cost of capital rate NPV of investment is €4,085,709.

CONCLUSION

The presented methodology provides an economic assessment of the implementation of Directive 2009/90/EC in the period 2009-2015 and identifies the cases of deterioration (Article 4 (4), (5) & (7)) in the East Aegean Region. Based on the obtained results, additional measures could be taken in the period 2022-2027.

The methodology has been tested for contamination from mining and ore processing, but it is suitable for all water bodies and aggregates as well as for the entire region. The employment of administrative boundaries of the area stimulates the efforts of the local administrations to look for financing of the necessary measures.

The reference point in the methodology is the target water status in the area. Once the sources of pressure have been identified, local stakeholders are consulted about the possible measures for each form of pressure. Then, an analysis of cost minimization is carried out, which makes it possible to choose the most effective set of measures and the levels of activation of individual measures.

The main benefits of the methodology are the simplicity, the logical transition between the different steps, and the ease of practical use.

LIMITATIONS

For benefit assessment, the changes in water status affecting the use costs and the changes that are associated with the non-use cost are analyzed. The available information is employed to estimate the use cost in terms of savings on drinking water treatment and emergency drought interventions. In the analysis of the non-use values, some secondary effects for the economy and society are omitted, which is a deficiency of all methodologies of this type.

The non-use benefits are determined through the benefit transfer (BT) method. We assess the value for recreation and the value of water quality. Due to the limitations of this method, sensitivity analysis is recommended. The analysis would allow determining the limits in which the actual recovery cost varies. Despite this additional information, in general, the way the benefits are determined needs significant improvements and further on-site research.

Another problem for carrying out analysis is the uncertainty. Uncertainty is generated by technical and economic factors. The incorrect estimates of these factors influence both the final outcome of the evaluation and the choice of intervention option. The consequences of uncertainty can be estimated with higher accuracy through more precise models such as stochastic models, Monte Carlo simulation, and Bayes models.

As any other methodology the one presented here depends on the data used and the time constraints. The credibility of the economic analysis could certainly be enhanced by a more detailed study of the local conditions.

From a practical point of view, the methodology can be improved by reproducing a more categorical two-step approach, which involves prior identification of the problem areas and subsequent detailed analysis of some of them (Vecherkov et al., 2017). For researchers and managers, it would be useful to develop a model of the reciprocal dependence between pressure and water quality/quantity to help making more accurate assessments of the measures concerning water quality.

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**HEARING WITH THE MIND'S EAR:
HOW AUDITORY IMAGERY AFFECTS CONSUMER PREFERENCES**
Ruby Saine, Roger Williams University

ABSTRACT

Without hearing the rhythmic pounding of ocean waves crashing against rocks at a beach, we can still create a sensory representation of the actual sound: retrieved, evoked, and constructed from memory. This process is referred to as auditory imagery. Across two experiments, we provide converging evidence to support a conceptual model in which evoked auditory imagery increases consumer product preferences. This effect is moderated by information coding type and auditory imagery vividness. Together, our results provide strong support for perceptually based theories of auditory imagery and represent a cogent argument on how auditory imagery can change consumer preferences.

INTRODUCTION

Would Beethoven's Symphony no. 9 sound better if played a little faster or slower? Does the soothing sound of ocean waves remind you of a carefree vacation from your childhood? Without hearing the music instruments comprising Beethoven's symphony or the rhythmic pounding of ocean waves, the audience is still able to create a sensory representation of the actual sounds: retrieved, evoked, and constructed from memory. This phenomenon is referred to as auditory imagery, or hearing with the mind's ear.

Auditory imagery is one aspect of sensory cognition in which auditory information is generated from within and processed in the absence of corresponding auditory sensory stimulation, or sound (Baddeley & Logie, 1992; Herholz, Halpern, & Zatorre, 2012; Intons-Peterson, 1992). In other words, an auditory image is a memory representation that resembles sound perception about a particular subject. Invoking consumers' innate ability to engage in auditory imagery in marketing expands the scope of their sensory and shopping experiences.

Recent years have seen the emergence of research on mental imagery (Cian, Krishna, & Elder, 2014; Krishna & Schwarz, 2014; MacInnis & Price, 1987; Shiv & Huber, 2000; Schlosser, 2006; Rajagopal & Montgomery, 2011). Despite the research examining a variety of specific sensory modalities, for instance, visual imagery (Bone & Ellen, 1992; Chang, 2013; Cian et al., 2014; Dahl, Chattopadhyay, & Gorn 1999; Elder & Krishna, 2012; Hung & Wyer, 2011; Lee & Qiu, 2009; Petrova & Cialdini, 2005), olfactory imagery (Krishna, Morrin, & Sayin, 2014), and haptic imagery (Peck, Barger, & Webb, 2013), there is a significant need to expand research in marketing research to auditory imagery. In the present research, we are interested in exploring whether or not using their existing auditory schemas about product categories that are stored and retrieved from memory may generate similar information processing as effective as in auditory perception, and how this would likely influence consumer preferences.

Conceptually, building on findings from marketing, consumer psychology, neuropsychology, and music, this research integrates and extends the scholarship on information processing to examine auditory: imagining what a product sounds like impacts how consumers perceive and think about the product. We provide a conceptual model in which evoked auditory imagery has a positive effect on consumer preferences towards the product in focus.

In the following sections, we first introduce our conceptual framework, demonstrate the resemblance between auditory perception and auditory imagery. We then delve into a discussion on how two moderators (iconic and propositional information coding, imagery vividness) impact the relationship between auditory imagery and enhanced consumer preferences. Lastly, we present findings and conclude with theoretical and managerial implications as well as directions for future research.

CONCEPTUAL DEVELOPMENT

Auditory Imagery

All senses can be imagined (Sheehan, 1967), and imaging through mental stimulation is a cognitive process that involves the same mental resources as perception (Cian et al., 2014; Unnava, Agarwal, & Haugtvedt, 1996). In other words, imaging a sound is similar to hearing a sound. To understand the substantial resemblance between hearing and auditory imagery, it is important to first examine how we perceive sounds. Hearing, or auditory perception, is the ability to perceive sound by detecting mechanical waves in the ear, which consists of the outer ear, the middle ear, and the inner ear (see Figure 1). When we uncork a bottle of champagne at a birthday party, the sound waves of the

“pop” enter the outer ear and travel through the ear canal to the eardrum. Mechanical vibrations are generated and transmitted via the middle ear to the inner ear fluids and the hair cells, and the resultant nerve impulses relay via the auditory nerve to nuclei and then to the auditory cortex where the popping sound of the champagne is registered in the brain.

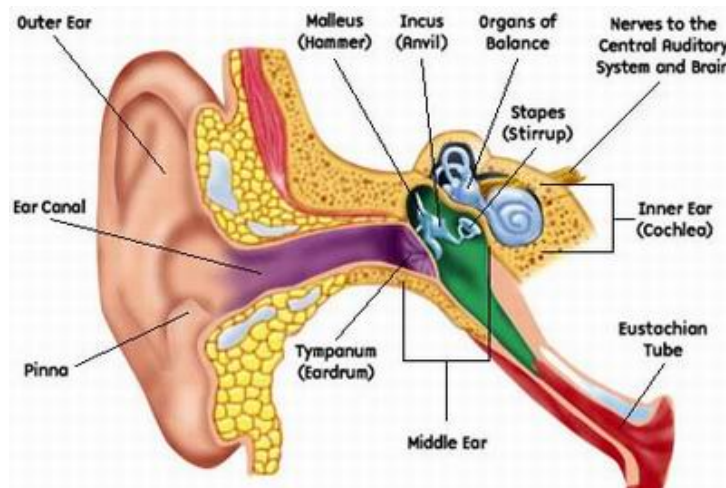


Figure 1. Physiology of auditory perception system

Past research confirms that auditory imagery is referred to as hearing with the mind’s ear because the process of hearing a sound is similar to imagining a sound in the mind (Halpern, 1988, 1989; Halpern, Zatorre, Bouffard, & Johnson, 2004). Just like during actual hearing of the “pop” of the uncorking champagne, in auditory imagery processing, the popping sound is represented in the auditory cortex based on previously stored information about the auditory input in memory. In other words, auditory imagery processing depends on the activation and motivated retrieval of stored auditory information in working memory associated with the particular popping sound (Kosslyn, Thompson, & Ganis, 2006; Wood, Kallgren, & Preisler, 1985; Wright & Rip, 1980).

It has been observed that most elements of auditory perception, including pitch (Halpern 1989), tempo (Halpern 1988) and timbre (Halpern et al. 2004), are accurately captured in auditory imagery. Evidence in neuropsychology also confirms that auditory imagery preserves many of the structural and temporal properties of auditory information present in auditory stimuli, and that it involves similar brain activation patterns, neural responses, and cortical structures as in listening (Hubbard, 2010, 2013; Herholz et al., 2012; Tian & Poeppel, 2010). Zatorre and Halpern (1993) present further evidence in this regard. They find that people who have a right temporal lobe lesion perform worse on a pitch comparison task in imagery and perception than do individuals with a left temporal lobe lesion.

More importantly, marketing research on auditory perception offers evidence to support the idea that hearing a signature ad jingle of a brand acts as a persuasion cue in advertising, generates positive brand attitudes, and increases brand recall (Anand & Sternthal, 1990; Park & Young, 1986; Scott, 1990; Shen & Sengupta, 2014; Yorkston & Menon, 2004; see Krishna 2009 for a review). Lowrey and Shrum (2007) find that brand names that are congruent with expectations towards the product evoke positive evaluations in consumers. Russell (2002) discovers that product placements (such as Pottery Barn) mentioned during television shows heighten brand memory and attitude. Given the psychological, physiological and neurological similarities between imagined listening and actual hearing, we predict that evoked auditory imagery has a positive effect on consumer preferences, just as in actual hearing.

H1: Auditory imagery enhances consumer preference in general.

Information Coding Type as Moderator

Information is represented and processed in the brain in two forms: iconic coding and propositional coding (Kosslyn, 1994). Iconic coding represents a sound stimulus pictorially with a high level of visual details, whereas in propositional coding, language is used to arbitrarily resemble a sound. Iconic coding automatically incorporates the visual aspect of the product under consideration into auditory information processing. A mental image that is evoked by matching imagined sounds provides an additive multisensory input of both the audios and illustrative visuals, which would facilitate judgment of the sound (Macklin, 1994; Schneider et al., 2008). Unnava et al. (1996) also find that participants in their study learned better and retained the information longer when auditory information was accompanied with high levels of visual imagery than with low levels of visual imagery. Therefore, presenting the auditory information in the form of iconic coding makes the product more salient and easier to recall. Such processing fluency generates more pleasure and elicits more positive attitudes (Schwarz and Clore 1983; 1988). Therefore, we hypothesize the following.

H2: Consumer preference is stronger in auditory imagery involving iconic information coding than propositional information coding.

Imagery Vividness as Moderator

Similar to information representation mentioned above, one's ability to generate vivid imagery in the mind would likely modulate the effect of auditory imagery. Vividness of auditory imagery refers to the clarity of a mentally created scenario (MacInnis & Price, 1987) and it has been identified as a relatively stable trait differing among people (White, Ashton, & Brown, 1977). Vividness of auditory imagery positively correlates with the salience of the auditory information represented in the articulatory loop in the brain as a greater degree of vividness requires more sensory information be stored, ready for retrieval in working memory (Baddeley & Andrade, 2000). Compared to cloudy auditory imagery, vivid auditory imagery more closely resembles the actual product or experience. Hence, we hypothesize that individual differences in ability to generate vivid imagery should have a moderating effect on auditory imagery processing. Given the discussion above, we offer the following hypotheses for additional empirical testing.

H3: Consumer preference is positively associated with the vividness of auditory imagery.

STUDY 1

We conducted two studies to test the hypotheses involving the effects of auditory imagery processing on consumer preferences. In Study 1, we investigated the main effect of auditory imagery on purchase intentions, qualified by individual's ability to generate vivid auditory imagery.

Method, Participants, and Procedure

Study 1 involved a one-factor design with two levels of sound source (auditory imagery, control), with BAIS for imagery vividness being measured. Forty-five people participated in the study administered via Qualtrics in exchange for small monetary compensation. We used the Bucknell Auditory Imagery Scale (BAIS) to measure vividness of auditory imagery (Halpern, 2015; Zatorre et al., 2010). The BAIS was designed to elicit self-reported measures of auditory imagery vividness (BAIS-V, $\alpha = .83$) and auditory imagery control (BAIS-C, $\alpha = .86$). We focused only on the BAIS-V scale in this study because prior research had found auditory imagery correlated significantly with vividness for auditory imagery, but not with the control of auditory imagery, which measured the ability to manipulate an auditory image at will (Pfordresher & Halpern, 2013). The participants rated the BAIS-V (with sound prompts such as waves crashing against rocks at a beach, a dentist's drill, a gentle rain, and an upbeat rock song on the radio) on a 7-point Likert scale (1 = no image was present at all, 4 = my image was fairly vivid, and 7 = my image was as vivid as the actual sound).

As a cover story, the participants were informed that a grocery store was opening up in the local area and was interested in testing the market potential. They were given one minute to evaluate a promotional message featuring a new champagne. In the auditory imagery condition, a message was displayed, "Pop! It's time to celebrate with champagne! Imagine the popping, sparkling, and fizzy sound of a bottle of champagne in your mind as vividly as you can for one minute!" The participants could not proceed to the next page until the end of the designated period of one minute. In the control condition, no such prompt for mental imagery was introduced. After the manipulation, participants indicated their purchase intentions (1 = not likely at all and 7 = very likely). Manipulation checks on the imagery

activity level in each condition confirmed the validity of the manipulations. After a suspicion probe, none of the participants correctly guessed the intention or the hypotheses of the study.

Results and Discussion

ANOVA testing revealed a significant main effect of sound source on likelihood to purchase, $F(1, 43) = 16.64, p < .001$, $M_{\text{auditory imagery}} = 4.58$, $M_{\text{control}} = 2.81$. We then conducted a spotlight analysis to test the interaction of BAIS and sound source. It revealed that when BAIS was low at -1 SD, there was a significant positive relationship between sound source and purchase intention, $\beta = 1.96$, 95% CI [.76, 3.17], $t = 3.30, p = .002$. At the mean value of BAIS, there was also a significant positive relationship between sound source and purchase intention, $\beta = 1.74$, 95% CI [.83, 2.65], $t = 3.86, p < .001$. Similar result was obtained when BAIS was high at $+1$ SD, $\beta = 1.51$, 95% CI [.28, 2.74], $t = 2.47, p = .018$.

The results of study 1 support the hypotheses that evoked auditory imagery has a positive effect on consumer purchase intention and that this effect increases with the individual ability to produce vivid imagery.

STUDY 2

In Study 2, we were interested in testing whether or not iconic information coding was more effective than propositional coding in influencing consumers.

Method, Participants, and Procedure

Study 2 employed a 2 (sound source: auditory imagery, actual sound/auditory perception) X 2 (information coding: iconic, propositional) between-subjects design, with prior consumer knowledge with the product category being measured. One hundred and twenty-seven participants were recruited from an online discussion panel in exchange for a small monetary incentive and were randomly assigned to one of the four conditions. Two participants expressed suspicion about the purpose of the study and were excluded from the analyses, leaving the final sample size at 125 participants.

The same cover story was used as in Study 1. The participants in each of the four conditions were given one minute to evaluate a promotional message featuring a new champagne. In the auditory imagery with iconic coding condition, the message said "Pop! It's time to celebrate with champagne! Imagine the popping, sparkling, and fizzy sound of the champagne in your mind as vividly as you can for one minute!" A picture of the champagne was displayed below the message for a period of one minute. In the auditory imagery and propositional coding condition, the message was identical to the first condition except for lack of the picture. In the actual sound with iconic coding condition, an audio clip of a champagne cork popping open was automatically played above a picture of the champagne. In the actual sound with propositional coding condition, an audio clip of a champagne cork popping open was automatically played above a message "It's time to celebrate with champagne!" Post-manipulation measures of imagery activity level in each condition confirmed the validity of the manipulations.

The participants were then instructed to indicate how familiar they were with the champagne product category (1 = not at all familiar and 7 = very familiar) and how likely they would purchase the champagne (1 = not likely at all and 7 = very likely). Further, we measured the base level and post-manipulation level of thirstiness (1 = not thirsty at all and 7 = very thirsty) as we suspected that consumers' level of thirstiness would increase in both the actual sound and evoked auditory imagery conditions. Additional data were collected on a 7-point PANAS scale (Watson, Clark, & Tellegen, 1988) to test the possibility that affect was accounting for some of the effects.

Results and Discussion

The evoked auditory imagery and the actual sound generated a similar level of positive impact on purchase intentions ($t(123) = .62, p = .534$, $M_{\text{auditory imagery}} = 3.97$, $M_{\text{auditory perception}} = 3.78$) and a similar level of change in thirstiness ($t(123) = .44, p = .661$, $M_{\text{auditory imagery}} = .45$, $M_{\text{auditory perception}} = .37$).

ANCOVA testing revealed that the covariate, prior experience with the product category, was significant for purchase intention, $F(1, 120) = 58.27, p < .001$, and marginally significant for the change in thirstiness, $F(1, 120) = 3.62, p = .060$. After controlling for the effect of prior knowledge, there was a significant effect of sound source on purchase

intentions ($F(1, 120) = 206.65, p < .001, M_{\text{auditory imagery in iconic coding}} = 4.19, M_{\text{auditory imagery in propositional coding}} = 3.76, M_{\text{auditory perception in iconic coding}} = 3.45, M_{\text{auditory perception in propositional coding}} = 4.14$) and the change in the level of thirstiness ($F(1, 120) = 5.69, p < .001, M_{\text{auditory imagery in iconic coding}} = .63, M_{\text{auditory imagery in propositional coding}} = .29, M_{\text{auditory perception in iconic coding}} = .19, M_{\text{auditory perception in propositional coding}} = .57$). The sound source X information coding interaction was significant, $F_{\text{purchase intention}}(1, 120) = 7.70, p = .006; F_{\text{change in thirstiness}}(1, 120) = 4.30, p = .040$, indicating that information coding moderates the effect of sound source on consumer preference. Specifically, auditory imagery was more effective with iconic coding ($M_{\text{purchase intention}} = 4.19; M_{\text{change in thirstiness}} = .63$) than with propositional coding ($M_{\text{purchase intention}} = 3.76; M_{\text{change in thirstiness}} = .29$). Levene's tests were insignificant, ($F_{\text{purchase intention}}(3, 121) = 1.11, p = .349; F_{\text{change in thirstiness}}(3, 121) = .70, p = .555$), indicating that the variances in the different conditions were roughly equal and that the assumption of homogeneity of variance had been met. Further, PANAS was not shown to be significant in explaining the effects observed above.

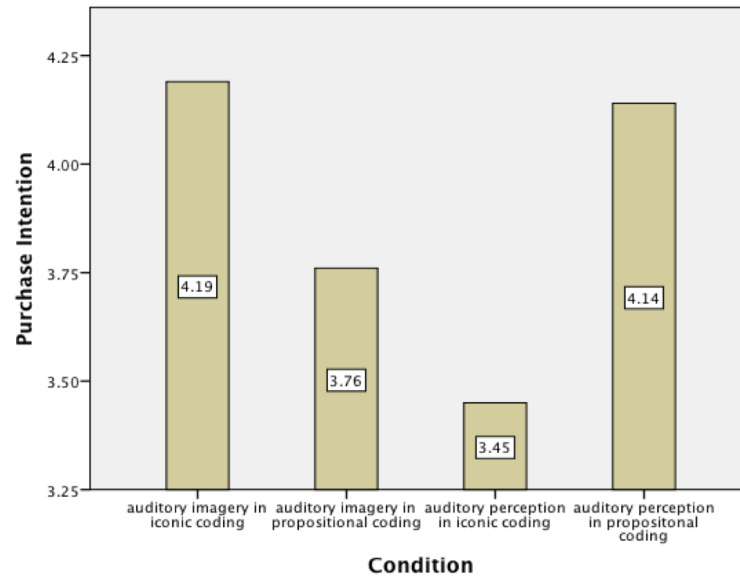


Figure 2. Purchase intention in auditory imagery and auditory perception in iconic or propositional coding conditions

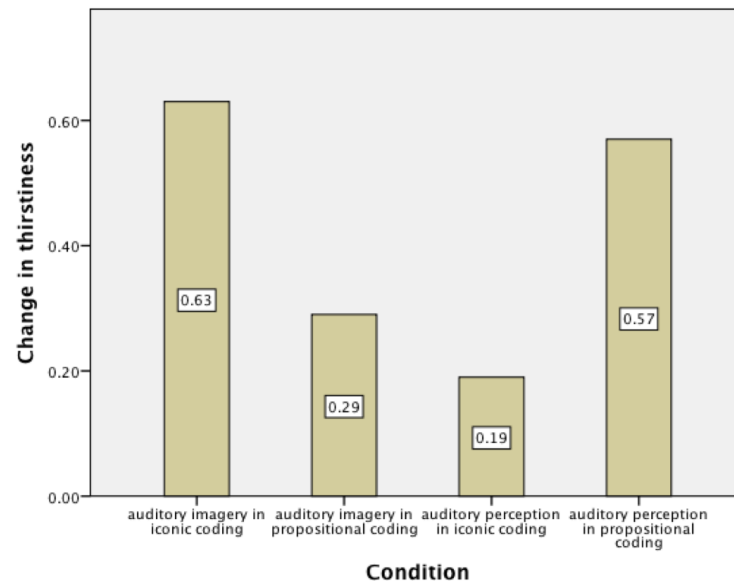


Figure 3. Change in thirstiness in auditory imagery and auditory perception in iconic or propositional coding conditions

The results together provide strong support for the hypothesis that evoked auditory imagery increases purchase intentions. This effect is enhanced with the presence of a matching picture to the evoked mental image. Lack of iconic information coding does seem to grossly compromise participants' sensory imagery ability.

GENERAL DISCUSSION

This research provides one of the first examinations in marketing linking auditory imagery with consumer preferences. It expands our understanding of the power of sound to the auditory domain of sensory imagery. We explain the overlapping brain activity patterns and cortical structures involved in the recognition of both auditory perception and auditory imagery. The study reveals that individuals who imagine hearing a sound associated with a product are more willing to purchase it than those who do not imagine the sound. Equally telling, those who hear the actual sound are no more likely to make a purchase than those who simply imagine the sound.

