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REAL EARNINGS MANAGEMENT, CSR AND THE MODERATING EFFECT OF CORPORATE GOVERNANCE IN INNOVATIVE FIRMS

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ABSTRACT

The purpose of this paper was to examine the effect of corporate social responsibility (CSR) on the level of real-based earnings management (REM) as well as the moderating effect of the corporate governance (CG) on the CSR-REM relationship in American innovative firms. This empirical study was conducted on a sample of 280 American firms indexed in S&P 500 during the period between 2012 and 2018. We divided the full sample into two sub-samples according to the Research and development (R&D) intensity median. Indeed, firms with high R&D intensity are considered more innovative. The results demonstrate that CSR is significantly and negatively associated with REM in more innovative firms but the relationship CSR-REM is not