Auditory imagery offers important managerial implications for marketers, retailers, and companies using promotional strategies that rely on traditionally silent media, such as store displays, e-commerce, online bidding, brochures, print advertisements, catalogs, and bulletin boards. Marketers will be able to save resources by employing prompts of auditory stimuli, rather than investing in the creation of auditory-embedded advertisements and other promotional materials. For example, if a consumer is contemplating two travel destinations, Alaska and Hawaii, she will be more likely to choose a relaxing vacation on the beach in Hawaii if that travel brochure evokes vivid images of the sounds of ocean waves and seagulls. Similarly, a restaurant patron will be more likely to choose a high-margin steak dinner if the menu prompts him to imagine a piece of juicy steak sizzling on the grill.

While much emphasis has been placed on sensory perception in recent years (in particular, haptics, vision, and olfaction; Krishna & Schwarz, 2014), a stream of research dedicated to the power of auditory imagery would be refreshing. A limitation of this research, however, is that we only tested the auditory imagery stimulus congruent in valence with the product used in the studies. This offers an opportunity for future researchers to examine the effects of congruent and incongruent auditory imagery stimuli with the product on consumers' information processing.

Auditory features often include pitch, timbre, loudness, duration, tempo, and rhythm (Hubbard 2013). Examining variations in these auditory properties would provide a promising direction for future research on auditory imagery. For instance, soft music slows down eating and increases total food and drink consumption because background music reduces perception of time duration in consumption (Caldwell & Hibbert, 2002; Chandon & Wansink, 2012; Milliman 1986; Morrin, Chebat, & Gelinias-Chebat, 2009). An area ripe for future inquiries would be whether tempo used in auditory imagery has a similar effect on consumer choice as in auditory perception.

In addition, another future research direction to take is to examine the effect of physical and imagined touch on persuasion. Peck and Shu (2009) find that both touching and imagery that encourages touch result in an increased perceived ownership of an object. Another direction for future research is to test possible alternative explanations such as perceived ownership that may be pertinent to auditory imagery processing as well.

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RESEARCH NOTES

SOCIOECONOMIC IMPACT OF HEALTH CARE

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ABSTRACT

Health care, insurance costs and tax policy are prominent topics in the current election cycle. Health care costs encompass many different factors such as medications, physician visits, medical testing and prosthetics. The United States outspends the world in health care and health insurance; but paying more does not mean a healthier country. Studies show that comparable countries have longer life spans and are healthier. The rising costs of health insurance and health care has given life to the myth that paying more means better care.

Tax policy has a dramatic impact on healthcare. Traditionally, preparers helped taxpayers with medical deductions on their tax returns. Income tax rules for medical deductions are constantly changing. Over the years, the role of the tax professional and financial planner has become more entwined with healthcare. The Affordable Care Act enforces a “shared responsibility payment” on certain taxpayers without healthcare coverage. The Consolidated Omnibus Budget Reconciliation Act (COBRA) provides for continuing health care coverage between jobs. Health care savings accounts and flexible spending accounts impact tax reporting. Individual Retirement Accounts have special exceptions regarding medical expenses, insurance and disability. The landscape of healthcare options is growing more complex and changing every day.

How do we navigate the new health care landscape? Understanding health care, insurance, and tax law and their implications can help America get healthier and live longer.

INTRODUCTION: HEALTH CARE IN AMERICA

Health care and insurance costs are constant topics in the news. The costs of health care encompass many different factors such as medications, physician visits, medical testing and prosthetics. The United States is outspending the world in health care and health insurance, but paying more does not mean the country is healthier. There are many studies that show those in comparable countries have longer life spans and are healthier. The rising costs of health insurance and health care has given life to the myth that paying more means better care. Many comparable countries that use a form of universal/socialized medicine have proven less can mean more in terms of the quality of care as well as the health of the nation.

Health insurance costs as defined by the medical profession are “*The actual costs of providing services related to the delivery of health care, including the costs of procedures, therapies, and medications.*”¹ Health care can be defined as services rendered by a medical professional to improve, maintain or restore an individual’s physical, mental, or emotional health.

The United States health care system has been described as “broken” or “sick.” Treatment said to be unnecessary², improperly diagnosed and over medicated.³ It is a puzzle publicly funded programs like Medicare and Medicaid and private health programs that do not fit together seamlessly. The US federal government plays an important role in overseeing the program, although it fails to bring cohesiveness to the system necessary for it to operate smoothly and efficiently. The United States should be at the top of care, but high costs, inequity, and inaccessibility place the system and its benefits at the bottom.⁴

Health care costs in the United States have continued to rise over the last decade while the quality of care, has, in some areas declined. The Centers for Medicare and Medicaid use many different ways to define quality care. Patient outcomes, patient safety, effective and timely treatment as well as the affordability of treatment are some of the tools

¹ Healthcare Costs, Reference MD, www.reference.md

² Gawande, A. (2009). Testing, Testing. *New Yorker*, 85(41), 34–41.

³ Walsh-Childers, K., & Braddock, J. (2014). Competing with the Conventional Wisdom: Newspaper Framing of Medical Overtreatment. *Health Communication*, 29(2), 157–172

⁴ Oliver, T. R. (2014). *Guide to U.S. Health and Health Care Policy*. Thousand Oaks, California: CQ Press

used to measure care and define quality.⁵ This information is collected via claims reported to insurance companies, hospitals, health care providers, and others serving the health care industry.

Steps are being taken to help health care providers improve patient safety under a program run by the US Office of Disease Prevention and Health Promotion Services. By making health information more assessable to the public, the government hopes that the overall quality of health care will improve. The current program in place focuses on the prevention of drug abuse as well as infections that may be spread through health care.⁶

TAXATION: COMPLICATING THE HEATH CARE ANALYSIS

The United States Health care system is a complex topic even without discussing the impact of taxation but a complete analysis requires a look at tax law. This is especially relevant in the current political climate that sees both major political parties looking at Health care reform. Republicans are looking to change the Affordable Care Act⁷ and Democrats are looking to revising health care with even going as far as universal health care or “Medicare for all”.⁸ A thorough discussion of where our country is heading begins with a look at where we came from. This is true of tax law as well as health care options.

Tax law did not always contain provisions for medical care. The inclusion of health coverage in the tax law created a steady progression changes building on statutory and case law. Medical coverage has been constantly changing procedurally and substantively. Tax law grew past a mere discussion of deductions with the creation of flexible spending accounts and other benefits. In March of 2010, tax preparers were required to join the health care discussion with the implementation of the Affordable Care Act.⁹ Now an annual review of one’s tax return included a look at insurance coverage. More and more tax law and health care coverage are becoming comingled. An analysis of one now requires a look at the other.

THE ECONOMY OF HEALTH CARE IN THE UNITED STATES AND THE WORLD

When comparing the United States to other countries, the Organization for Economic Co-operation and Development (OECD) considered the size of the country’s economy and population including specific financial trends, household incomes and spending per capita.¹⁰ The cost of health care when averaged across countries with similar economies is US \$5,169, less than half that of the United States. A recent study showed that Switzerland was the closest in health care costs per person spending, US \$7,919/person compared to US \$10,348/person in the United States.

There is no true comparison of insurance costs as most of the countries used by economists, especially those used for comparison by the OECD practice in some part or in whole, socialized (also known as universal) medicine while the system of medical health insurance in the United States is based upon the privatization of care. The socialization of health care suggests one central governing body to provide oversight of the health care system and in theory, ensure that everyone who needs care is receiving it while the privatization of care allows for the individual providers and insurers to govern themselves and to pick and choose who receives care based upon the economic feasibility of the outcome of treatment.¹¹ The system of health care in the United States is one that encourages physicians and other care providers to constantly push forward to enhance the quality of care for their patients as well as foster competition within the health care sector to continually improve the financial stability of their practices.

⁵ <https://www.cms.gov>

⁶ <https://health.gov>, Office of Disease Prevention and Health Promotion

⁷ Steinhauer, J. & Pear, R. (2017). Hard-Line Republican Caucus Backs Revised Bill to Repeal Obamacare. *New York Times*, <https://www.nytimes.com/2017/04/26/us/politics/affordable-care-act-health-republicans.html>

⁸ <https://elizabethwarren.com/plans/paying-for-m4a>

⁹ "Health Insurance Coverage and the Affordable Care Act, 2010–2016" (PDF, 731.96KB)

¹⁰ *ibid*

¹¹ Toader, E. (2014). The effects of rising healthcare costs on the US economy. *American Journal of Medical Research* 1(2), 44.

Economic analysts use many formulas to determine the impact of the costs of care. One such study looks at the inverse relationship between the costs of care as a percentage of a country's gross domestic product (GDP)¹². Between 1970 and 2016, the total spent by the United States has risen from 6% of GDP in 1970 to more than 18% of GDP.¹³ The increased costs of care can be directly related to the availability of health technology as well as the frequency of care.

From an economic point of view, some attribute the high costs to expensive procedures and testing that are recommended although not medically necessary. Many patients associate better quality care with high tech procedures and testing and higher pricing. Some believe that health care should be seen as dedicated and continuous care rather than interventional and episodic cures.¹⁴ Others in the health care field believe that better management of health care—including insurance, medical care facilities, providers, etc.—is the key to providing improvement in care at more affordable costs.¹⁵ Those with insurance are more likely to request the more advanced use of technology and medical care than those without as the costs of their care is not borne by them but their insurance. As insurance companies attempt to find solutions to control spending, procedures and testing are being analyzed from both a medical and an economic point of reference.¹⁶

HISTORY OF HEALTH CARE IN THE UNITED STATES

The origin of health insurance in the United States can be traced back to the recommendations made by a committee of physicians, public health experts, and health-focused economists established in 1927 who called themselves the “Committee on the Costs of Medical Care.”¹⁷ The group determined that the citizens of the United States were not spending enough money on health care. It published 28 volumes of reports to support the conclusion that United States only spent 4% of GDP on health care in 1930 which they felt was too low.¹⁸

Today, the United States spends in excess of US \$ 2 trillion per year, roughly 16% of GDP.¹⁹ The committee's research showed that Americans who needed care did not seek care due to its cost. Medical costs were not uniform and families from the same economic backgrounds were often charged different prices for the same medical treatment.²⁰ People of African descent and those who were poor went without care.²¹

The committee determined that forcing people to pay for health care themselves was not working, it was “impossible for 99 per cent of the families to set aside any reasonable sum of money with positive assurance that that sum will purchase all needed medical care.”²² Recommendations were made to pool people together to share the costs of health care and make it available to more people by making more affordable. Most members of the committee felt that group health insurance could be supplemented by local taxes and payments by individuals and families. Following the release of the committee's report, a new era of health care took root in the United States²³.

¹² Hofmann, B. R. (2009). *Health Care Costs : Causes, Effects and Control*. New York: Nova Science Publishers, Inc.

¹³ <https://www.healthsystemtracker.org/chart-collection/health-spending-u-s-compare-countries>

¹⁴ Mintzberg, H. (2017). *Managing the Myths of Health Care : Bridging the Separations Between Care, Cure, Control, and Community*. Oakland: Berrett-Koehler Publishers

¹⁵ Jost, T. S. (2012). Eight Decades of Discouragement: The History of Health Care Cost Containment in the USA. *Forum for Health Economics & Policy*, 15(3), 53–82

¹⁶ Hofmann, B. R. (2009). *Health Care Costs : Causes, Effects and Control*. New York: Nova Science Publishers, Inc.

¹⁷ ibid

¹⁸ US Department of Health and Human Services 1990

¹⁹ Hartman, Micah et al. (2010) “Health Spending Growth at Historic Low in 2008” *Health Affairs*, 29:147.

²⁰ Committee on the Costs of Medical Care (1932) *Final Report: Medical Care for the American People*. Chicago, Illinois: University of Chicago Press.

²¹ ibid

²² Committee on the Costs of Medical Care (1932) *Final Report: Medical Care for the American People*. Chicago, Illinois: University of Chicago Press.

²³ ibid

Health insurance plans first became available in the United States in the 1930s and began replacing the traditional out-of-pocket plans.²⁴ Blue Cross hospital insurance plans became available in 1932. These plans were initially sold to employment-related groups and funded by the employees through weekly payroll deductions. Blue Shield followed suit in 1939 and offered coverage for doctor's visits as well. A variety of employer sponsored plans and shared costs were introduced in 1930s and 1940s.²⁵

Following World War II, organized labor used collective bargaining agreements to get better care for workers and force employers to contribute to employee health insurance.²⁶ Over 75 million Americans had hospital insurance by 1950. Insurance coverage expanded to cover major medical expenses, hospitalizations, drugs, dental, and optical care over the next 10 years. In the decades that followed, over 80% of the population would have hospital insurance. The foundation of the health care system in place today in the United States is the employment--based health insurance plan that was established in the 1940s and the years following World War II.²⁷

The United States system of health care insurance is based largely upon privatization. Costs are paid for by a mix of public and private funding. Health insurance coverage for many United States citizens is provided through their employer. Nonetheless, rising costs of health insurance has hampered some companies' ability to provide this benefit for their employees. Individualized plans can be purchased directly from health insurance carriers but at much higher rates, also they may be difficult to obtain based on a person's health history.²⁸

The US Military offers a medical program which could be considered a form of socialized medicine. The TRICARE program is designed to provide medical services to active and retired military personnel and their families. Services are available through a network of civilian medical professionals and facilities as well as Military Treatment Facilities (MTFs). TRICARE provides benefits governed by United States law; participants are not allowed free choice of plans. The program does offer minimum coverages to make premium payments lower.²⁹

A BRIEF HISTORY OF TAX LAW FOR HEALTHCARE

The first federal income tax was enacted in the Revenue Act of 1861.³⁰ The tax was struck down as a violation of the apportionment clause of the constitution.³¹ Another federal income tax did not come about after the passage of the Sixteenth Amendment in 1913.³² The Revenue Act of 1913 saw the first federal income tax imposed in the United States. No deductions were allowed for medical expenses in early income tax law.

Deductions for expenses came into law with the introduction of the United States Revenue Act of 1942 signed by Franklin Delano Roosevelt.³³ Deductions were limited to items deemed to be "extraordinary" and were limited to expenses that exceeded five (5%) percent of adjusted gross income. This "ceiling" on medical deductions has been subject to change depending on the whims of political policy; changing from no limit at all to most recently a limit of ten (10%) percent of adjusted gross income. In addition to changes to the overall limit there has been extensive case law as to what actually represents allowed deductible medical items.

²⁴ Jost, Timothy S. (2007) *Health Care at Risk: A Critique of the Consumer-Driven Movement*. Durham, North Carolina: Duke University Press, pp. 54–69.

²⁵ *ibid*

²⁶ *ibid*

²⁷ Oliver, T. R. (2014). *Guide to U.S. Health and Health Care Policy*. Thousand Oaks, California: CQ Press.

²⁸ Hofmann, B. R. (2009). *Health Care Costs :Causes, Effects and Control*. New York: Nova Science Publishers, Inc.

²⁹ Jacksonis, M. J., Deyton, L., & Hess, W. J. (2008). War, Its Aftermath, and U.S. Health Policy: Toward a Comprehensive Health Program for America's Military Personnel, Veterans, and Their Families. *Journal of Law, Medicine & Ethics*, 36(4), 677–689.

³⁰ Joseph A. Hill, "The Civil War Income Tax," *Quarterly Journal of Economics* Vol. 8, No. 4 (Jul., 1894), pp. 416–452

³¹ *Pollock v. Farmers' Loan & Trust Company*, 157 U.S. 429 (1895)

³² Buenker, John D. 1981. "The Ratification of the Sixteenth Amendment." *The Cato Journal*. 1:1

³³ Erb, K., (2011). "Deduct This: A History of the Medical Expense Deduction" *Forbes* 20 Jun 2011.

In addition to the deductibility of medical costs and insurance, federal law has seen many other provisions supporting healthcare. In 1985, congress passed the Consolidated Omnibus Budget Reconciliation Act (COBRA) creating law to aid employees in transferring health insurance after employment changes. The introduction of flexible spending accounts and Healthcare Savings accounts have also aided taxpayers in facing health care decisions. Finally, the Affordable Care Act, passed in 2010 made tax preparers face health care questions with their clients each tax season.

AVAILABILITY OF HEALTHCARE AND COSTS

Many who are unable to purchase insurance attempt to obtain care through public programs such as Medicaid and Medicare and, if under the age of 18, individual state-run programs under State Children's Health Insurance Program (SCHIP). State funded programs are aimed at helping the elderly and the disabled as well as poor and low-income families with dependent children gain access to health care.³⁴

Medical care is less likely to be sought when people are faced with economic and financial hardship. The inaccessibility (or perception of inaccessibility) of health care based upon lack of means leads to late diagnoses and increased complications for what may have otherwise been able to be handled by routine visits to a physician. Affordability as well as accessibility along with other factors such as family income, average household size, unionization rates, small-sized firms, the percentage of the population age 65 and above, smoking behavior, and health status must be taken into consideration when attempting to develop a national program.³⁵

Lack of health care and health insurance can have far reaching consequences not just for individuals, but for families as well as communities. A single health event can devastate a family's finances; when there is no insurance, providers seek payment from public funds to pay for medical services. In those communities where clinics are available, the physicians are often unable to provide quality care due to lack of resources and time.³⁶

European countries take a much different approach to healthcare and health insurance than the United States. The general rule in Europe is that medical services should be available to everyone, regardless of income. Each country's system is designed to allow for free choice and access to medical services.

Unlike the United States, most European countries use a system based on some form of social insurance. The European Union has many different healthcare programs based on political and socio-economic issues. The main differences in healthcare in the various European countries reflect the methods of financing available and the way the program is structured by providing a combination of private and government insurance. While organization and finance of the individual programs vary from country to country, they share common objectives: equity, efficiency and affordable costs.³⁷

The financial base of the European healthcare model relies on a system that has money transferring from the population or patient (first party) to the medical provider (second party) via third party companies. Sharing costs across the sick and the healthy populations and being able to adjust the costs based on the levels of payment ability shows the European Union's policy that healthcare needs to be monitored; it should not be dependent on the free market. The European healthcare systems act as level of social protection by ensuring some form of base coverage to European citizens as well as a stabilizing force of the European social market economy.

³⁴ KIRBY JB, KANEDA T. Unhealthy and Uninsured: Exploring Racial Differences in Health and Health Insurance Coverage Using a Life Table Approach. *Demography*. 2010;47(4):1035-1051

³⁵ Cebula, Richard J., and Anthony E. Bopp. "Estimating the percentage of the US population without health insurance: an ecological approach." *International Advances in Economic Research*, vol. 14, no. 3, 2008, p. 336+. *Health Reference Center Academic*, Accessed 10 Oct. 2018.

³⁶ Abrahamsen, E., & Fagerland, A. (2012). *Health Insurance : Issues, Challenges and Perspectives*. [Hauppauge, N.Y.]: Nova Science Publishers, Inc.

³⁷ Glowik, M., & Smyczek, S. (2015). *Healthcare : Market Dynamics, Policies and Strategies in Europe*. Berlin, Germany: De Gruyter Oldenbourg; [2015], Adapted from *Healthcare Systems in Europe. A Comparative Study*, European Parliament, Luxembourg 1998p. 18

Overall, 8% of the total European workforce and 10% of the European Union's GDP are intertwined with healthcare systems. Healthcare spending in European countries account for approximately one-third of social policy budgets; 80% of health budgets are funded by public funds. Government records show that almost 15% of government spending in 2010 was spent on healthcare.³⁸

In Switzerland, the country closest to the United States in health expenditures, health care is regulated by the government and is required by law. The program is financed through a combination of private health insurances, public funds and cost sharing.³⁹ Individuals are responsible for paying for their own coverage unless they are unable to pay, in which case the government will assist them in obtaining insurance. The Swiss system decentralizes health care and allows the patient to seek treatment with their choice of medical providers. Medical insurance can be obtained for as little as US \$451/year⁴⁰.

Canada, the United States' closest and largest neighbor spent approximately US \$4,752 on health care and health care related expenses according to a 2017 OECD study.⁴¹ Health care is decentralized and administration of health insurance programs is the responsibility of the provinces and territories. Universal health care is available to residents and is paid for by public funds. Federal, provincial and territorial government taxes account for 70% of the country's total health costs.⁴²

There are many forms of cost-sharing measures that are being used as a way to make health care affordable in European countries. Co-payments are one method and are generally paid by the patient at the time medical services are rendered and are usually applied to the cost of drugs either as a percentage of the drug cost or a flat rate. Co-insurance is another term used to describe a specific dollar amount to be paid by the patient for medical treatment. Outside companies called insurance funds collect a percentage of income from workers to pay for compulsory and voluntary insurance. Funds are then available to pay for medical care when needed.

TAX DEDUCTIONS: AN OFFSET TO HEALTH CARE COSTS

Relief is available for taxpayers that incur medical expenses. This relief comes in the way of tax deductions allowed annually that can offset taxable income. The Internal Revenue Code provides these specific rules for medical expenses.⁴³ The basic rule provides that "there shall be allowed as a deduction the expenses paid during the taxable year, not compensated for by insurance or otherwise, for medical care of the taxpayer, his spouse, or a dependent."⁴⁴ These deductions have been limited by a percentage of adjusted gross income with a floor of ten (10%) percent in 2019 - an increase from 2017 and 2018 of seven and one half (7.5%) percent.⁴⁵

The types of expenses allowed are varied. A deduction is allowed for prescription medication and insulin.⁴⁶ This means that non-prescriptions drugs are not deductible. Payments to medical professions are deductible including payments to doctors, dentists, surgeons, chiropractors, psychologists, counselors, physical therapists, osteopaths, podiatrists, home health care nurses, cost of care for chronic cognitive impairment among others.⁴⁷ Insurance

³⁸ Health at a Glance: Europe 2012, OECDiLibrary, Retrieved February 14, 2014 from: <http://www.oecdilibrary.org/>, 1-54

³⁹ Carsten Colombier, & Thomas Braendle. (2018). Healthcare expenditure and fiscal sustainability: evidence from Switzerland. *Journal of Public Sector Economics*, Vol 42, Iss 3, Pp 279-301 (2018), (3), 279.

⁴⁰ Britain should look to Europe to fix the calamitous NHS monopoly; Germany and Switzerland provide universal healthcare but with less waste and better results NHS AT 70. *Daily Telegraph (London, England)*. <http://search.ebscohost.com>

⁴¹ <https://www.healthsystemtracker.org/chart-collection/health-spending-u-s-compare-countries>

⁴² Marchildon, G. P. (2013). *Health Systems in Transition : Canada* (Vol. 2nd ed). Toronto [Ont.]: University of Toronto Press, Scholarly Publishing Division.

⁴³ Internal Revenue Code: Note all references to the Internal Revenue Code are derivations of code sections of the Internal Revenue Codes of 1939 and 1954. Washington: U.S. G.P.O., 1992. Print.

⁴⁴ 26 USC §213(a)

⁴⁵ Ibid.

⁴⁶ 26 USC §213(b)

⁴⁷ 26 CFR §1.213-1

premiums are deductible, if no deduction is claimed elsewhere on the tax return, for both health insurance and long-term care insurance.⁴⁸

Deductions are also allowed for medical equipment such as crutches, wheelchairs, prescription eyeglasses, hearing aids. Also, a deduction may be allowed for capital expenditures that are advised by a physician, if the expense is reasonable. These can include items such as swimming pools, an elevator for someone with heart disease, ramps and lift chairs for taxpayers with mobility issues.⁴⁹ Payments to nursing homes and care facilities can be deductible if medical care is the primary basis for admission.⁵⁰

Expenses are deductible for travel expenses including travel to and from doctors, hospitals and other facilities for medical treatment.⁵¹ This includes many varied expenses under numerous cases such as automobile expenses, airfare, parent's travel to accompany child patients, trips to escape a bad climate, travel expenses for nurses and lodging. In addition to out of pocket travel expenses for travel, the tax law allows for an optional standard mileage rate for travel.⁵²

Special rules also exist as the deductibility of expenses based on the taxpayer's relationship to the patient. The medical expenses of one's spouse are generally deductible as the expenses of dependents. The rules become more detailed for the children of divorced or separated parents and adopted children. Taxpayers should be careful navigating these very specific rules.

These medical expense deductions are constantly developing through added IRS authority and case law. The ever expanding and contracting set of rules are constantly being tested to determine the outer limits of deductibility. What is important for taxpayers to know is that relief exists for the ever increasing out-flow of expenses. While differing political parties continue to change these rules, some form of medical expense deduction has been available for over seventy years. The future of the expense will probably continue to change but continue to be available while we still have taxpayers incurring expenses.

Health care was seen as a private and individualized moral responsibility.⁵³ In today's medical culture, Americans tend to go to the doctor only when sick. Delays in seeking treatment by the patient could potentially impact the cost as well as the outcome. The United States approach to health care is more reactive rather than proactive.

Obtaining health care in America is a simple process if you are employed by a company that offers benefits. You are hired to work at a company. When hired, you are given a benefit's package to review, you select your health benefits either through a company run website or directly with the health carrier and your benefits go into effect. Every paycheck, money is taken out by your employer to pay for a percentage your health care. Every year of subsequent employment, you renew your benefit choices at open enrollment – the time designated by the company and the carrier that allows you to review your coverage and make changes if any—confirm your choices and coverage continues.⁵⁴

In most cases, individuals are not required to submit to a physical or provide proof of health to continue coverage. Because insurance is considered to be “private,” employers are not entitled to review health records unless a release is signed or the person chooses to disclose information. If unemployed, private health insurance can be purchased. Costs are often unaffordable for most.

HEALTH CARE: SUPPLY AND DEMAND

Accessibility to health care can be viewed from an economic standpoint of supply and demand. The supply side reflects the insurance companies, improvement in public health and the governing bodies to ensure that coverage is available

⁴⁸ IRS Publication 502, Medical and Dental Expenses (including the Health Coverage Tax Credit). Washington, D.C.: Dept. of the Treasury, Internal Revenue Service, 2018. Print

⁴⁹ 26 Reg. §1.213-19(c)(1)(iii)

⁵⁰ IRS Publication 502, Medical and Dental Expenses (including the Health Coverage Tax Credit). Washington, D.C.: Dept. of the Treasury, Internal Revenue Service, 2018. Print

⁵¹ 26 USC §213(d)(1)(B)

⁵² IR-2018-251, December 14, 2018 – provides standard medical mileage rates for 2019.

⁵³ Oliver, T. R. (2014). *Guide to U.S. Health and Health Care Policy*. Thousand Oaks, California: CQ Press.

⁵⁴ Gruber, J. (2008). Covering the Uninsured in the United States. *Journal of Economic Literature*, 46(3), 571–606.

to those who need it while demand focuses on individual health and use of services.⁵⁵ The principles of supply and demand provide two different perspectives to evaluate the “success” of universal health plans. Supply side results are viewed from the point of changes in health status, quality of life factors, the use and application of clinical guidelines; the demand side looks at the amount of care that is offered, personal interactions with medical providers and health care personnel and the ability to understand medical information.⁵⁶

The accessibility, availability and cost of health insurance in the United States has been debated over the decades by government officials, health care providers and health insurance carriers. Health insurance in the United States is considered to be a benefit of working, not an entitlement. Changes in the health insurance systems have seen more managed care (HMOs) and preferred provider organizations (PPOs) replacing general coverages.

Both programs seek to manage the costs of health insurance by limiting choices, utilization reviews, and incentives to providers willing to participate.⁵⁷ Health insurance in the United States will continue to be seen as a benefit unless a complete overhaul of the health insurance program is undertaken. Current economic policies will not support a universal health care system that is sustainable based on social and financial constraints in the United States.⁵⁸

TAX LAW HELPING PATIENTS: HEALTH SAVINGS ACCOUNTS (HSA)

According to Forbes Magazine, employees consider choosing health insurance to be one of the most stressful decisions they must make. Over 80% of employees at Fortune 100 companies make poor choices when choosing a plan. Some companies change plans yearly forcing employees to change medical providers and facilities; this causes interruption in ongoing treatment plans as patients are often forced to start over with a new physician and a new treatment plan. There are many factors that play into choosing your health insurance. How much will co-pays be? What are the premium costs? What is my out of pocket expense? How much are my prescriptions? Are the medical costs tax deductible?

Health savings accounts (HSA) are relatively new and are associated with high-deductible health plans. Health deductible plans offer lower monthly premiums and the ability to save for future health care expenses in a “tax-friendly” way. In 2019, new guidelines were put in place for health savings plans. In order to contribute to a health savings plan, you must be enrolled in a health insurance plan with a deductible of at least \$1,350 for single coverage or \$2,700 for family coverage⁵⁹. Contributions can be made up to \$3,500 for single coverage and \$7,000 for family coverage. For those who are 55 or older in 2019, you can contribute an extra \$1,000.

Unlike flexible spending accounts which usually require funds to be used by March 15 of the following year, health savings accounts can be used to save for upcoming major medical expenses that are being planned for the future. Also, contribution amounts can be changed throughout the year and participants can make lump sum contributions at any point or change investments⁶⁰. The account can be funded with pre-tax (or tax deductible) money which reduces your taxable income for the year and allows participants to take home more of their paycheck.⁶¹

The money will continue to grow tax deferred as long as it remains in the account. These funds can be withdrawn tax free to pay for qualified medical expenses such as co-payments, deductibles, prescriptions and out of pocket vision and dental costs. Any funds used for non-medical expenses withdrawn before age 65 incur a 20% penalty plus income tax on the amount withdrawn.⁶² If the employer contributes to a HSA it counts toward the total contribution maximum for the year. Individuals who are enrolled in Medicare are not eligible to contribute to health spending accounts per the current regulations.

⁵⁵ Reddock, J. (2017). Seven parameters for evaluating universal health coverage: Including supply- and- demand perspectives. *International Journal of Healthcare Management*, 10(3), 207–218

⁵⁶ *ibid*

⁵⁷ Jost, T. S. (2012). Eight Decades of Discouragement: The History of Health Care Cost Containment in the USA. *Forum for Health Economics & Policy*, 15(3), 53–82

⁵⁸ Hill, B. (2016). *Health Care Costs : Policies, Economics and Outcomes*. Hauppauge, New York: Nova Science Publishers, Inc.

⁵⁹ www.irs.gov/forms-pub/about-publication-969

⁶⁰ [Cnbc.com/FSA or HAS: How to best maximize your health savings/Konish/28-11-2017](http://Cnbc.com/FSA%20or%20HAS%3A%20How%20to%20best%20maximize%20your%20health%20savings/Konish/28-11-2017)

⁶¹ Fedsmith.com

⁶² [Kiplinger.com/article/insurance/health savings account limits](http://Kiplinger.com/article/insurance/health%20savings%20account%20limits)

To utilize the health spending account to pay for deductibles, the funds must be used for all in-network covered benefits inclusive of prescription medications. Annual out of pocket expense, excluding premiums cannot exceed \$6,750 for single coverage or \$13,500 for family coverage; in addition, all deductibles, co-pays and co-insurance for in-network benefits are counted toward the policy's out-of-pocket limits. It is important to note that eligible out-of-pocket spending limits for an HSA are lower than the requirements for health insurance limits set by the Affordable Care Act (ACA); all HSA-qualified plans meet the ACA requirements, but not all ACA-qualified plans meet the HSA requirements.

MORE HELP: FLEXIBLE SPENDING ACCOUNTS (FSA)

Flexible spending accounts are more widely used by employees as a way to pay for eligible medical expenses. Unlike health saving accounts which can accumulate interest and grow, flexible savings accounts are generally governed by the "use it or lose it" rule. The funds in the account must be used for eligible medical expenses by the end of the year or one risks losing any remaining money in the account. Some employers allow a grace period and extend the deadline for submitting expenses to March of the following year. Others allow a carryover option which allows participating employees to "carry over" up to a maximum of \$500 to use for medical expenses the following year.

The maximum amount contribution allowed in 2019 was \$2,700; an increase of \$50 from 2018. Contributions are not subject to federal, social security or Medicare tax. Employer may also make contributions to individual flexible spending accounts if allowed by the plan however like the health care savings accounts, any amount contributed is counted toward the maximum contribution.⁶³ Funds from the account can be used to pay eligible medical expenses incurred throughout the year including co-pays, deductibles, prescriptions, dental, vision and hearing aids. Claim procedures vary by plan; participants in a plan should check with their employer for specific claim procedures.

MAXIMIZING BENEFITS: HSAS VS. FSAS

In order to determine which option is best, the differences in the accounts need to be reviewed in detail. Those leaning toward a flexible spending account should review their previous year's medical expenses and use them as a key to how much you should contribute. Were the expenses one-time expenses - like eyeglasses - or recurring like prescription maintenance medications? Flexible savings accounts are generally used to pay for short term medical expenses- those expenses that will be occurring in the upcoming year.

Health savings accounts are designed for those with an outlook for paying for medical expenses in the long term. For example, individuals who retire before age 65 will be required to pay for Medicare health premiums- the money saved in a health care savings account can be used to pay for premiums as well as other eligible medical expenses. Also, if planning to keep the health care savings account for retirement, participants have the ability to roll their balance into another health savings account once a year to a qualified account with more attractive fees and investment options. Finally, health savings accounts are "portable"; you can keep them even if you change jobs or stop working. Also, the account balances can be carried over from year to year.

GOVERNMENTAL INTERVENTION INTO HEALTHCARE: COBRA AND ACA

If it appears that other countries are doing a better job than the United States in reforming their health care systems, the question must be asked- Can we change health care in America? Is there even precedent for the United States government stepping in and reforming the healthcare system and the answer is, Yes. American has on at least to separate occasions stepped in to reform the health care system. The first time, under Republican leadership, the Consolidated Omnibus Budget Reconciliation Act (COBRA) signed by President Reagan enacted law to benefit taxpayers changing employers to save their health insurance coverage. The second time, under Democratic leadership, the Affordable Care Act (ACA) signed by President Obama set forth law to reduce the number of taxpayers without health care coverage.

The Consolidated Omnibus Budget Reconciliation Act (COBRA) came into law in 1985.⁶⁴ COBRA allows former employees and their families to obtain health care coverage at group rates that might not be available elsewhere. These parties may pay more for coverage than they would have paid under their prior employer's plans but they can still

⁶³ www.irs.gov/newsroom/irs-plan-now-to-use-health

⁶⁴ Consolidated Omnibus Budget Reconciliation Act of 1985 (Pub.L. 99-272, 100 Stat. 82).

obtain health insurance at rates cheaper than individual health care coverage. COBRA coverage provides for prescription drugs, doctors, hospital care, dental and vision plans.⁶⁵

COBRA coverage mimics the insurance provided by the former employer. It provides for periods extending between eighteen (18) and thirty-six (36) months. COBRA coverage is terminated if the recipients 1) stop paying premiums, 2) the former employer ceases to maintain benefits for employees or 3) the beneficiary gains coverage under a new employee plan or Medicare.

The Affordable Care Act (ACA) came into law in 2010. While deemed controversial by some the act expanded health insurance coverage to millions of uninsured Americans. It required employers, except certain small businesses, to provide health insurance to its employees. It also required uninsured taxpayers (with some exceptions) to obtain health insurance or be subjected to a penalty on their income tax returns. The act expanded consumer insurance protections such as limiting insurance companies' exclusions for preexisting conditions. The act emphasized prevention and wellness initiatives. It worked to improve quality of care health care system performance. It also expanded individual states roles in governing health care.

Many of these provisions under the ACA have come under attack with the change of political administrations but progress was made in an exceptionally difficult area of the law. The future of the act is uncertain even though the discussion of healthcare is foremost in the current political debate. What is certain is that the discussion will continue for the foreseeable future.

CONCLUSIONS AND SPECULATION

Clearly, the discussion about health care and health care reform are at the forefront of America's political horizon. Other countries have made major changes in the way they approach health care. Our current system has many benefits but also many flaws. We have the ability to do better. We can see that government intervention can happen in America. Tax policy is constantly changing in the application of medical benefits. Politicians are tweaking tax law for better or worse depending on the view of the individual. Political parties on both sides have come together to make the United States better through the implementation of laws such as COBRA and the Affordable Care Act. The country can come together to reform our health care system and learn from the lessons of our history and the changes made around the world.

⁶⁵ "Benefits Under Continuation Coverage" section of [Department of Labor - Employee brochure Archived 2013-12-27](#)

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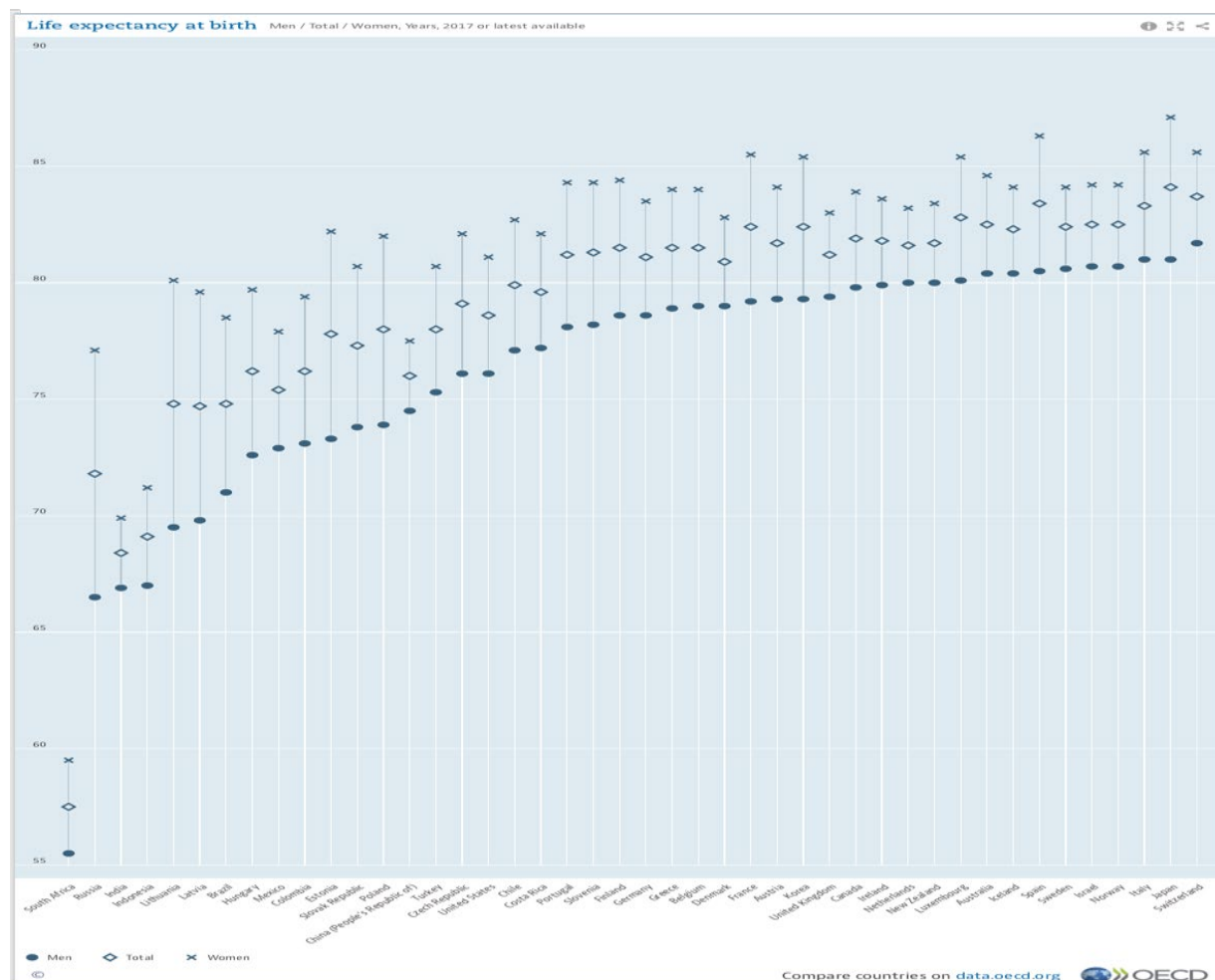
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APPENDIX

Definition of Life Expectancy at birth: Gains in life expectancy at birth can be attributed to a number of factors, like rising living standards, improved lifestyle and better education, as well as greater access to quality health services. Life expectancy at birth is defined as how long, on average, a newborn can expect to live, if current death rates do not change. The actual age-specific death rate of any particular birth cannot be known in advance. If rates are falling, actual life spans will be higher than life expectancy calculated using current death rates. Life expectancy at birth is one of the most frequently used health status indicators. This indicator is presented as a total and per gender and is measured in years.⁶⁶



⁶⁶ OECD (2018), Life expectancy at birth (indicator). doi: 10.1787/27e0fc9d-en; direct quote/reference

Total health expenditures per capita, U.S. dollars, PPP adjusted, 2016



The US value was obtained from the 2016 National Health Expenditure data

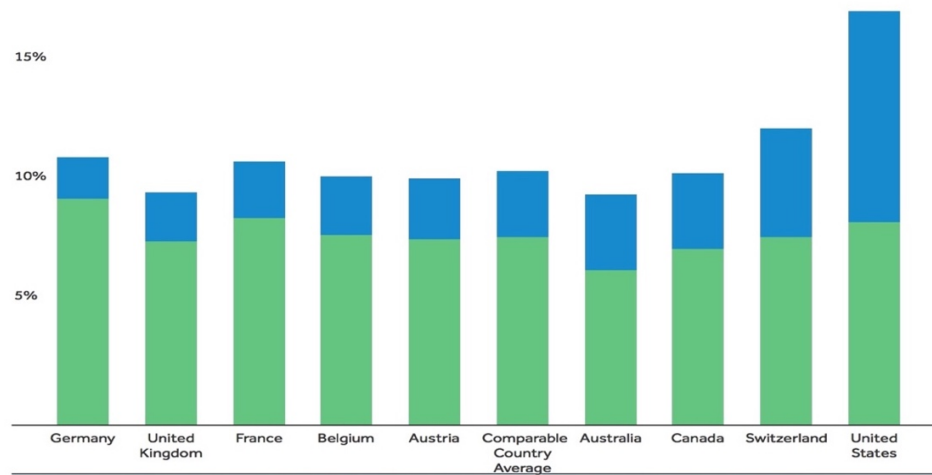
Source: Kaiser Family Foundation analysis of data from OECD (2017), "OECD Health Data: Health expenditure and financing: Health expenditure indicators", OECD Health Statistics (database) (Accessed on March 19, 2017). • [Get the data](#) • [PNG](#)

Peterson-Kaiser
Health System Tracker

In the last 30 years, the United States has outspent countries with similar economies in health care expenditures at a rate of 2:1.⁶⁷

Total health expenditures as percent of GDP by public vs. private spending, 2016

Public Private

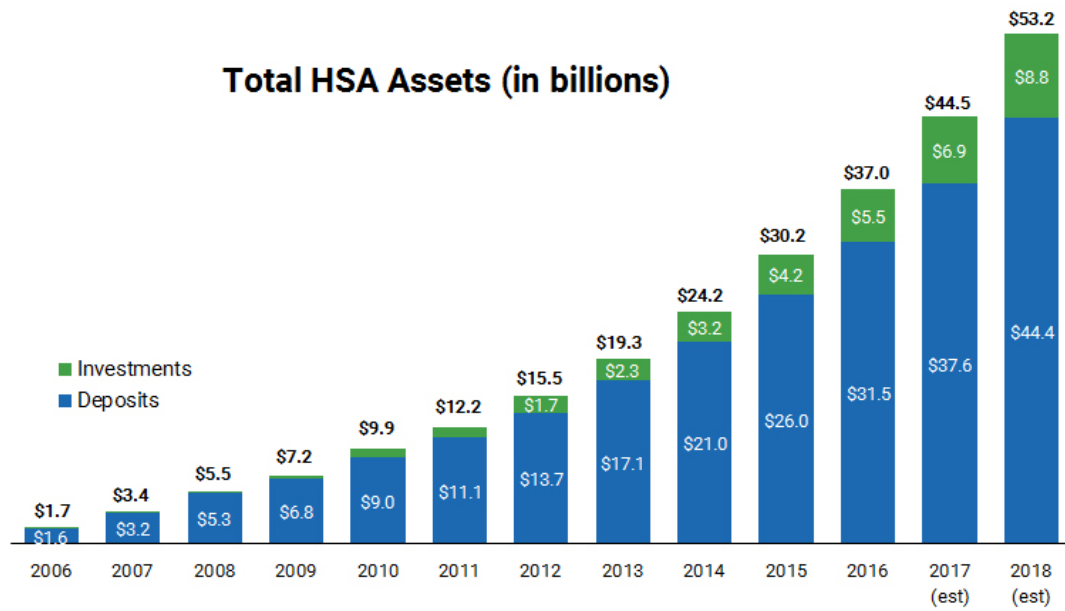


Source: Kaiser Family Foundation analysis of data from OECD (2017), "OECD Health Data: Health expenditure and financing: Health expenditure indicators", OECD Health Statistics (database) (Accessed on March 20, 2017). • [Get the data](#) • [PNG](#)

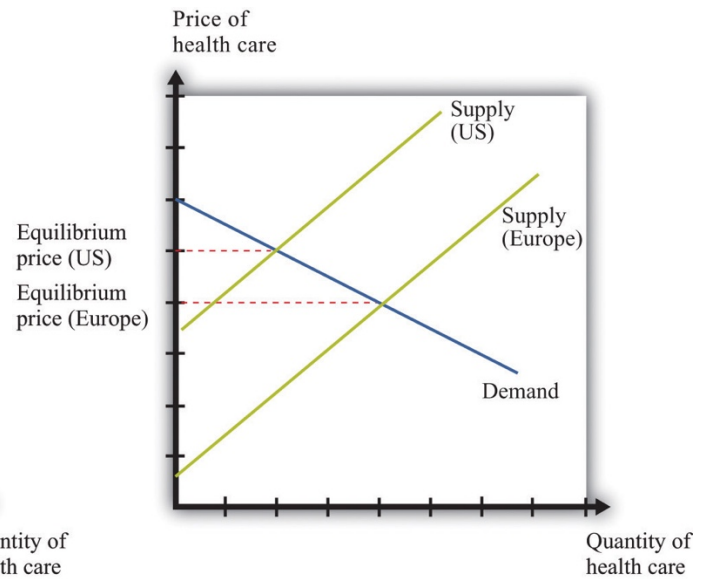
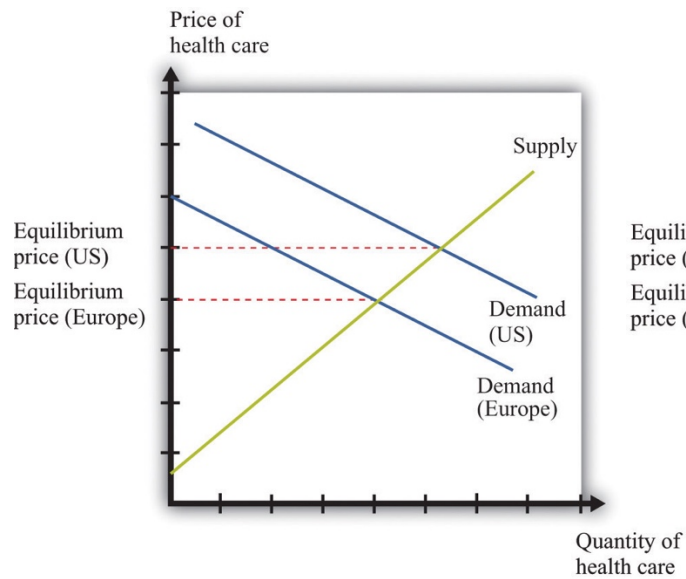
Peterson-Kaiser
Health System Tracker

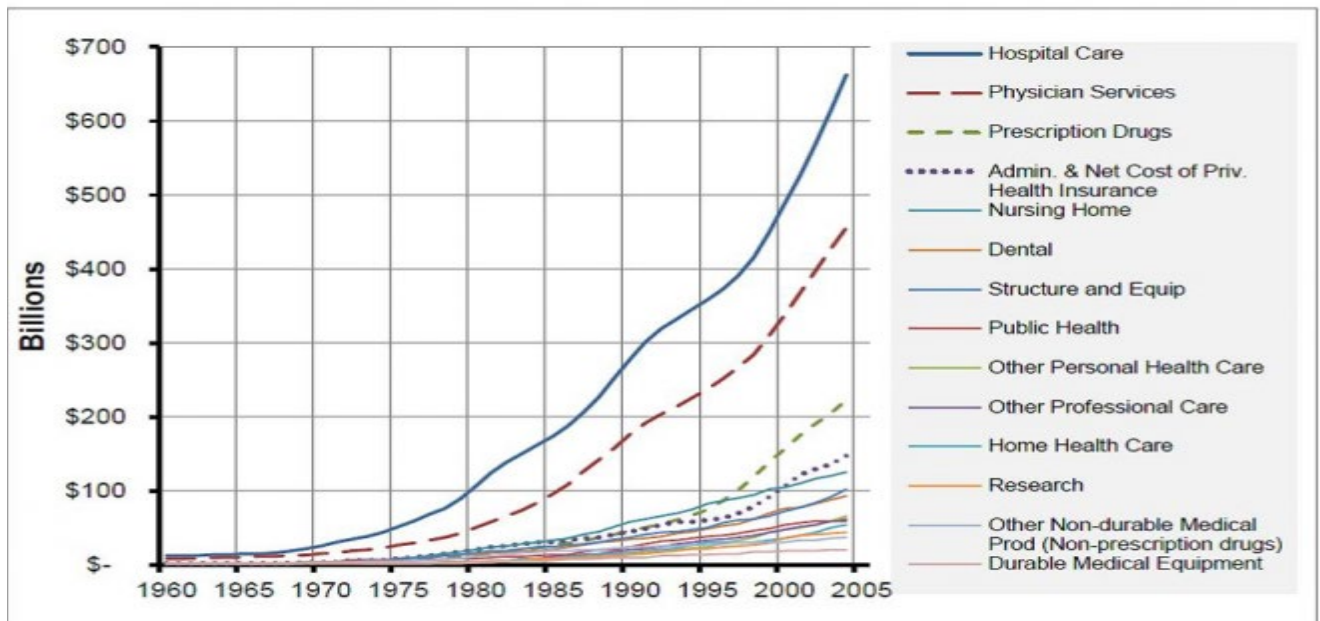
⁶⁷ Kaiser Family Foundation analysis of data from OECD (2017), "OECD Health Data: Health expenditure and financing: Health expenditure indicators", OECD Health Statistics (database) (Accessed on March 19, 2017).

Total HSA Assets (in billions)



Source: Devenir Research





2018 IRS Limits		
Plan Type	2018 Limit	2017 Limit
Medical FSA	\$2,650	\$2,600
Limited FSA	\$2,650	\$2,600
	\$5,000	\$5,000
Dependent Care FSA	\$2,500 (married filing separate)	\$2,500 (married filing separate)
Transportation	\$260/month	\$255/month
Parking	\$260/month	\$255/month
Adoption Assistance	\$13,840	\$13,570

2018 HSA Limits		
Coverage Level	2018 Limit	2017 Limit
Single	\$3,450	\$3,400
Family	\$6,900	\$6,750
Catch Up Limit	\$1,000	\$1,000
HDHP Minimum Annual Deductible		
Single	\$1,350	\$1,300
Family	\$2,700	\$2,700
HDHP Out-of-Pocket Maximum		
Single	\$6,650	\$6,550
Family	\$13,300	\$13,100

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⁶⁸ http://unitedstatestaxservices.us/wp-content/uploads/2018/10/2018_Limits.png

THE IMPACTS OF A VOTER APPROVED MINIMUM WAGE INCREASE IN ARKANSAS

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ABSTRACT

Much has been written concerning minimum wage, but the critical issues on this topic are far from resolved. Supporters argue for fair wages, living wages, and an increase in the United States federal minimum wage. Opponents argue that minimum wage laws lead to higher unemployment, higher inflation, and disincentivize workers from seeking skills that would lead to higher earnings in the workplace. This research focuses on state-level minimum wage law in Arkansas and the impact on prices and employment. A change in Arkansas' minimum wage law in 2014 gradually increased minimum wages over a 3-year period. This research adds to the body of knowledge on the topic of minimum wage by providing evidence that relatively smaller increases in minimum wage may not have the negative impacts argued by opponents. Based on the primary data collected for this research, the increase in minimum wage in Arkansas did not result in an increase in the price of fast food compared to the US nationally and the change in price was not significantly greater than the overall inflation rate in the US nationally. In addition, no negative employment effects were observed.

INTRODUCTION

Franklin Roosevelt was famous for his fireside chats. In 1938, just before signing the Fair Labor Standards Act (FLSA), Roosevelt said of this legislation, “Without question it starts us toward a better standard of living and increases purchasing power...” (Reich, 2015, p.538). The FLSA has been accepted and has lasted the test of time. The stated purpose of the FLSA was to create a minimum wage to maintain a “minimum standard of living necessary for health, efficiency and general well-being” (hrdirect, 2019). However, the FLSA was not the first attempt at establishing a minimum wage in the United States. First, Massachusetts passed a limited minimum wage law in 1912 and President Roosevelt's New Deal legislation included a federal minimum wage component in 1933. The Supreme Court struck down both the Massachusetts law and the New Deal minimum wage component (hrdirect, 2019).

The FLSA established the first minimum wage at 25 cents/hr. Most American economists did not oppose the establishment of a wage floor when the FLSA was passed. In fact, John Maynard Keynes argued that the downward spiral of wages contributed to the great depression (Reich, 2015).

Since the passage of the FLSA in 1938, the minimum wage has been increased several times at the federal level. The current federal minimum wage is \$7.25/hr. and was established at this level in 2009 (hrdirect, 2019). As of June 2019, ten years have passed since the minimum wage rate was increased at the federal level. This marks the longest period of time since the passage of the FLSA that the federal minimum wage rate has not been increased (Olen, 2019).

LITERATURE REVIEW

Arguments for Minimum Wage

There are many arguments for having a minimum wage. Proponents argue that it reduces employee turnover, increases productivity and helps the economy (Brown, 2019). Minimum wage is also said to result in greater spending power of low-income individuals (Whitaker, Herian, Larimer, & Lang, 2012). Others state that it reduces income inequality (Gasparro & Morath, 2015). There is also the argument that minimum wage allows, or at least should allow, workers to support themselves and their families (Miller, Benjamin, & North, 2014).

Some good examples of a more evidenced-based argument for minimum wage can be found in the case studies of David Card. In his study of California, Card found that the increase in minimum wage in 1988 did not result in any significant job losses and that the result was an increase in wages for teenagers and an increase in the employment population (Card, 1992). A study of New Jersey had similar findings. From 1991 to 1992, New Jersey increased its minimum wage from \$4.25/hr. to \$5.05/hr. Card and Krueger found that this increase did not result in a decrease in employment for the restaurants surveyed. In fact, employment increased in spite of the fact that New Jersey was in a recession at the time (Card & Krueger, 1993).

From economists' perspective, low skilled workers lack bargaining power and the result is that companies, in the absence of a minimum wage law, will set wages very low. As Adam Smith stated, "employers are "always and everywhere" in a conspiracy to keep wages as low as possible" (Krueger, 2015, p. 534). During the 1930's and 1940's, the view of many prominent economists was that wages are set not only by supply and demand forces, but also by morale, loyalty, turnover, and bargaining power (Krueger, 2015).

Arguments against Minimum Wage

The arguments against minimum wage range from opinionated positions focused on behavior to broadly accepted economic theory. The most often expressed views opposing minimum wage focus on its perceived negative impact on employment and prices. The theory is simple, an increase in the price of low-skilled labor will result in an increase in the price of goods and services and a decrease in the quantity demanded of that labor and goods and services. A wage floor, established by an intervening government, therefore disrupts the labor market and results in greater unemployment and higher prices. The final result is that the law hurts those it is intended to help.

Many scholars argue that minimum wage reduces employment (Brown, 2019) (Gitz, 2016) (Hanson & Hawley, 2014) (Miller, et al, 2014) (Stigler, 1946). These arguments range from the far-right view that not having any minimum wage law is preferable, to the more commonly accepted view of opponents that the current minimum wage should not be increased. These arguments date from at least the 1940's to modern times. Though the institutional view of economists in the 1930's and 1940's was supportive of minimum wage, not all economists at that time agreed. George Stigler, a Chicago economist, argued that minimum wage reduces employment and does not reduce poverty (Stigler, 1946). His argument continues to more recent times. In 2014, the Congressional Budget Office released a report on the impact of increasing the minimum wage from \$7.25/hr. to \$10.10/hr. This report showed that the expected loss of jobs would be 500,000 to 1 million (Hanson & Hawley, 2014).

It is commonly accepted that a large portion of minimum wage workers are teenagers. One of the most common arguments against minimum wage, or increasing minimum wage, is that it will reduce the opportunity for teens to enter the workforce and gain the skills they need to advance their careers. This argument has been extended to describe even higher unemployment for minority workers. "When the government mandates an above-market wage, the result is a surplus of low-skilled workers. It thus becomes easier and cheaper to discriminate" (Miller, et al, 2014, p. 91).

The effect of minimum wage on employment, particularly on teens, is the primary focus of most of the literature from opponents of minimum wage. However, there is also some focus on the effect of minimum wage on price as well. Several scholars address the issue broadly by stating that increases in minimum wage, or the very existence of any minimum wage, increases the price of goods and services and the cost of living (Allegretto & Reich, 2018) (Belman & Wolfson, 2014) (Brown, 2019) (Gitz, 2016) (Wong, 2014). A number of these focus on more specific industries. For example, Belman & Wolfson, 2014, itemize 7 published studies that reflect a positive impact on prices as a result of an increase in minimum wage. These studies cover a variety of industries that rely on low-wage labor, with an emphasis on restaurants. These seven studies range from 2000-2010 (Belman & Wolfson, 2014).

State vs. Federal Minimum Wage

From 1938 to 2019, the federal minimum wage was increased, or modified to add additional types of workers, 28 times (United States Department of Labor, n.d.). On average, the increase or change occurred approximately every 2.9 years. However, these increases did not occur evenly. There are 3 periods of time when the minimum wage was frozen, or stagnant, for an extended timeframe. Table 1 below describes these periods (United States Department of Labor, n.d.).

Table 1

Minimum Wage Freezes for Long Periods of Time				
	Start Date	End Date	Rate	Timeframe
1	Jan. 1, 1981	Apr. 1, 1990	\$3.35	9 yrs. and 3 months
2	Sep. 1, 1997	Jul. 24, 2007	\$5.15	9 yrs. and 10 months
3	Jul. 24, 2009	Still in effect	\$7.25	Still in effect (federal legislation has been introduced and is pending to increase minimum wage to \$15)

The FLSA did not prohibit states or localities to establish a minimum wage above the federal level. Even so, states did not begin to establish minimum wages above the federal level until the 1980's (Reich, 2015). Each of the periods listed in Table 1 resulted in states taking action to increase minimum wage above the federal level. By the late 1980's, the real value of minimum wage had declined to the point that many states began to establish a minimum wage above the federal level (Card, 1992). During the second period, 29 states had increased minimum wage to a level above the federal minimum (Gascon, 2014). By 2015, during the third period still in effect, 29 states had set minimum wage above the federal level (Gasparro & Morath, 2015). The wave of state increases is further evidenced by 21 states that raised the minimum wage in 2015 and 19 states raising minimum wage in 2019 (Kasperkevic & Srinivas, 2015) (Long, 2018). Many of the states that increased minimum wage in 2015 also increased it again in 2019.

Minimum Wage and the Cost of Living

This discussion of minimum wage and the cost of living is very closely related to the discussion of minimum wage at the federal vs. state level. The quote from Franklin Roosevelt clarified one of the reasons for establishing minimum wage as a tool toward a better standard of living. But, with the cost of living differences in the United States, standardizing minimum wage does not seem to make much policy sense. States began to address this directly in the 1980's as they began to recognize the income inequality within their states and the fact that the federal minimum wage rate was not satisfactory to address it (Riech, 2015).

The Bureau of Economic Analysis, BEA, has done some important work in addressing the issue of cost of living differences throughout the country. The BEA has developed a measure for this known as Regional Price Parities, RPPs, to show the difference in the cost of living between states and major metropolitan areas. This tool has been used to simply identify the real minimum wage in various geographic locations based on the federal minimum wage (Gascon, 2014). The issue is that a national standardized minimum wage has differential impacts on states and metropolitan areas (Hanson & Hawley, 2014).

An excellent tool has been developed by the Massachusetts Institute of Technology to identify a 'living wage' and compares that to the minimum wage across the United States (Glasmeier, 2019). This tool shows the differences in cost of living on a county level and by Metropolitan Statistical Area, MSA. The tool defines a living wage as "the hourly rate an individual must earn to support their family, if they are the sole provider and are working full-time (2080 hours per year)" (Glasmeier, 2019). This calculator shows the living wage necessary based on several family sizes. For example, in the Little Rock-North Little Rock-Conway, AR MSA, the living wage is \$11.03/hr. for a single adult, while the minimum wage in Arkansas is currently \$8.50. For the San Francisco-Oakland-Hayward, CA MSA, the living wage is \$18.73, while the minimum wage is currently \$11.00. For the New York-Newark-Jersey City, NY MSA the living wage for a single adult is \$15.97, while the minimum wage is \$10.40.

The discussions of the differences in the cost of living and the disparate impact of a standardized federal minimum wage are addressed by several scholars (Gascon, 2014) (Glasmeier, 2019) (Reich, 2015). These sources detail what states have done to address the issue and what states and MSAs should do to increase their minimum wage based on the differences in the cost of living.

An opposing view is that minimum wage was never intended to provide sufficient wages to support a family. Wage increases should be given by employers for performance, not by government decree. A large percentage of the jobs included in the discussion are held by teenagers, college students, and part-time workers (Gitz, 2016). According to

Gitz (2016), workers should use these jobs as entry level to gain skills. But, minimum wage discourages workers from doing so and increasing minimum wage will have greater negative effects than positive. Increases in minimum wages in California and New York ultimately serve as a trap for workers that have no incentive to gain additional skills. These workers fall subject to the political pandering that entraps them (Gitz, 2016).

Minimum Wage and Teenagers

The issue of minimum wage is largely an issue of pay for teenagers. “During the 1979 to 2014 period, 40.2% of working teens earned within 10% of the statutory minimum wage as compared to 7.7% of workers overall” (Allegretto, Dube, Reich, & Zipperer, 2017, p.562). Focusing on teenage unemployment then is appropriate, particularly since the strongest opposition to minimum wage laws is based on the view that employment is negatively impacted by establishing a binding minimum wage.

The findings of two studies strongly support having a minimum wage. In fact, these studies show that increasing the minimum wage resulted in an increase in teen employment, not a decrease. In 1987 California’s legislature voted to increase minimum wage. The increases took effect over the next 3 years. David Card’s study of the impact of this increase on employment demonstrated that teen employment actually rose. Unemployment declined and the overall employment-population ratio increased. These conditions were superior to that of the entire United States during the same timeframe, demonstrating that the minimum wage increase did not have negative job effects as opponents argued. Another famous study by David Card and Alan Krueger, 1993, showed that an increase in minimum wage increased employment in New Jersey among fast-food workers, who are typically teenagers. Strikingly, this occurred during a recession (Card & Krueger, 1993).

In spite of these findings, there are still strong arguments that an increase in the minimum wage will result in decreased employment opportunities for teenagers. One argument is that teenagers and older workers working part-time may be more vulnerable to being replaced by automation. The Obama proposal to increase minimum wage to \$10.10/hr. could also result in the replacement of labor with capital and could also result in greater unemployment of minorities (Hanson & Hawley, 2014).

Minimum Wage and the Restaurant Industry

In addition to focusing on teens, it is also appropriate to focus on the restaurant industry because many teens earn minimum wage, or within 10% of it, and many restaurant workers do also. In 2006, 33% of restaurant employees earned within 10% of minimum wage. Also, the restaurant industry employed approximately 30% of all workers earning within 10% of minimum wage (Dube, Lester, & Reich, 2010). “No other industry has such high intensity of use of minimum wage workers” (Dube, Lester, & Reich, 2010, p. 948).

There are several studies that have focused on the impact of changes in the minimum wage on the restaurant industry (Allegretto & Reich, 2018) (Belman & Wolfson, 2014) (Card, 1992) (Card & Krueger, 1993) (Katz & Krueger, 1992). The studies of David Card are discussed in the Minimum Wage and Teenagers section above and show that an increase in the minimum wage in New Jersey and California not only did not decrease employment, but actually resulted in an increase in employment, particularly among teens.

Allegretto & Reich (2018) studied an increase in California in 2013, about 20 years after Card’s study. The Allegretto & Reich (2018) study focused on price impacts from a 25% increase in minimum wage. They found that the 25% increase resulted in a 1.45% increase in restaurant prices. This small percentage price increase is in line with the findings of other researchers that conclude that an increase in minimum wage does not significantly change price. This is in spite of the findings of Belman & Wolfson (2014) who provide evidence from 7 different studies indicating a positive impact on price. The literature is inconclusive and the impact on restaurant menu prices are found to range from none to positive to positive in the long-run (Allegretto & Reich, 2018) (Belman & Wolfson, 2014). Worth mentioning is an article from Bloomberg.com that reports several restaurant chains with plans to increase prices as a result of increases in minimum wage. Jack In The Box, Cheesecake Factory, Denny’s, BJ’s Restaurants, and Nathan’s Famous all reported an expected increase in price as a response to the increase in minimum wage in California in 2013 (Wong, 2014). However, the reported expected increase in prices for these restaurants was only 1.4%, on average, compared to the 12.5% increase in minimum wages.

Katz & Krueger's study (1992) of the impact of an increase in minimum wage in Texas in the early 1990s epitomizes the findings of several. They looked at the impact on price and employment for the fast-food industry. They also focused on the impact on teens. They discuss the conventional economic theory that an increase in price should result in higher prices of goods and reduced employment. However, as with others, they found that the conventional view did not hold. Price changes occurring during their study did not appear to be the result of minimum wage increases and employment increased. They go one step further than other researchers do by pointing out that a relatively high minimum wage may result in the expected increase in price and reduction of employment (Katz & Krueger, 1992).

This issue of the impact on price, and the restaurant industry, based on a relatively greater minimum wage increase is brought into focus by articles addressing the recent increases in minimum wage to new-high levels. For example, Seattle's city council voted to gradually increase its minimum wage to \$15/hr. in 2014. The increases began in 2014 and were scheduled to be fully implemented by 2021. "Data shows that Seattle MSA lost 700 restaurant jobs from January to September (2015)" (Jessen, 2015). This was in spite of an overall climate of job growth in the Seattle MSA. Also, the additional recent increases in California are impacting the restaurant industry. In San Francisco, "an early adopter of the \$15 wage. It's now experiencing a restaurant die-off" and in "San Diego...wage was increased 43 percent in two years...Watch for the next mass die-off there" (Agott, 2017).

Recent National Trends in Minimum Wage

The Raise the Wage Act passed the Democratic controlled House of Representatives on July 18, 2019. This bill would raise the federal minimum wage to \$15/hour by 2025 (Clark, 2019). The Republican controlled Senate will likely not pass the bill. As has been the case since the passage of the FLSA in 1938, economists disagree on the consequences of passing the bill (Maurer, 2019).

As of June 2019, there are 29 states that have a minimum wage above the federal minimum. The highest state minimum wage rate is \$12 in California, Massachusetts, and Washington. There are also 44 other municipalities that have a higher minimum wage than their state. Half of these municipalities are in California. The highest minimum wage in among these 44 municipalities is \$16/hr. in Seattle, WA, which applies to companies employing more than 500 workers (Labor Law Center, 2019).

The wave of increases in minimum wage above the current federal level was foreseen in 2012 by Whitaker, et.al. They stated that federal inaction to increase minimum wage could lead to pressure for states to act. Their prediction came to fruition in just a few years. In 2015, 21 states raised their minimum wage (Kasperkevic & Srinivas, 2015). But during this timeframe, it was not only states that were increasing wages. A variety of high-profile public companies also made public their plans to increase wages above minimum wage (Che, 2015). Among these 13 companies was Starbucks. This is no surprise given that Starbucks is based in Washington state and that state has some of the highest minimum wage rates in the country. But also included in the list of companies was Walmart of Bentonville, AR. With minimum wage in Arkansas at only \$7.50/hr. as of the time the article was written, Walmart's increase to \$9/hr. was significant. Also, Walmart announced that wages would be raised to \$10/hr. in 2016.

The movement to increase minimum wage at the state and local level has continued and has apparently increased in momentum over the past couple of years. From 2017 to 2019, 23 states have increased their minimum wage. Also, 17 of the 44 municipalities referred to above have passed laws to increase their minimum wage either on July 1, 2019 or January 1, 2020 (Labor Law Center, 2019).

Recent Arkansas Trends in Minimum Wage

This empirical research study focuses on the impact of an increase in minimum wage on the state of Arkansas. So, before moving on to the methodology section of this paper, a review of the recent trends and law changes in minimum wage in the state of Arkansas is appropriate.

In 2014, Arkansas' state minimum wage was \$6.25/hr. This was \$1/hr. below the binding federal minimum of \$7.25/hr. As a result, Arkansas' state minimum wage was not effective. Arkansans undertook a ballot initiative to increase the minimum wage in the November 2014 election (Kasperkevic & Srinivas, 2015). The issue passed with 65.94% voting for and 34.06% voting against the issue (Ballotpedia, 2019). There was very broad support for Issue 5 from across the state. Senator Mark Pryor (D) wrote of his support for Issue 5 in an article titled *Time to give Arkansans*

a raise (2014). In addition, the Republican running for Governor in the same 2014 election, Asa Hutchinson, also supported Issue 5. A final revealing fact on Issue 5 is that \$471,010 was raised in support of the issue and \$0 was raised in opposition according to Ballotpedia (2019). Specifically, the law increased minimum wage as shown in Table 2 (Basten, 2018).

Table 2

Year	Arkansas' Issue 5 Minimum Wage Amounts from November 2014 Election			
	State Minimum	Federal Rate	Increase in the Binding Minimum Wage	New Minimum Wage and Effective Date
2014	\$6.25/hr.	\$7.25/hr.		
2015	\$7.50	\$7.25	\$.25	\$7.50 as of Jan. 1
2016	\$8.00	\$7.25	\$.50	\$8.00 as of Jan. 1
2017	\$8.50	\$7.25	\$.50	\$8.50 as of Jan 1

This increase in minimum wage in Arkansas increased wages from \$7.25/hr. to \$8.50/hr. over 24 months and 1 day. This represented an increase of 17.24%.

Also, Arkansas voted to increase its minimum wage again in the fall of 2018. The scheduled increases will raise the Arkansas minimum wage from \$8.50 to \$11.00 by 2021. Since these increases will continue for the next two years, the data showing any consequences of this new law are not yet available. This will be addressed in the section below regarding future research.

METHODOLOGY

Research Questions

As summarized in the literature review above, there are many arguments for and against minimum wage laws. However, the most often expressed views opposing minimum wage focus on its perceived negative impact on employment and prices. A number of studies have been done from the 1990's to 2013 in large states with higher relative population incomes, populations, and costs of living than Arkansas (Allegretto & Reich, 2013) (Card, 1992) (Card & Krueger, 1993) (Katz & Krueger, 1992). Arkansas is a low-income state with a small population. Arkansasans voted on in the November 2014 election to increase minimum wage above the federal level by 17.24%. The research questions focused on in this study address the employment and price impacts of Arkansas' passage of Issue 5 in the 2014 election.

The five research questions addressed are as follows:

- I. Did the increase in minimum wage in Arkansas lead to an increase in fast food menu prices greater than the increase in fast food menu prices in the United States?
- II. Did the increase in minimum wage in Arkansas lead to an increase in fast food menu prices greater than the increase in the overall rate of inflation in the United States?
- III. Did the increase in minimum wage in Arkansas result in a greater rate of unemployment compared to the United States?
- IV. Did the increase in minimum wage in Arkansas result in a greater rate of teen unemployment compared to the United States?
- V. Did the increase in minimum wage in Arkansas lead to a difference in the labor force participation rate compared to the United States?

The important issues addressed by these questions are not whether the price increased or employment changed, but rather how these things changed compared to the overall economy.

Data Collection

To determine the impacts on prices and employment resulting from the change in minimum wage rates in Arkansas, the authors collected menu price data from fast food restaurants in Arkansas. The data were collected from 44 restaurants quarterly from the fourth quarter of 2014 to the first quarter of 2017. This timeframe began before the first minimum wage increase on January 1, 2015, and ended after the last increase on January 1, 2017. A total of 292 menu item prices were collected each quarter. These 292 menu items were the exact same items for the entire study. At the beginning of the study, 46 restaurants were included and several additional menu items were included. During the data collection timeframe, 1 restaurant closed and 1 burned down. The menu items for these two restaurants were removed. Also, as restaurants changed their menus, items that were not consistent over the entire data collection period were dropped. For example, if a restaurant ceased to offer a specific item, then the item was removed from the sample. Menu prices were obtained by visual observation from drive-through menus from various Sonic, Subway, Taco Bell, Burger King, McDonald's, Popeyes, Arby's, Hardees, Dairy Queen, Chick-fil-a, Wendy's, and Kentucky Fried Chicken restaurants.

To compare the change in menu prices to other price changes and to compare changes in employment statistics, secondary data was obtained as shown in Table 3.

Table 3

<i>Data Collected</i>		Secondary Data & Sources		
		<i>Frequency of Data</i>	<i>Time Period for Data</i>	<i>Source of Data</i>
I	US CPI U for limited service restaurants	Quarterly	4Q14 – 1Q17	Bureau of Labor Statistics
II	US CPI U	Quarterly	4Q14 – 1Q17	Bureau of Labor Statistics
III	US & Arkansas Unemployment Rate	Monthly	Oct. 2014 – Mar. 2017	Bureau of Labor Statistics
IV	US & Arkansas Teen Unemployment Rate	Monthly	Oct. 2014 – Mar. 2017	US-Bureau of Labor Statistics AR-Bureau of Labor Statistics Data provided by the Arkansas Division of Workforce Services
V	US & Arkansas Labor Force Participation Rate	Monthly	Oct. 2014 – Mar. 2017	US-Bureau of Labor Statistics AR-Bureau of Labor Statistics Data provided by the Arkansas Division of Workforce Services

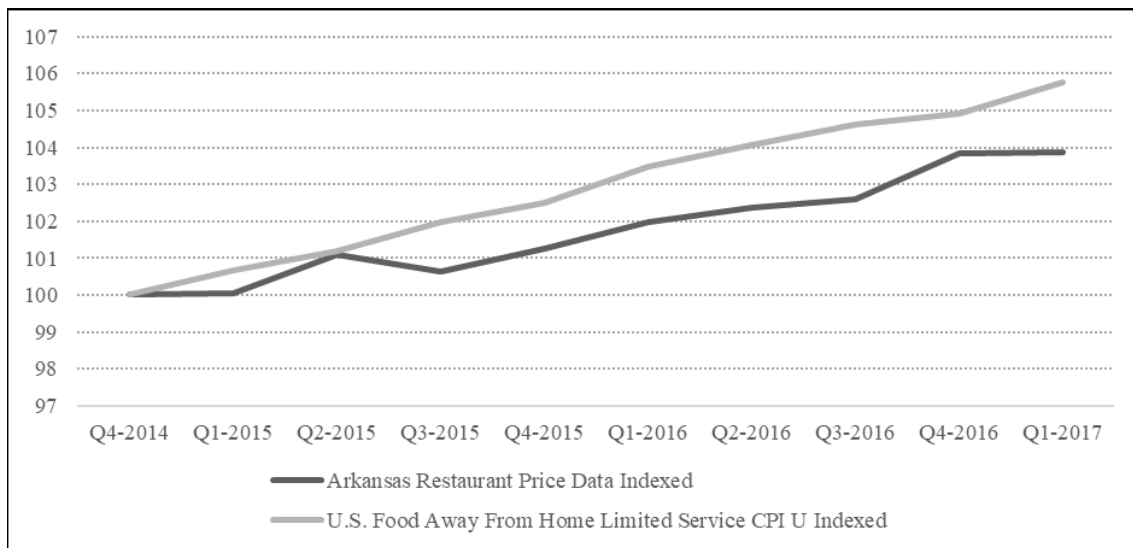
FINDINGS

Research Question I – Comparing Fast-Food Prices

Primary data collected for this study were menu prices for fast food restaurants from 4Q14 – 1Q17, also referred to as food away from home – limited service by the BLS. The menu items' prices were totaled and the totals were indexed with the total price for all items in 4Q14 being set as the base period and equal to 100. The CPI U for the United States for limited service restaurants was also indexed from the BLS data with the base period being set to 4Q14 and equal to 100.

The data show that the increase in menu prices for Arkansas fast food restaurants rose from the base period index amount of 100 to 103.859 as 1Q17. This is an increase in food prices of 3.859% in Arkansas. The CPI U data for limited service restaurants across the United States show an increase in price from 100 to 105.774, reflecting an increase in food prices of 5.774% over the United States. Figure 1 compares these indices.

Figure 1: Arkansas vs. United States Fast Food Prices

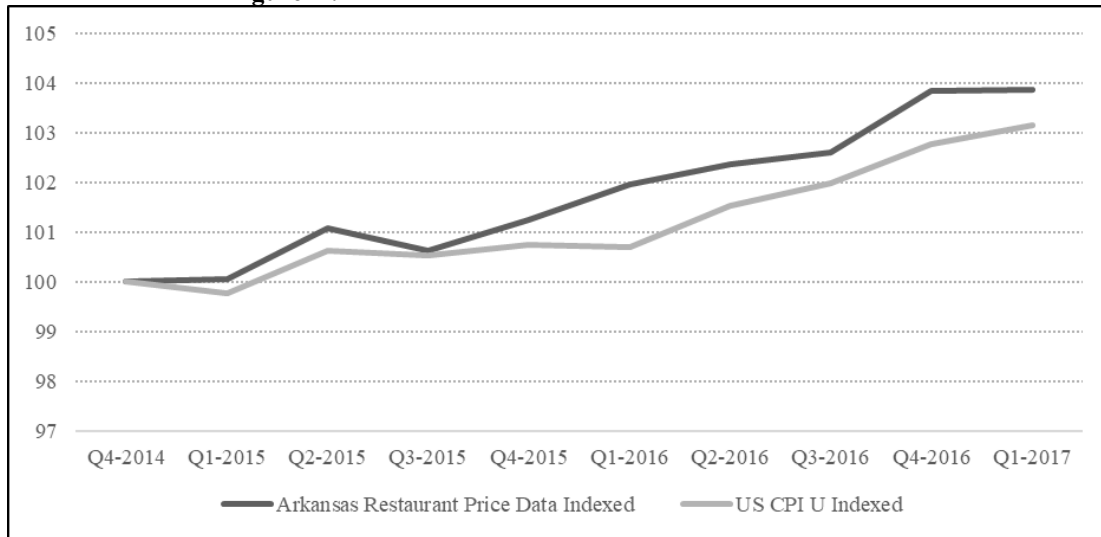


Research Question II – Comparing Arkansas' Fast-Food Prices to United States Inflation

Similar to the research question, a comparison was made of the change in prices of fast-food restaurants in Arkansas to overall inflation in the United States. With the US CPI U data being indexed with a base period of 4Q14 at 100, the US CPI U data show an increase in prices from 100 to 103.161 at 1Q17. This represented an increase in prices of 3.161%.

Since the increase in Arkansas' menu prices was greater than the increase in US inflation, an independent T-test was done to determine if the difference was significant. The independent T-test produced a one-tail p value of 0.338909111. This result fails to support that the change in menu prices for Arkansas was significantly greater than the overall inflation rate in the United States. Figure 2 compares these indices.

Figure 2 : Arkansas Fast Food Prices vs. United States CPI U

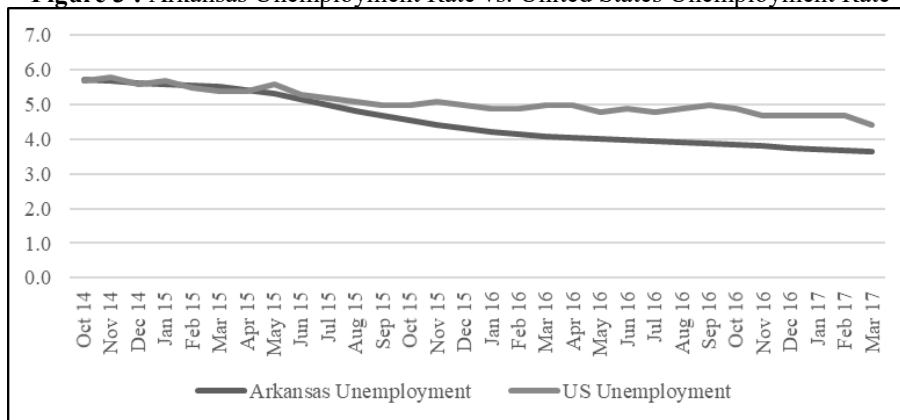


Research Question III – Comparing the Unemployment Rate

Arkansas' unemployment rate declined from 5.7% to 3.6% over the 30-month period measured. This reflects a decline of 1.9%. Further, in each month measured, the rate was either steady or declining. There was no month during the timeframe where unemployment increased.

The US unemployment rate declined from 5.7% to 4.4% over the same period. This decline was, in absolute terms, less than the decline Arkansas enjoyed. Figure 3 compares these unemployment rates over the 30 months measured.

Figure 3 : Arkansas Unemployment Rate vs. United States Unemployment Rate



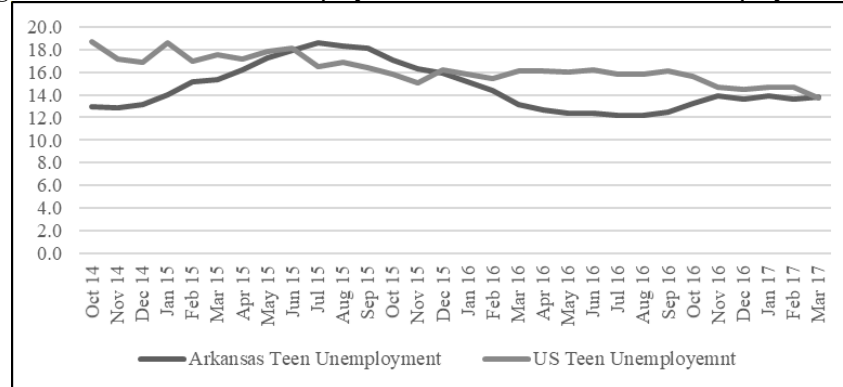
Research Question IV – Comparing the Teen Unemployment Rate

The Arkansas teen unemployment rate was 13.0% at Oct. 2014. This rate increased to a peak of 18.1% in Sep. 2015 before declining to 13.85% at Mar. 2017. This was not a steady directional change as was the Arkansas unemployment rate reflected in the Research Question III data.

The US teen unemployment rate was 18.7% at Oct. 2014. This rate declined to 13.7% by Mar. 2017. However, this rate also did not follow a steady directional path during the 30-month timeframe.

The Arkansas teen unemployment rate and the US teen unemployment rate were indexed based on a base period of Oct. 2014 and a value of 100. An independent T-test was performed on the change in the values of the indices to determine if the change in the Arkansas teen unemployment rate was greater than the change in the value of the US teen unemployment rate. The independent T-test produced a one-tail p-value of 0.138338629. This result fails to support that the change in Arkansas teen unemployment was significantly greater than the change in US teen unemployment over the same period. Figure 4 compares these teen unemployment rates over the 30-month period.

Figure 4 : Arkansas Teen Unemployment vs. United States Teen Unemployment Rate

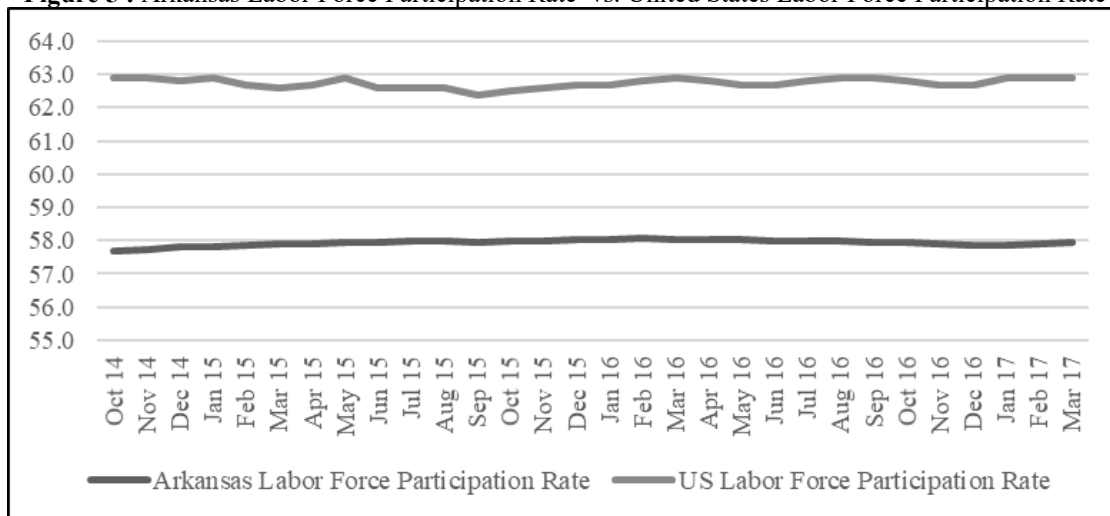


Research Question V – Comparing the Labor Force Participation Rate

During the 30-month timeframe measured, Oct. 2014 – Mar. 2017, Arkansas' labor force participation rate, LFPR, was fairly steady and consistently below the US LFPR. For Arkansas, the LFPR was 57.7% in Oct. 2014 and 57.9% in Mar. 2017. The rate only fluctuated .4% over the 30 months. For the US, the rate was 62.9% in Oct. 2014 and 62.9% in Mar. 2017. The US rate was also fairly steady over the period and only fluctuated .5%, down to 62.4%, during the period.

To determine if the change in the AR LFPR was significantly different than the change in the US LFPR, an independent T-test was performed. The AR LFPR and the US LFPR were indexed with to Oct. 2014 with a base value of 100. The change in the rates was compared using the independent T-test. The test produced a two-tail p-value of 0.708228595. This result fails to support that there was a significant difference in these labor force participation rates. Figure 5 compares these rates.

Figure 5 : Arkansas Labor Force Participation Rate vs. United States Labor Force Participation Rate



ANALYSIS

At the beginning of this study, and as the authors were beginning to gather data, the expectation was that Arkansas' fast food prices would increase at a rate greater than the US as a whole and that the increase would negatively impact employment in the state because of the increase in minimum wage. These expectations were in line with traditional economic theory. It was surprising to find that fast food prices in Arkansas increased by less than the fast food prices in the US. Although the Arkansas fast food index rose by 3.859%, this was less than the 5.774% increase in fast food prices across the US. For research question I, regarding price comparisons of fast food restaurants, clearly Arkansas did not suffer an increase in fast food prices as compared to the US as a result of the minimum wage hike. For research question II, although Arkansas' fast food price increase was 3.859% over the period measured, more than the US inflation rate of 3.161%, the change in these measures was not significant. These findings related to price fail to support the economic view that an increase in minimum wage will result in an increase in price, measured as a comparison of goods or as a comparison of inflation for the broader economy.

The findings for the employment effects also fail to support the economic view that an increase in minimum wage will result in greater unemployment, particularly among teens. This is clearly demonstrated by the fall in unemployment in AR from 5.7% to 3.6% compared to the fall in unemployment in the US from 5.7% to 4.4% over the same 30-month period. According to the traditional economic view, Arkansas' unemployment should have increased, or at least decreased by a lesser rate, when compared to the overall economy. This did not happen. Unemployment actually decreased in AR by .8% more than in the broader economy. The teen unemployment analysis is more challenging because the change in both the Arkansas teen rate and the US teen rate is not steady. However, with the independent T-test one-tail p-value result of 0.1338338629, the comparison of the change in the two rates is not significant. Lastly, the LFPR for both Arkansas and the US is very steady. There is no significant difference in the change in these rates. It is clear that the increase in minimum wage in Arkansas did not lead to an increase in unemployment, any significant difference in the change in teen unemployment rates, or the LFPR.

Limitations

This study is limited by the fact that the primary data from Arkansas fast food restaurants was collected from 44 restaurants across 8 cities and 6 counties. However, these counties range from rural to urban, including several restaurants from small towns and several from the largest MSA in the state.

The timeframe for data collection and the analysis is limited to the quarter before the minimum wage was changed to the quarter in which the last increase in minimum wage was implemented in the state of Arkansas. Thus, the timeframe covers the entire period of the increases in minimum wage. However, a lag effect may impact the results if collection of data had continued for additional quarters.

CONCLUSIONS

Summary

Traditional economic theory suggests that an increase in minimum wage will result in both an increase in prices and negative impacts on employment. For Arkansas, the increase in minimum wage did neither from 4Q14 to 1Q17. In fact, unemployment dropped, teen unemployment did not change significantly when compared to US teen unemployment, and the LFPR remained very stable. Also, prices increased less than related prices nationally and did not increase significantly greater than prices in the broader US economy.

It would not be appropriate to suggest that traditional economic theory is wrong. To the contrary, traditional economic theory includes the phrase 'ceteris paribus'. This means 'all other things held constant'. Of course, this is a useful tool when learning economic theory. But, when applying economic theory to real-world situations, the ceteris paribus consideration must be kept in mind to avoid misunderstanding.

For minimum wage, the research seems to conflict. Many studies show that an increase in minimum wage resulted in an increase in price (Lemos, 2008). Several recent increases in minimum wage demonstrate, at least anecdotally, that increases in minimum wage have resulted in negative employment consequences (Agott, 2017) (Jessen, 2015). What researchers should keep in mind is that not all other things are held constant. There are many other factors to consider. Further, an increase in price or an impact on employment must be compared to something to be relevant. Some other factors often ignored are the lag effect, the magnitude of an increase in wages, the minimum wage compared to the average wage in the economy, the condition of the economy within the business cycle, the incentive or disincentive to workers of an increase in minimum wage.

We find that the increase in minimum wage in Arkansas, approved in the 2014 fall election, did not result in an increase in price compared to other relevant factors or in negative effects on employment, ceteris paribus.

Future Research

Interestingly, Arkansas voted in the fall of 2018 to raise the minimum wage again (Arkansas.gov, 2018). This time, Arkansas voted to increase minimum wage from \$8.50/hr. to \$11.00/hr. by 2021. The 2014 law increased minimum wage by \$1.25/hr., representing a 17.24% increase. The 2018 law will increase minimum wage by an additional \$2.50/hr., representing an additional 29.41% increase. Future research may focus on whether or not the higher increase amount will result in negative impacts on price and employment more in line with traditional economic theory.

A final consideration is that research on this topic should focus on policy. Much has been done to describe the impacts of minimum wage, but little has been done to focus on what an appropriate minimum wage policy really looks like. Some states index their minimum wage, but all do not. The federal government has not increased minimum wage in over 10 years. Regional price differences seem to call for differences in minimum wage. Research should focus on the development of minimum wage policy without political pressure.

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AN APPLICATION OF AHP FOR DECISION-MAKING REGARDING MOBILE DEVICE MANAGEMENT SYSTEMS

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ABSTRACT

The IT infrastructure, and the IT operations of an organization, are always in a constant flux and pose several unique challenges. In this paper, we have considered a unique challenge faced by the Remodeling Company that is related to their IT infrastructure and operations. We have looked into their issues with the JAMF enrollment services effected due to the misconfigurations in the settings of the MDM server. This is a unique and critical issue to the Remodeling Company. To address this issue, we conducted group interviews with the experts within the organization to elicit all the potential solutions and the decision criteria and have modelled this problem as a MCDM. Finally, we have applied the AHP to evaluate the potentiality of each solution proposed by their experts. Based on our recommendation for creating a separate server for personal (BYOD) devices the organization was eventually able to mitigate this issue.

INTRODUCTION

The Remodeling Company's IT environment was choked with several issues. Their obstacles were three folds namely a highly unstructured imaging business processes, a non-traditional approach for their infrastructure implementation, and several misconfiguration issues within the settings of their device management server. Unstructured business processes have cost them a significant loss of person-hours. This is due to the fact that repetitive tasks were being performed redundantly and in an inefficient manner. By following a non-traditional approach for their IT infrastructure, they face compatibility issues with the organization-wide exchange of documents. Finally, the misconfiguration of settings for their device management, MDM server, has resulted in their supervised *i.e.* institutional devices to be mistakenly registered as unsupervised *i.e.* personnel devices, therefore severely restricting the management capabilities in such devices. Here, we focus only on addressing the issue related to the misconfiguration of the settings within their device management server. More specifically, we have tried to identify and evaluate the different alternatives which when implemented could potentially resolve the issue related to the enrollment of supervised "institutional" devices as unsupervised "personal" devices.

Below we provide a short history of the Remodeling Company and a brief introduction to their IT infrastructure and operations. In 1992, Adam and Jeff Kaliner started their company, that later became Power Home Remodeling (Power), with a vision. They envisioned a home improvement company that focused on the customer experience. Since Power's inception, it has been nationally recognized for its integrity, ethics, and customer loyalty. Power's success can be directly attributed to their scrutinized installation process and their quality product offerings. Power has also fine-tuned the customer's interactions. This has ensured them a high customer satisfaction. Here after, we will refer to the Power Home Remodeling as the Remodeling Company.

Back in the early days, the Remodeling Company consisted of around 200 employees; at that time, little thought was placed on the IT automation and infrastructure. Instead, a great deal of energy was invested into building the customer experience. After several years of their establishment, when demand expanded beyond their capabilities, they embraced several key changes. The first change was the relocation of the company's headquarters. Their old headquarters was small, about 16,500 square feet, and could no longer accommodate the growing company's increasing needs. The new headquarters was larger *i.e.* about 55,000 square feet. The increased square footage provided much needed space for additional employees and workspaces. The company further planned to upgrade their space to about 105,000 square feet. This planned change resulted in procurement of additional workspaces and focused on providing additional open collaborative spaces. The second major change was the development of an in-house application by their newly appointed chief innovation officer (CIO). The application was developed to simplify direct communication with employees in the field, and to automate processes throughout the organization. This application also greatly reduced the overhead created by previous methods that relayed heavily on using paper documentation for fulfilling the customer orders. The in-house application also streamlined processes including marketing and sales reporting, tracking customer satisfaction, installation progress, post-installation financing and payments, and much more. The development of their in-house application required many developers to incorporate additional features, automation, and to meet the company's ever-changing business needs.

For many years, the departments within the organization-utilized machines running Microsoft Windows configured as a workgroup. Files were stored locally and on a local file server, and many forms were filled out by hand and mailed. These paper forms spanned multiple departments and were required for financing, permitting, and work orders. Ultimately, legacy processes created an excess amount of overhead and ultimately hampered the growth of the company. With the development of their in-house application, it became easier to provide a cost effective and reliable platform for communication between departments throughout the organization. However, administration of hardware throughout the organization in the current environment was difficult. In 2011, the Remodeling Company started utilizing Team Viewer to administer and assist employees both in remote location and in the contact center. This was a step in the right direction; unfortunately, the information technology department was utilizing machines running Ubuntu. This caused some issues with cross platform support and administration. Their disparate infrastructure predicated a push to create a more consistent and reliable platform for desktop users. In early 2012, an Ubuntu setup was tested in the contact center. End-users could perform their job duties; however, there were administrative difficulties with several drivers and the configuration of multiple displays. Ultimately, these setbacks derailed the deployment of additional Ubuntu machines. In mid-2012, two Apple Mac Minis were deployed and tested. One Mac Mini was tested in the IT department and the other in the contact center. The implementation was a success. After few weeks of testing, Mac Minis were deployed in the entire department. This deployment was also successful, ultimately leading to the deployment of Mac Minis in other departments. The Apple platform provided both stability and reliability; unfortunately, it was incompatible with their legacy database that was used for generating statistics and reporting. It took them several years to transform their legacy database and its functionality into the in-house application. This severely resulted in delaying the process of conversion of their Microsoft Windows computers to the Apple platform.

The Remodeling Company's hardware environment is comprised mainly of Apple products. The standard desk setup consists of a Mac Mini, two 27" ASUS monitors, an Apple Keyboard and Mouse, and a GrandStream PBX phone. Mobile users are equipped with a MacBook Pro, an Apple Keyboard and Mouse, and an Apple Thunderbolt Display. Sales representatives are provided with an iPad and battery powered printer. An exception is the Accounting department; they still relay on PCs running Microsoft Windows 7. Their Apple devices are managed by the JAMF Nation software JSS and the Casper Suite. They also use JSS to manage the distribution of their proprietary in-house application and for managing the settings for personal, BYOD, and supervised, institutional, devices. The in-house application revolutionized their sales process. It also facilitated the need to incorporate technology in many processes that were previously reliant on paper forms.

Currently the MDM server handles the management of personal BYODs, and institutional devices throughout the organization. Miss-configuration of their MDM server poses a severe challenge to the Remodeling Company's IT infrastructure. Because of this miss-configuration, the end-users with company owned institutional devices must navigate to the web portal and register such devices as personal or employee owned devices. When the user attempts to install the management certificate and the profile, in devices registered as personal devices; they encounter an error. The system removes many of the management capabilities for the registered personnel device thus providing a scenario very commonly known as *denial of service*. In this research, we will identify and evaluate possible solutions (alternatives) and weighted criterions (factors) to determine the best course of action to be taken to rectify this issue. In the next section, we provide a detailed explanation of the business problem experienced by the Remodeling Company.

The remaining part of this paper is structured as follows – brief description of the business problem, research strategy, proposed AHP model and evaluation, results of the various alternatives and criterions, implementation of the proposed solution and the conclusions.

BUSINESS PROBLEM

In this section we provide details about the issue related to the miss-configuration of the MDM server i.e. the issue with the JAMF enrollment of supervised institutional device and to give a deeper insight in to the consequences faced by the Remodeling Company. The Apple devices of the Remodeling Company is managed by the JAMF software. JAMF provides different tools to automate inventory, distribution, maintenance and updates (JAMF Software, LLC). JAMF software is utilized for the secure distribution of email and proprietary in-house application; to employee owned and personally owned devices. Personal devices have limited management capabilities and are inexpensive to register. The Remodeling Company also has an institutionally owned, supervised, devices. A user is manually bound to the device, then an automated process links the user's LDAP credentials and sets up email, contacts, calendars, and their

in-house application. A printer payload is then scoped to the iPad. This payload contains the assigned printer's configuration parameters. These supervised devices have extensive management capabilities and allow an administrator to perform advanced actions. Supervised devices are more expensive to manage under the JAMF licensing agreement. The Remodeling Company is currently experiencing an ongoing issue with its JAMF device management software. The management software in its current configuration, is enrolling the institutional and supervised devices as personal, and unmanaged device. This is troublesome because devices like the company owned iPad cannot be managed and their in-house application installed in iPad is less likely to receive future updates.

This problem arises when the end-user navigates to the device enrollment program from their company owned iPad to install the mobile device management profile and associated certificates in their device. Thou the new certificate installs properly but the device management profile fails to install properly. In the administrative JAMF tool, JSS, the device changes from a supervised institutional device to an unsupervised personal device. When the device is enrolled as a personal device, its device management options become very limited.

To correct the enrollment status of the iPads, from personal to institutional, the re-enrollment process must be re-initiated. The current course of action taken by the Remodeling Company is to wipe the device. Once the device is reactivated through the device enrollment program, its enrollment status is corrected, and the management capabilities are restored in those devices.

RESEARCH METHOD

In this research, we have employed two qualitative research techniques. To begin with, we interviewed experts *i.e.* the employees of the Remodeling Company and secondly, we asked them to fill the survey instrument (questioner). Employees of the Remodeling Company who were directly involved with managing the MDM server were identified as the experts. We also ensured that such employees were aware of the on-going issue related to the JAMF enrollment of supervised institutional devices. These experts were then asked to participate in the focus group interview. Before conducting the focus group interview, we ensured that the experts were knowledgeable about the purpose and the proper functioning of the MDM server; were knowledgeable about the JAMF device management system and were well-aware of the consequences of this issue. Each expert participating in the focus group interview were asked to list down the potential solutions to this problem. Table 1 lists the potential solutions (alternatives) gathered from interviewing three experts.

Table 1: Alternatives identified by the experts during group interview

Alternatives	Description
A1 Work with JAMF to Adjust Software Settings	Contact JAMF and troubleshoot with their technical support team. In previous occasions, the software provider had expressed difficulties in configuring their application to work with the Remodeling Company's LDAP configuration.
A2 Create Another Server for Personal (BYOD) Devices	Another virtual server can be created with an additional instance of the JAMF running in it. This new server will register only the personal devices. Any attempts to register an institutional device on this server will be blocked automatically.
A3 Change to an Alternate MDM	Cancel contract with the JAMF, and setup a new device management solution with a competitor. This solution is costly and very time consuming, however, it may be the best way to resolve this issue.
A4 Register All Devices as Institutional	All personal devices will be re-registered as institutional devices. The need for enrollment can be eliminated. However, this might not be a feasible solution because when the institutional devices are registered there is a per-device fee (cost) associated with it, while registering personal devices are associated have no or zero cost.
A5 No Personal Devices	Management of all personal devices is ended. Email and the in-house application will need to be distributed manually. No additional direct cost incurred.

A6	Blacklist URL for Enrollment	Establish a policy to restrict access to the enrollment URL from institutional devices. In past such implementations have failed on earlier iOS versions. There could be other issues associated with the filtering policy.
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Secondly, the experts were also asked to list down all the decision criteria's that would enable them to evaluate the different alternatives and choose the final course of action. Table 2 lists all the decision criteria identified by the panel of three experts.

Table 2: Decision criterions identified by the experts during group interview

Criterion	Description
C1	Cost of implementation
	The projected cost of implementing a solution
C2	Ease of Implementation
	The anticipated difficulty of the proposed solution
C3	Time to Implement
	The estimated time before the solution is in place
C4	Training Necessary
	Training required to implement and maintain the solution.
C5	Availability of In-House App
	One or more available in-house application(s) can be woven together to address the issue.
C6	Initial Assessment of Future Issues
	Number of future problems generated due to the implementation of a given solution.
C7	Management's Opinion of Solution
	Management's subjective opinion of a solution

As soon as the group interview was over all the three experts were given a questioner to perform a pairwise comparison of all the criterions with respect to the goal, and a comparison of all the alternatives in relation to each criterion (see figure 1). Through this process, we obtained the subjective opinion of an expert on the criterions; and on each alternative, with respect to each criterion.

We modelled the JAMF enrollment issue as a Multi-Criteria Decision Making (MCDM) problem. A typical MCDM problem evaluates a set of alternatives in relation to a set of decision criterion. In the next section, we have briefly discussed the steps that were followed for performing the Analytic Hierarchy Process (AHP) analysis. Our objective here is to rank all the alternatives based on the criterions listed in table 2. From the ranked alternatives, we will pick the top 3 alternatives and recommend them for implementation to resolve the JAMF enrollment issue. This is as a typical MCDM problem which can be addressed using the AHP.

AHP MODEL

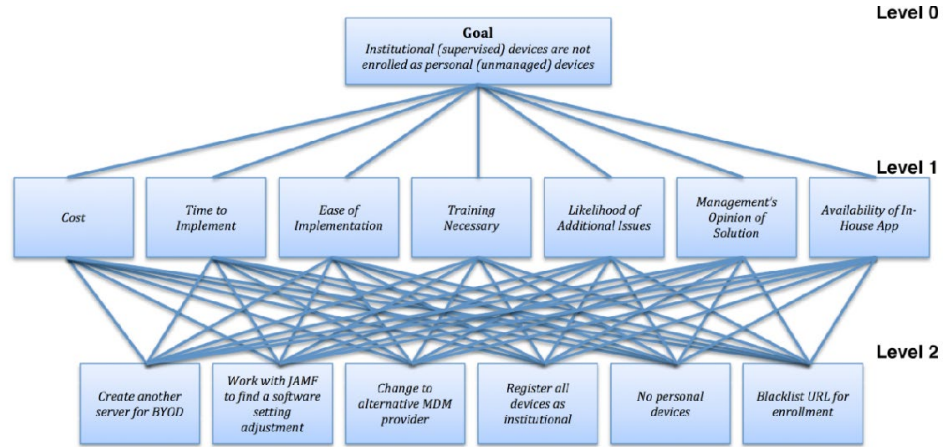
To rank each of the alternatives, based on the identified criterions, we opted to perform the AHP analysis. Figure 1 pictorially depicts the structure of hierarchy containing the Goal (JAMF enrollment issue) at the top level, level 0; all the criterions for the decision-making process at level 1, and the alternatives at level 2. The lines between the levels indicate the relationship between the criterion, alternatives, and goal. Satty proposed the AHP method as an effective tool for dealing with complex decision-making problems. The AHP aids the decision makers in setting the priorities and making the best decision (Satty, T.L., 1977). To conduct an AHP analysis for the JAMF enrollment issue we requested all the three experts to complete the questioner. The AHP method has an advantage *i.e.* it accommodates for small inconsistencies in the subjective judgment made by experts (humans). Humans are not always consistent. A survey instrument, questioner, containing 21 ($7c_2$) pairwise comparisons of the criterions was presented to the experts. The experts were asked to perform a pairwise comparison of the criterions by ranking each criterion on a scale of 1-9. Table 3 lists the AHP preferences on a scale of 1-9. Based on this table it can be inferred that if an expert rate a criterion i as 9 when compared to another criterion j then it means that the criteria j is $1/9$ times as important as criteria i in the context of the given decision-making problem.

Table 3: Preferences scale for the subjective judgment

AHP scale of importance for pairwise comparison	Numeric rating	Reciprocal
Extreme Importance	9	1/9 (0.111)
Very Strong Importance	7	1/7 (0.143)
Strong Importance	5	1/5 (0.200)
Moderate Importance	3	1/3 (0.333)
Equal Importance	1	1 (1.000)

Here, we have omitted the intermediary steps of the AHP computations and have focused on the important results from this analysis. To appreciate the merit of the AHP we briefly summarize the steps performed in the AHP analysis. To begin with we constructed a comparison matrix containing the pairwise comparisons of the 7 different criteria identified by the experts. In this comparison matrix, we compute the normalized principal Eigen vector or the priority vector which is then used to determine the relative weights for each criterion as envisioned by the experts. There are three basic steps involved in computing the priority vector from the given comparison matrix.

First, each element of the column in the comparison matrix is normalized using the column sum. Second, all the row sums are computed. Finally, each of the row sums are normalized by the total number of criteria in the decision-making problem.

**Figure 1: AHP Hierarchy for the JAMF Enrollment Issue**

Like the pairwise comparison of the criteria in level 1, we gathered the expert's opinion on the pairwise comparisons of all alternatives in level 2 with respect to each of the 7 criteria. A survey instrument, questionnaire, containing 15 ($6C_2$) pairwise comparisons of the alternatives were presented to the experts for each of the seven criteria. The experts were asked to pairwise rate all the alternatives with respect to each criterion on a scale of 1-9 (see table 3). Corresponding to each criterion, a comparison matrix was constructed that contained the pairwise preferences of the expert against each of the 6 alternatives. From these comparison matrices, we computed the priority vectors and determined the relative weights of each alternative across each of the criteria.

RESULTS

Table 4 below shows the adjusted weightage of each of the 7 criteria by three different experts. The adjusted weights of the criteria that were significantly less (less than 10%) have been indicated as missing entries in table 4. From

table 4, it can be observed that expert 1 has given a high weightage to decision criterion's such as *availability of in-house app* (33.7%), *cost of implementation* (32.2%), *management's opinion of the solution* (22.3%) and *ease of implementation* (11.7%). Alternatively, expert 2 has assigned higher weights to criterions namely *initial assessment of future issues* (32.6%), *cost of implementation* (21.7%) followed by the criterions *management's opinion of solution* (19.6%), *ease of implementation* (13.2%) and *availability of in-house app* (12.7%). The expert 3 on the other hand has given higher weightage to criterions namely *time to implement* and *ease of implementation* both with a weightage of greater than 24%. Within the three of them, expert 3 did not give much importance to criterions namely *cost of implementation* and the *management's opinion of solution*. It is important to note here that the sum of the adjusted weights for the different criterions, across each expert, is normalized to 1 (see table 4).

Table 4: Adjusted weightage of each criterion as expressed by three different experts

Criterion	Expert 1 weightage	Expert 2 weightage	Expert 3 weightage
C1 Cost of implementation	0.322	0.217	
C2 Ease of Implementation	0.117	0.132	0.247
C3 Time to Implement			0.293
C4 Training Necessary			0.182
C5 Availability of In-House App	0.337	0.127	0.127
C6 Initial Assessment of Future Issues		0.326	0.148
C7 Management's Opinion of Solution	0.223	0.196	

Table 5 provides the composite weightage of each alternative for all the three experts. Based on the importance of the decision criterions expressed by different experts (see table 4) we constructed a 4-criterion model for expert 1, and 5-criterion model each for expert 2 and expert 3 to evaluate the rankings of the 6 alternatives. The objective here is to rank all the potential solutions to identify the top solutions that has the potentiality to resolve the JAMF enrollment issue. From table 5, it is evident that all the experts have different preferences. Expert 1 has highly ranked the alternative 6 *i.e.* to Blacklist the URL for enrollment. However, for experts 2 and 3 this alternative was the least preferred option. All the three experts have highly ranked the alternative to *create another server for personal (BYOD) devices* (see table 5).

Table 5: Composite weightage of each alternative by three different experts

Potential solutions	Expert 1 weightage based on criterions C1, C2, C5 and C7	Expert 2 weightage based on criterions C1, C2, C5, C6, and C7	Expert 3 weightage based on criterions C2, C3, C4, C5 and C6
A1 Work with JAMF to Adjust Software Settings	15.422 (3 rd)	6.516	6.256
A2 Create Another Server for Personal (BYOD) Devices	20.663 (2 nd)	25.696 (1 st)	27.446 (1 st)
A3 Change to an Alternate MDM	6.946	19.456 (3 rd)	21.388 (2 nd)
A4 Register All Devices as Institutional	11.402 (4 th)	25.215 (2 nd)	17.937 (3 rd)
A5 No Personal Devices	12.560	10.454	11.836

A6	Blacklist URL for Enrollment	33.004 (1 st)	12.660 (4 th)	15.134 (4 th)
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VALIDATION OF THE AHP ANALYSIS

To validate the AHP analysis we computed the consistency Ratio (CR) (see table 6). The CR determines how consistent the experts were with their subjective analysis of the pairwise comparisons of criterions, and the pairwise comparisons of the alternatives with respect to each criterion. The CR is computed in several steps. First the principal Eigen value or the largest Eigen value λ_{max} is determined from the comparison matrix of the criterions and from the comparison matrix of the alternatives with respect to each of the criterions. The principal Eigen value computed here is the sum of the products between each element of the priority vector, and the sum of the columns in the comparison matrix. The next step is to determine the Consistency Index (CI), which is determined as $CI = \frac{\lambda_{max} - n}{n - 1}$, wherein, n is the number of criterions in the complex decision-making problem. Finally, the CR is computed as the ratio of CI and RI i.e. $CR = CI/RI$ where RI is the Random Consistency Index. We obtained the values for RI from (Genest and Rivest, 1994).

Table 6: Principal Eigen value, CI, RI, CR and decision obtained from the comparison matrix of the criterions and the alternatives with respect to each criterion for all the three experts

Items	Expert 1	Expert 2	Expert 3
Criterions	$\lambda_{max} = 8.3464$	$\lambda_{max} = 9.468901$	$\lambda_{max} = 12.86965$
	CI = 0.2244	CI = 0.411483	CI = 0.978276
	RI = 1.32	RI = 1.32	RI = 1.32
	CR = 0.1700	CR = 0.31173	CR = 0.741118
	Decision = Consistent	Decision = Consistent	Decision = Inconsistent
Alternatives with respect to criterion C1	$\lambda_{max} = 8.614939$	$\lambda_{max} = 8.238466$	
	CI = 0.522988	CI = 0.447693	
	RI = 1.24	RI = 1.24	
	CR = 0.421764	CR = 0.361043	
	Decision = Inconsistent	Decision = Consistent	
Alternatives with respect to criterion C2	$\lambda_{max} = 8.003648$	$\lambda_{max} = 8.176742$	$\lambda_{max} = 10.08677$
	CI = 8.003648	CI = 0.435348	CI = 0.817354
	RI = 1.24	RI = 1.24	RI = 1.24
	CR = 0.323169	CR = 0.351087	CR = 0.659156
	Decision = Consistent	Decision = Consistent	Decision = Inconsistent
Alternatives with respect to criterion C3			$\lambda_{max} = 8.103469$
			CI = 0.420694
			RI = 1.24
			CR = 0.339269
			Decision = Consistent

Alternatives with respect to criterion C4			$\lambda_{max} = 10.05203$
			CI = 0.810406
			RI = 1.24
			CR = 0.653553
			Decision = Inconsistent
Alternatives with respect to criterion C5	$\lambda_{max} = 6.790123$	$\lambda_{max} = 10.02234$	$\lambda_{max} = 8.732223$
	CI = 0.1580247	CI = 0.804469	CI = 0.546445
	RI = 1.24	RI = 1.24	RI = 1.24
	CR = 0.127439	CR = 0.648765	CR = 0.440681
	Decision = Consistent	Decision = Inconsistent	Decision = Inconsistent
Alternatives with respect to criterion C6		$\lambda_{max} = 7.215184$	$\lambda_{max} = 11.36814$
		CI = 0.243037	CI = 1.073628
		RI = 1.24	RI = 1.24
		CR = 0.195997	CR = 0.865829
		Decision = Consistent	Decision = Inconsistent
Alternatives with respect to criterion C7	$\lambda_{max} = 8.455769$	$\lambda_{max} = .490047$	
	CI = 0.4911539	CI = 0.498009	
	RI = 1.24	RI = 1.24	
	CR = 0.396092	CR = 0.40162	
	Decision = Consistent	Decision = Consistent	

In table 6, we list our decision against each of the items for each expert. Normally a 10% (0.10) for the CR is considered as a cutoff threshold above which the subjective ratings by an expert is deemed to be inconsistent. However, the problem investigated here is complex in nature involving 7 criterions and 6 alternatives. Therefore, we choose a cutoff threshold of 40% for the CR. Based on a 40% cutoff threshold, we deduced the subjective judgment of the experts, expert 1 and expert 2, against the criterions and alternatives with respect to each criterion, as highly consistent. We also noted that the subjective judgement of the criterions and alternatives for expert 3 is highly inconsistent. For experts, 1 and 2 the subjective judgement of the alternatives with respect to the criterions C1 and C5 respectively were highly inconsistent (see table 6).

In any decision-making process high level of inconsistencies can be mitigated by involving a greater number of experts. However, in the case of the Remodeling Company we were only able to seek the opinion of three experts as they were all directly involved with managing and maintaining the MDM server, and had a good knowledge and understanding about the JAMF enrollment issue.

DISCUSSION – SOLUTION IMPLEMENTATION

The Remodeling Company decided to primarily implement the alternative *blacklist the URL for enrollment*, and then to work with the JAMF to adjust the software settings. This resulted in a setback for them. Finally, the Remodeling Company opted to *create another server for personal (BYOD) devices*.

Several years back the Remodeling Company attempted to *blacklist the URL for enrollment*. At that time the “block” policy was too restrictive and eventually blocked access to most legitimate web traffic as well. This was not at all acceptable to them because the sales representatives will be needing access to several different websites throughout their workday. In the release of iOS version 9, JAMF reported that they have improved or resolved all the previously blocking tendencies existing in the previous versions of JAMF. To test this claim, the Remodeling Company rolled out a test policy blocking the enrollment portal to all members of the IT department. Within a few hours several sites were reported as blocked. They then adjusted the filter to allow selective domains. However, within 24 hours additional reports came in reporting the blockage of several additional websites. Thus, the testing was discontinued, and the implementation for *blacklisting the URL for enrollment* was abandoned.

The Remodeling Company contacted JAMF again. The initial solutions recommended by JAMF was not so fruitful. After several conference calls, implementation of patch solutions and numerous adjustments to the software settings, it was determined that the LDAP server of the Remodeling Company was not compatible with the JAMF software. Therefore, there was no way to synchronize the settings to prevent the devices from enrolling as personal.

After two failure attempts the Remodeling Company decided to spin up another VM and install another instance of JAMF. According to their licensing agreement with JAMF, there was no additional charge for the second instance since the server was designed to handle only personal devices. It took a few days to configure the new server, and a week to test it for bugs, before the personal enrollment URL was redirected to the new server. The issue was finally resolved. Now, if a sales representative attempts to enroll an institutional device the process fails since the certificate from the institutional server is different from the personal server. The policies for an institutional device prevent the existing certificate from being overwritten or removed. The end-user receives an error message and the supervised institutional enrollment remains the same. The only inconvenience occurs when trying to locate a personal device profile. Since all personal devices registered before the transition to the new server were still located on the old server, the technician often must check both servers for personal device administration. Other than this minor, and temporary, inconvenience the solution was implemented without a hitch.

LITERATURE SURVEY

In this section we provide details on the survey relevant to this study. Research methods play a vital role in determining the success, validity and the reliability of the research that is focused on social and Information sciences (Alshenqeeti, 2014). To better understand the human behavior, social scientists often tend to use different qualitative research strategies that can help them in gathering a detailed account of human behavior and beliefs within the given context (Rubin & Rubin, 2005, Alshenqeeti, 2014). Also, with the non-numeric data, the research generally seeks to explore and describe the quality and nature of how people understand, experience and approach the problem. According to Dörnyei, researchers often prefer to conduct interviews and use questionnaires to collect qualitative type data. He also emphasizes the fact that the interviews are more powerful in eliciting narrative data from the subjects who possess a deep knowledge about the topic being investigated when compared to that of using the questioners (Dörnyei, 2007, Alshenqeeti, 2014). According to Cohen *et al* and Berg, interviews not only helps in building a holistic snapshot and a detailed view of the topic, but it also allows the subjects to freely express their thoughts and feelings in their own voice (Cohen *et al*, 2007, Berg, 2007, Alshenqeeti, 2014). According to Weiss, interviewing the subjects have proven to provide a detailed description of the events in their natural settings (Weiss, 1994, Alshenqeeti, 2014). In a similar vein, Kvale has argued that talking to people would be one of the most effective methods for attaining and exploring the constructs of the event. More specifically, as interviews are interactive in nature, interviewers can press for complete, clear answers and can probe into any emerging topics. Hence, interviewing is expected to broaden the scope of understanding the investigated phenomena, as it is a more naturalistic and less structured data collection tool (Kvale, 1996, Alshenqeeti, 2014). According to Schostak interview is an extendable conversation between subjects that results in obtaining an in-depth information about a certain topic or subject, and through which a phenomenon could be better interpreted and appreciated (Schostak, 2006, Alshenqeeti, 2014). Such an extendable conversation can be on a one-on-one format or can be organized as focus group (Marshall & Rossman, 2006).

Gubrium and Holstein have discussed about open-ended (unstructured) interviews in (Gubrium and Holstein, 2002) and have commented that open-ended interviews tend to provide a greater flexibility and freedom to both the interviewers and interviewees. Therefore, the interviewer will have the opportunity to follow up the interesting developments and will also provide an opportunity to interviewee for elaborating on various issues related to a topic (Dörnyei, 2007). A specialized version of the open-ended interviews *i.e.* focus group interviewing is an interviewing technique in which participants are selected because they are a purposive, although not necessarily representative, sampling of a specific population, this group being 'focused' on a given topic (Barbour & Schostak, 2005). According to Hermanowicz, focus group interviews requires skillful chairing and group size. Generally, focus groups are suitable for investigating complex behavior but at times they can be very time-consuming and effortful (Hermanowicz, 2002). Smithson in (Smithson, 2000) has claimed that focus groups can be used as a quick way to gather data and get a sound opinion of the subject experts. Supporting the viewpoint of Smithson, Berg in (Berg, 2007) has discussed that focus groups have the potential to develop ideas collectively, bringing forward the priorities and perspectives of the participants, to create theory grounded in the actual experience.

Next, we present a literature survey of the MCDM and AHP. MCDM is also referred to as Multi-Attribute DM or MADM, is a branch of in a general class of Operations Research (OR) models. These models deal with decision problems under the presence of many decision criteria. In any MCDM or MADM related problem there are shared philosophies in the alternatives and attributes. Alternatives represent different choices of action available to the decision maker. Usually, the set of alternatives is assumed to be finite, ranging from a small number to large *i.e.* in hundreds. On the other hand, MCDM or MADM problems are associated with multiple attributes. Attributes are commonly referred to as goals or decision criteria. The alternatives should be screened, prioritized, and ranked. The attributes represent different dimensions from which the alternatives can be judged (Triantaphyllou *et. al.*, 1998). AHP, according to Satty, is based on breaking down a complex MCDM problem into a system of hierarchies. In the final step, AHP deals with the structure of a $M \times N$ matrix, M is the number of alternatives and N is the number of criteria. The matrix is constructed by using the relative importance of alternatives based on each decision criteria. Experts, or decision-makers, are often presented with a set of alternatives and a set of criterions. They are then asked to provide subjective judgment on the pairwise comparisons. The pairwise comparisons are based on the alternatives for a given criteria and for the criterions, both judged separately. Once the subjective opinions of the experts, or decision-makers, are received a comparison matrix of $O \times O$ is established, where O is the number of alternatives or criterion (Triantaphyllou *et. al.*, 1998).

AHP has applications in different engineering domains including integrated manufacturing (Putrus, 1990), technology investment decisions (Boucher and McStravic, 1991), flexible manufacturing systems (Wabalickis, 1988), layout design (Cambron and Evans, 1991), and in other engineering problems (Wang and Raz, 1991).

CONCLUSION

The JAMF enrollment issue resulting due to the misconfiguration in the MDM server is a very critical IT problem for the Remodeling Company. This misconfiguration in their MDM server has resulted in to mistakenly registering the institutional devices as personnel devices therefore restricting the management capabilities in such devices. Since this problem was very critical to the organization, there was an urgency to resolve this issue. Involving three experts from the organization, we conducted a group interview to elicit the potential solutions to resolve this issue and determined the criterions to evaluate and rank each of the solutions. With a follow up survey instrument, we could obtain the pairwise comparisons of the importance of each criterion and, the alternatives across each criterion. Upon performing AHP, we were able to rank all the potential solutions and identified the top solutions that can be recommended for resolving the JAMF enrollment issue. Based on the inputs from their experts and upon performing the AHP analysis, we recommended the company to create another server for personal (BYOD) devices. Once our recommendations were implemented, the Remodeling Company could successfully mitigate the JAMF enrollment issue. This research demonstrates that there is a huge potential in employing group interviews and AHP type analysis in addressing unique IT challenges faced by the organization. The issue related to the JAMF device enrollment is unique to the Remodeling Company and to the IT community and can be purely attributed to the non-traditional approach followed for their IT infrastructure and operations.

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IMPACT OF BANKRUPTCY FILING ON STOCK PRICE

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ABSTRACT

This study examines the impact of the bankruptcy announcement on the stock price and the behavior of it leading right to filing and immediately after the filing. It applies standard event study methodology to measure sensitivity of market returns and abnormal stock price movements around bankruptcy announcements of thirteen publicly traded companies. The results reveal that announcement has positive effect on stock price and only on the day leading to filing there is a negative impact. The value of the announcement may be incorporated into results immediately on day 1 or 2 following the announcement due to market efficiency.

INTRODUCTION

Chapter 11 is a form of bankruptcy that involves a reorganization of a debtor's business affairs and assets, usually filed by corporations that need time to restructure their debts. Chapter 11 bankruptcy filing allows the corporation (borrower) a fresh start which is stipulated in form of plan of reorganization approved by a court and outlines the rules for debtor's fulfillment of its obligations. Interest in the stocks of companies in bankruptcy surged along with the increased number of filings over the years and especially during the financial crises, Swedroe 2013. This surge occurred even though the equity is the last in line to receive what's available to be distributed in a bankruptcy proceeding. Ahead of the common stockholders in line, are secured lenders, suppliers, employees and even unsecured creditors. Even if a company successfully reorganizes, the future of common stock is very uncertain. The question arises, what is the impact of bankruptcy filing on the market price of failed firm? Announcements of bankruptcy filing may be viewed favorably by the market. Using the data for corporations which filed for Chapter 11 bankruptcy, we study the impact of the announcement on the stock price and the behavior of it leading up to and following the filing date. We apply standard event study methodology to measure abnormal stock price movements around the bankruptcy announcements. The results reveal that the actual announcement has a positive effect on the stock price while the day leading to the filing there is a negative impact.

This paper is organized in the following manner: section two is a literature review, section three discusses the data and methodology, section four reviews the empirical results and section five presents the conclusion, including other issues to be considered for further research and limitations of this study.

LITERATURE REVIEW

Public companies typically prefer to file under Chapter 11 bankruptcy (as opposed to Chapter 7) because it allows the company to continue operating and provides an opportunity for a turnaround. A successful reemergence doesn't always work out, however filing for Chapter 11 gives the company more control over the process. Chapter 11 also allows the company to continue to trade its stocks and bonds while going through a reorganization with the mandatory reporting of the bankruptcy on Form 8-K (SEC) within 15 days. The investors make the decision with very limited information until a bankrupt company files a disclosure statement detailing the plan of reorganization and advise whether existing shareholders get anything. Secured and unsecured lenders take an active role in the court proceedings to ensure they recover as much of their share as feasible, while stockholders have no say at the planning of reorganization table and make their trading decisions somewhat blindly. Kary (2011) found that some investors bet on the stock, while those who sold it short—borrowing shares and selling them, hoping to buy them back later at a lower price—unwind their positions. Purchases by short sellers can sometimes lead to a temporary run up in price.

Many institutional investors sell the stock in the light of possible bankruptcy filing. (Coelho 2009) notes that retail investors trade more extensively on the stock of bankrupt firms than sophisticated investors do. His evidence shows that individual investors own about 90% of a company in midst of bankruptcy. Given the high number of individual investors it is possible that some of them may trade on news about a bankrupt company without fully understanding it rather simply betting on it. As (Kary, 2011) notes “the sale of the company's assets (Blockbuster) to Dish Network for \$320 million on Apr. 7 effectively ended the chance that shareholders would get any money. Nonetheless, from Apr. 6 to Apr. 8, the stock rose 17 percent, to almost 7 cents a share”. Coelho (2009) shows in his study that “bankrupt

firms display striking lottery-like features, i.e., high idiosyncratic skewness and low price". The low-price investors get low probability opportunity to gain a large profit, and a high probability to realize a small loss. Hence, his "results suggest that particular retail investors may be trading the stocks of bankrupt firms as if they were playing lotteries, and thus using such securities to "gamble on the market" (Coelho 2009).

Datta (1995) observed significant price reversal reported for common stock during the post-filing period (+ 2, + 10). He argued that "this price recovery may be due to uncertainty resolution after the Chapter 11 filing and/or market over-reaction to the filing announcement" (Datta, 1995). He also noted that common stockholders lose the most during the announcement period, but significant price recovery is documented in the post-filing period. This can be due to shareholders perceiving some benefits that arise out of filing bankruptcy. As discussed earlier, bankruptcy can provide "the firm with the ability to unilaterally abrogate on contractual obligations with suppliers, customers, employees, and retirees. It also allows the firm to 'put' the unfunded pension obligations to the Pension Benefit Guaranty Corporation" (Datta, 1995).

Coelho (2009) and Kumar (2009) noted that humans like to gamble and that until very recently, we had little understanding of how this human characteristic impacts the stock price of publicly traded firms. Kumar (2009) shows that individual investors have a predisposition to invest disproportionately more in stocks that, for a small price, offer the opportunity to lock on a huge profit with low probability, and a small loss with high probability. He calls them "lottery-type stocks". Coelho emphasizes the same thesis in his paper: Gambling on the Stock Market: The Case of Bankrupt Companies. He uses a sample of 351 firms filing for Chapter 11 bankruptcy, and that continue trading on a major stock exchange to find that individual investors are particularly drawn to stocks with lottery-like features. In addition, he shows that, "when such market participants are allowed to trade without the correction of traditional arbitrage forces, market prices do not reflect fundamental value. As such, our evidence clearly suggests that gambling-motivated trading not only is a relevant market ingredient but also that it may even be responsible for some of the well-known market-pricing anomalies documented in the literature" (Coelho 2009).

Some companies bounced back from a bankruptcy filing and are "revitalized" by its reorganization and just the announcement of a bankruptcy filing can mean a journey towards profitable growth. The literature shows very limited research of immediate days surrounding bankruptcy and has little evidence on how such investments fared. Given the lack of extensive evidence in research literature on investing in bankrupt companies, we will take a further look into the companies from our data sample.

Air Canada experienced fallout due the 9-11 attacks. Most airlines went from the decade of favorable conditions in 1990s to pressure on margins due to decline in passenger traffic and variable costs associated with fuel expense and labor costs (Mudde.2014). The industry itself is driven by key factors such as (1) volatility in fuel costs, prices and availability, (2) mergers and acquisitions, (3) intensive labor costs, (4) conflicts and terrorist attacks, (5) extensive government fees and taxes and (6) intense price competition. Air Canada ended 2002 with loss of 295 million, which was its 2nd consecutive year of losses (US) dollars. It filed for Chapter 11 protection on April 1, 2003 attributing its declining margins to the economic slowdown including the consequences of war on terrorism, increased fuel costs and the labor unions agreements.

An additional airline, American Airlines filed for bankruptcy on November 29, 2011. The company announced on September 30 that it had \$24.7 billion in assets and \$29.6 billion in debt (De La Merced 2011). The company also posted annual losses three years in a row. These losses were tremendous, and scared investors, causing the stock price to decrease by over 70 percent in 2011 (De La Merced 2011).

There are many reasons for these losses. At the time, consumers started to move towards low-cost carriers such as South West Airlines (De La Merced 2011). Many airlines noticed this trend and began lowering their prices as well, causing industry prices to decrease. American Airlines decided not to lower its prices and to stick to its business model. By moving to cheaper airlines, American Airlines lost a lot of revenue. The company should have noticed the trend and adjusted accordingly. American Airlines' parent company, AMR, also began to drastically increase its borrowing. It pledged nearly all of its assets which left it in a lot of debt. Other airlines, such as UAL Corporation's United Airlines and Delta Airlines filed for bankruptcy previous to American Airlines, enabling them to shed a lot of debt and restructure labor contracts (De La Merced 2011). These companies then benefitted from their new structures, hurting American Airlines even further. A lot of the competition also began undergoing mergers and acquisitions, making them larger and more powerful than ever before, hurting American Airlines (De La Merced 2011). American

Airlines' lack of sound strategy hurt them tremendously. American Airlines essentially got into a cycle where its decisions made things worse and helped out the competition.

American Airlines developed a plan of action to get out of bankruptcy and return the airline to its former prominence. It started by realizing that it was necessary to achieve a competitive cost and debt structure while maintaining its reputation for providing a world class travel experience. In order to do this, the company had to cut its labor costs and shed its very heavy debt burden (De La Merced 2011). Management was very adamant about negotiating with labor unions in order to get labor costs down to "competitive levels". In order to cut costs, American Airlines purchased 460 new single-aisle planes from Airbus and Boeing in order to revamp its fleet (De La Merced 2011). Prior to this move, American Airlines had one of the oldest fleets of all of the major US airlines. By purchasing new planes, it will shed fuel costs from 15-35 percent, lowering expenses tremendously (De La Merced 2011). American Airlines also announced that it would cancel many of its leases in order to shave costs. It leased roughly 29 percent of its airplanes, so cancelling the leases will save the company money. While all of this was occurring, American Airlines was as committed to providing quality service.

CIT Group: filed for Chapter 11 bankruptcy under prepackaged plan on November 1, 2009 which allowed it to emerge from bankruptcy just a month later. Since then the stock has seen 23.4% growth (Mc Grath 2013). CIT Group's bankruptcy file had been the 5th World's largest bankruptcy in America, due to their assets. CIT Group asked the Southern District of New York for a fast, prepackaged plan. A prepackaged plan is an organized arrangement in which puts together a prepayment plan for the future of a company. CIT had announced that during its bankruptcy file, their operating subsidiaries would not be involved nor touched by this. The prepackaged plan was supposed to help CIT continue to provide for middle market customers and smaller businesses. Although it is not confirmed the prices of stock before, during, and after this announcement, it is confirmed that the company had \$71 billion assets. Their liabilities also were at \$64.9 billion dollars. CIT is the top leading company in the U.S in which provides funding for major companies. CIT is the third largest funder for rail cars and aircraft. This is important because these types of transportation are crucial in today's society.

Although many debt holders had accepted the prepackage agreement, CIT did not receive the \$5.9 billion debt exchange from bondholders. This meant that in order for CIT to remain a strong company and far away from bankruptcy, they needed the support from bondholders. Instead CIT decided they will reduce their debt to \$10 billion dollars by liquidating many of their assets. They want to increase their profits in order to go back to be a successful company. They also received \$4.5 billion in credit to continue working with clients while the actions for bankruptcy take place. As for common and preferred shareholder's they will be terminated. During the bankruptcy it is stated they the shares were at \$0.64 after hours and \$0.72 during the day. During this most difficult time, an investor named Carl Icahn decided to help CIT get back on their feet. Icahn head fudge firm gave CIT \$1 billion in credit line. The reconstruction of the company began as creditors were helping them with relief from this time.

Within 38 days, CIT Group had come out of this dark time and been able to put themselves back together. There was a 2.3-billion-dollar lifeline that was from the government in which disappeared during the time of bankruptcy. CIT had announced that they would no longer depend on short-term debt and that they wanted to better increase their company. The stock shares eventually went up to \$27 a few days after they began up and running again. Delta, the airline filed for bankruptcy in September 2005 after losing over \$6 billion between 2001 and fall of 2005. The high fuel cost and lower-cost competition were further compounding its problems. The initial response of stock return was positive, and we observe increase in stock price immediately after the bankruptcy filing. It took Delta 19 months to get through restructuring but since Delta emerged from bankruptcy on April 30, 2007, DAL stock has seen a 25.7% gain (McGrath 2013).

Delphi Automotive filing for Chapter 11 protection on October 5, 2005 "is the clearest sign yet that the U.S. auto industry -- and its unionized workers -- are moving toward the sort of slash-and-burn restructuring that was forced on airline and steel workers by major bankruptcies in those industries" (McCracken 2005). This move was not unexpected as the threat of a bankruptcy filing was clear for months as Delphi was looking for a bailout from the UAW and former parent General Motors Corp.

General Motors: filed for Chapter 11 bankruptcy protection on June 1, 2009. On June 2, the stock began trading in over-the-counter markets showing positive return in first two days following the filing. Soon after, GM was removed from the Dow Jones Industrial Average. Since November 2007, GM stock has seen gains of 26.85% (McGrath 2013).

What led to the bankruptcy filing was years of losses and market share declines caused mainly by the recessionary environment leading to decline in auto sales. “According to GM’s bankruptcy filing, the company has assets of \$82.3 billion, and liabilities of \$172.8 billion”.

Hawaiian Airlines filed for bankruptcy twice. The first time they filed was in September 1993 and then again on March 21, 2003. A day before filing bankruptcy the stock price was \$1.45. However, the day they filed bankruptcy their stock price increased from the day before, making it worth \$1.51. The first-time Hawaiian Airlines filed for bankruptcy was in 1993 due to financial problems they were struggling with for a while, and the drop-in tourism at the time (Sanchez). There were several factors and events that led them to file a second time. One major event was the Iraq war starting the day before the filing and the 9/11 terrorist attacks back in 2001. Air travel continued to be affected by the tread of terrorist attack which was causing business to fall drastically. The war amplified that worry. The airline had \$100 million in debt, as well as \$100 million in assets, making it impossible to function. The negotiations with their aircraft lessors to refinance the leases at a lower rate couldn’t reach an agreement, Chapter 11 protection was needed. Months before the filing, they tried to make some profit by merging with their competitor, Aloha Airlines, but it didn’t work out.

The joint plan with Hawaiian’s creditors’ committee and investor group, Ranch Capital LLC. Ranch capital helped them grow by giving them capital, and in return they became the controlling shareholder of their parent company, Hawaiian Holdings Inc. “Under the plan: creditors will receive 100% of the value of their claims, most in cash; existing stockholders keep their shares, whose value has risen during bankruptcy; and employees have new contracts that for the first time, have pay benefits comparable or better than their competitors” They had a great turnaround due to this plan. The US Department of Transportation ranked them in 2004 as #1 of on time service and #2 for baggage handling and for over sales.

Marvel filed for a Chapter 11 bankruptcy on December 27, 1996. The company claimed a loss of \$464 million (Paulo, 2017). The comic book industry was declining three years prior to Marvel filing for bankruptcy causing financial struggle. Marvel struggled to keep up with new innovation in technology and trends. The company had difficulty servicing its debt and its attempts to cut costs were not enough.

Pilgrim's Pride Corp: ended up in bankruptcy due to high leverage of company and low chicken prices. “Analysts hope that bankruptcy protection will make it easier for Pilgrim's Pride to rid itself of excess production capacity, a move that could help lift chicken prices by reducing supply” (Adamy McCracken 2008). In case of Pilgrim’s Pride Corp, the announcements of bankruptcy court filing had positive impact; after the date of filing and stock daily return data showed positive results for immediate days following filing.

Six Flags: filed for Chapter 11 bankruptcy protection on June 13 with plans to significantly deleverage its balance sheet and eliminate more than \$300 million in preferred stock obligations. Almost a year later, on May 3, 2010, it emerged from bankruptcy with a lowered debt load and under the control of several hedge funds. “Shares of SIX have grown a whopping 303%” (2013, McGrath).

Texaco, the oil company [filed for bankruptcy protection](#) on April 13, 1987 to prevent the seizure of assets after a court awarded Pennzoil \$10.5 billion in damages as a results of merger agreement. Most of Texaco's operating subsidiaries (which accounted for 96% of revenue on 1996) while “virtually all of Texaco's debt and other financial obligations are held by the parent company and its two finance subsidiaries, which are those involved in the bankruptcy” (Hiltzik,1987). Texaco ended up paying Pennzoil \$3 billion, emerged from bankruptcy a year later and subsequently became part of Chevron.

United Airlines: struggled due to an industry downturn, surging oil prices and higher labor costs following the terrorist attacks on September 11, 2001. The airline did not receive aid from government it applied for and filed for bankruptcy protection on December 9, 2002. The initial stock market reaction was positive, and stock observed positive return in first few days following filing. The plan of repaying debt was not finalized till 4 years later and United Airline did not emerge from bankruptcy till 2006.

US Airways filed for a Chapter 11 bankruptcy on September 12, 2004. The company was unable to cut wages and expenditures of \$800 million each year (Chan, 2004), needed to compete with other airlines. Nevertheless, US Airways owed the government approximately \$718 million from a loan given to the airline company after the events

of 9/11. During the filing for bankruptcy, the company reported \$8.8 billion in assets and \$8.7 billion in liabilities (Chan).

Rose-Green (2002) notes that the treatment of bankruptcy as tool to provide a fresh start for poorly performing firms is no longer always the case and that “economically viable firms may choose to file bankruptcy petitions for strategic reasons”. The study points out “that the 1978 modifications in the Bankruptcy Reform Act make it possible for financially solvent companies to seek protection under Chapter 11” (Rose-Green, 2002). The bankruptcy may be a mechanism to shift financial risks to other parties. There are a growing number of companies seeking bankruptcy for nonfinancial reasons. “Companies now use bankruptcy as a strategic tool in everything from litigation to merger negotiations. Once a company files under Chapter 11, the court prohibits all creditors from taking actions against the company pending an approval of a reorganization plan by a bankruptcy court” (Rose-Green, 2002). The firm gets temporary relief from collection attempts, lawsuits, and foreclosure procedures. Bankruptcy therefore provides the means by which a company can execute strategy it could not be otherwise employ.

DATA AND METHODOLOGY

Our hypothesis is that the announcements of a bankruptcy court filing has a positive effect on stock return following the date of filing and a negative impact immediately before the bankruptcy filing. The firm’s plan of reorganization projects is not expected to be lucrative, but announcements of filing Chapter 11 may be favorably viewed by the market. Indeed, investors may prefer that the struggling company files for court protection and institutes the plan of reorganization.

Sample Selection

Data on bankruptcy announcements are collected from Bloomberg/ Wall Street Journal and other major newspapers/ newswires. For each bankruptcy date, an announcement date is identified as the court filing date also announced. Please see figure 1 for the list of companies, bankruptcy dates, and stock ticker.

Only the companies complying with the following criteria are included in the sample:

CRSP/COMPUSTAT contained the required data to conduct the analysis. The company was listed and remained listed after the bankruptcy announcement date, and was trading common stock defined as a domestic company, filing for Chapter 11. Due to sector volatility, utility companies were not considered.

(See Figure 1, below)

Figure 1

Company name	Stock Ticker	Bankruptcy Filing Date	Industry	Sector
Air Canada	AC	04/01/03	Airlines	Industrials
American Airlines	AMR	11/29/11	Airlines	Industrials
CIT Group	CIT	11/01/09	Banks	Financial Services
Delta Air Lines	DAL	09/14/05	Airlines	Industrials
Delphi Automotive PLC	DLPH	10/08/05	Auto Parts	Consumer Cyclical
General Motors	GM	06/01/09	Auto Manufacturers	Consumer Cyclical
Hawaiian Airlines	HA	03/01/03	Airlines	Industrials
US Airways	LCC	09/12/04	Airlines	Industrials
Marvel	MVL	12/27/96	Semiconductors	Technology
Pilgrim's Pride Corp	PPC	12/02/08	Packaged Goods	Consumer Defensive
Six Flags	SIX	06/13/09	Leisure	Consumer Cyclical
Texaco Inc	TX	04/13/87	Oil & Gas Integrated	Energy
United Airlines	UAL	12/09/02	Airlines	Industrials

Methodology

The event study method that we employ is used often in empirical studies in corporate finance (Brown and Warner 1985, Campbell, Lo and MacKinlay 1997, Fama, Fisher, Jensen, and Roll 1969, and MacKinlay, 1997). The data used for the initial analysis was retrieved from the CRSP (Center for Research in Security Prices) database. The variables used include mean return and value weighted return. The companies chosen are listed all had complete variables for the time periods reviewed. (Firm names were matched with the identifiers in CRSP). We use the standard event study methodology to measure abnormal stock price movements around bankruptcy announcements. The estimation period is from -200 to -11 days prior to announcement. The event period is defined as 5 days before through 10 days after announcement. Let R_{it} designate the stock return of firm i on day t . Then the abnormal return of i (AR_{it}) during the event period is measured using the following formula:

$$AR_{it} = R_{it} - (\hat{\alpha}_i + \hat{\beta}_i R_{mt}),$$

Where R_{mt} is the CRSP value-weighted market return on day t , and α and β are estimates of market model parameters during the estimation period. Next, we perform statistical test for the population mean applicable to small sample situation ($N < 30$). We denote comfortable error level as 5%.

Null Hypothesis H_0 :

mean = on average there is no significant abnormal return, i.e. mean = 0

Alternative Hypothesis H_a :

mean \neq 0, i.e. mean is different from 0 (2-tailed test); on average there is significant abnormal return

Test of Statistics

The average abnormal return on day t (AR) is then obtained by averaging the abnormal return over all i . Next, we obtain standard deviation of all observations on day T . Then we compute the corresponding t-score: $T = (X - M) / (S / \sqrt{N})$.

Rejection Region

Next, we calculate probability using the following formula:

$$p = \text{TDIST}(\text{ABS}(T), N-1, 2)$$

If the probability p computed in the above step is less than our comfort error level of 5%, we reject the null hypothesis H_0 and accept the alternative hypothesis. Otherwise we failed to reject hypothesis. Table 2 summaries the results.

EMPIRICAL RESULTS

Table 2. Abnormal Returns

Measure/ Day	(5)	(4)	(3)	(2)	(1)	-	1	2	3	4	5
Mean	0.0023	0.0122	0.0727	(0.0777)	(0.1128)	(0.1353)	0.0336	0.0302	0.0320	(0.0006)	0.0317
St. Deviation	0.1692	0.1140	0.2562	0.1955	0.1476	0.2789	0.0581	0.0503	0.1007	0.0630	0.2004
T	0.0484	0.3850	1.0227	(1.4334)	(2.7559)	(1.7493)	2.0867	2.1644	1.1459	(0.0328)	0.5697
P	0.9622	0.7070	0.3266	0.1773	0.0174	0.1057	0.0589	0.0513	0.2742	0.9744	0.5794

Most of the results come in showing the probability greater than 0.05 so we cannot reject the null hypothesis. This study provides statistically significant evidence for stock performance on day 1 and day 2 as well as on day -1, where the probability is less than 0.05 and we reject the null hypothesis. The announcements of bankruptcy court filing have positive effect after the date of filing on day 1 and 2 which was consistent in the observations in the literature quoted in the literature researched. The study also provides statistically significant evidence for a negative reaction of a stock price a day before the filing which supports the theory that institutional investors sell their position in a company on the verge of filing.

Figure 2. Simple Mean Daily Stock Returns

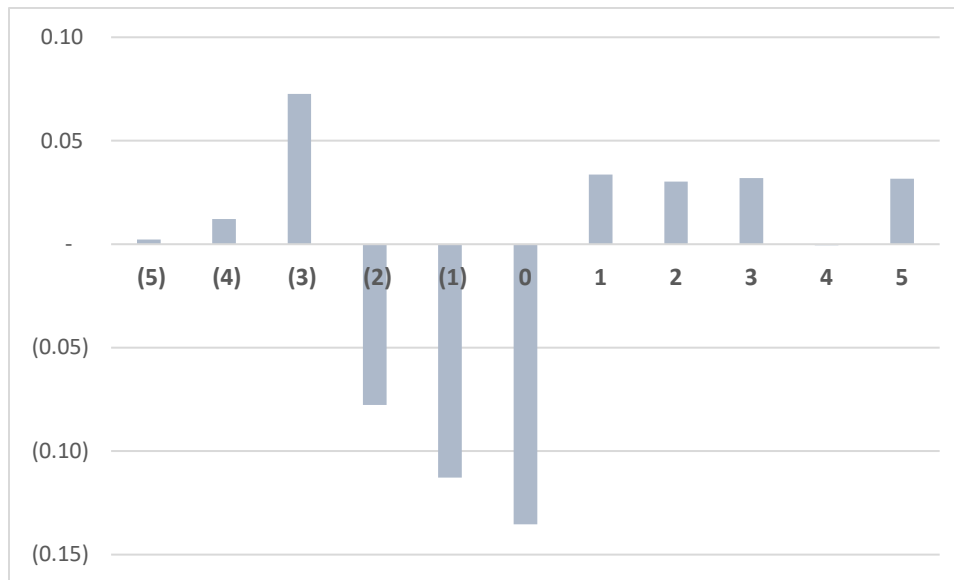


Figure 2 shows simple mean return for a period of eleven days, starting five days prior to filing for bankruptcy, then showing the average return on the day of filing (shown as “0” on horizontal axis) and then followed by results post-bankruptcy filing for five days. We observe the dramatic drop in the mean stock return starting two days prior to the day of the filing of the bankruptcy. The negative return is exacerbated on the actual day of the filing. The expected announcement and then the news of an announcement on the filing day appear to be quickly be discounted by the stock market and immediately the next day after the bankruptcy announcement the returns begin to show positive trends.

Figure 3. Stock Price Daily % Change

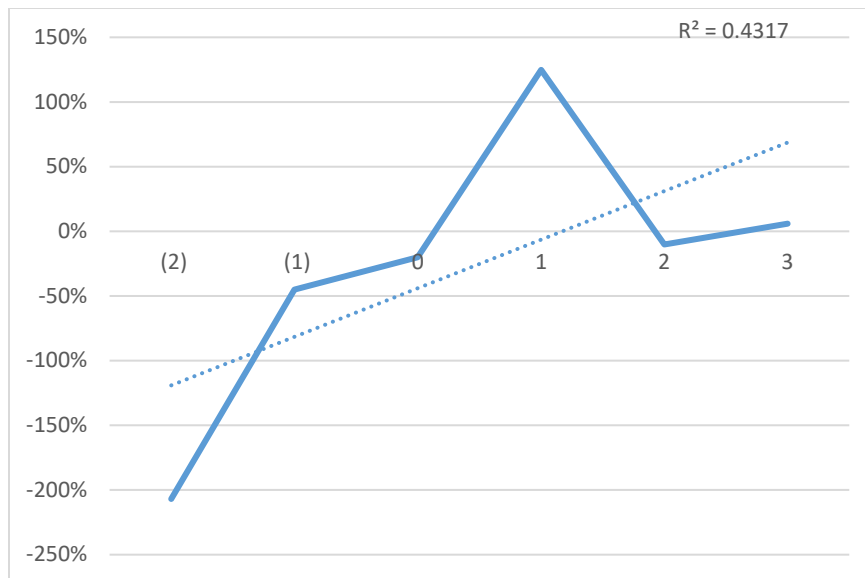


Figure #3 displays the change in return for days surrounding bankruptcy filing. It shows the impact on share price after each of the subject companies filed for bankruptcy. In order to compare the impact of bankruptcy filing to the share price, all values that are in the graph show the percent change over the mean return on the previous day. The bankruptcy filing for all the companies occurs on day 0. The chart reports two days of stock price return changes before filing and three days after the filing date. We observe significant volatility in price change on both the bankruptcy filing date and the days before and after the filing. The companies experienced negative daily returns starting two days prior leading to the bankruptcy filing and continued that trend till the day of the filing occurrence. The negative trend is strongest two days prior the filing day and continues to be negative but less pronounced on the day before the filing and the day of the filing. This seems to indicate that the market had already priced in most of the bankruptcy information into the share price prior to the filing date which would indicate that the market is efficient. The bankruptcy filing is always preceded by the company being in financial trouble, with an impaired ability to service debt. The second day preceding the bankruptcy filing showing exacerbated negative return may indicate that market overreacts to the filing information and then proceeding to correct this in the days following. The overreaction to an expected bankruptcy may present a potential opportunity for technical analysts and traders.

For American Airlines, the announcement of bankruptcy had an immediate positive impact on the stock price. The stock price went up 56 cents in the next two days. American Airlines stock price increased tremendously throughout the rest of the year. The stock price has been generally increasing since 2011 and is now at \$34.64 (Yahoo Finance, 2019). This increase is incredibly impressive and shows that by filing for Chapter 11 bankruptcy, the company was affected very positively. Generally, companies continue trading even if they declare bankruptcy. Based on research, it seems as though stock price can be impacted either way when a company files for bankruptcy. The stock price of some companies goes down and the stock of some other companies go up. In the case of American Airlines, investors were not pleased with how the company was doing leading up to filing Chapter 11. Once American Airlines' declared, a new strategic plan was created that surely made investors feel better about the company. Other factors such as lowering fuel costs post-2011 and the recovery in the greater economy also are partially responsible for American Airlines turnaround. As the economy improves, more people have discretionary income and can spend money on air travel. These factors led to increases in net income over the years, raising the price of the stock. In terms of whether or not there is abnormal price movement after declaring bankruptcy, I believe that it is totally dependent on the strength of the recovery plan, the core strengths of the business going forward, and greater economic conditions. In the case of American Airlines, it benefitted greatly from the declaring Chapter 11 Bankruptcy.

When Delta filed for bankruptcy in September 2005, they had a plan for restructuring that would allow them to continue operations while fighting to gain financial stability back into its business. What helped them immensely and allowed them "...to keep the company running, Delta said it has lined up \$1.7 billion in debtor-in-possession financing

from GE Commercial Finance and Morgan Stanley” (MarketWatch, 2005). American Express also got in on the action and pledges to give Delta an additional \$350 million in secured financing. Once they accomplished the financial stability and restructuring portion of the emergence back into the airline industry it took other more strategic steps to not only come back but come back stronger than they were before. They decided to leverage and take advantage of certain airports around the U.S. that were located in high traffic parts of the country and would act as gateways to other nations. Currently, Delta can boast that they have been “one of the world’s five most profitable airlines for each of the past five years (in total operating profits) and has been operationally profitable every year since 2010” (airwaysmag.com, 2017). Since 2010 Delta has been on what many in the industry consider the second best stretch of financial success in the airline industry. Its stock price currently sits at \$48.96 which is 68 times greater than what it was in 2005 when it declared bankruptcy. Delta is a great story of how a company can turn its future around even after going through 19 months of bankruptcy

CONCLUSION

When a company files for bankruptcy under Chapter 11 the plan is to get a fresh start and the common stock may then have a chance to recover, however the risk of the stock turning worthless is still high. Some research suggests that corporations may also file for strategic reasons as well as for financing needs. There is limited information available to shareholders at the time of the filing. The existing research emphasizes the increased risk involved with these stocks and also shows the positive reaction of the stock market to the bankruptcy filing in the immediate days that follow. This study uses the standard event study methodology to measure abnormal stock price movements around bankruptcy announcements. We confirm our hypothesis that the announcement of bankruptcy court filing has a positive effect on stock returns after the date of filing and negative impact a day before the filing. This study provides statistically significant evidence for stock performance a day before the filing confirming my hypothesis that bankruptcy filing has negative impact on stock return. We analyze what happens to the stock prices of firms that remain listed in the post-bankruptcy period, and this study shows statistically significant evidence for day 1 and day 2 following announcement confirming the hypothesis that the announcements of bankruptcy court filing have positive impact on stock return immediately following the date of filing. Important to note, the value of the announcement may be incorporated into results immediately on day 1 or 2 following the announcement due to market efficiency. It will be interesting to expand this study to larger data set to retest these hypotheses for expanded data set and conduct more extensive analysis of the rationale for an increased interest in companies filing bankruptcy. Is the interest due to the lottery like feature of bankrupt stocks, short-selling activity or is it a market-price anomaly or perhaps another phenomenon?

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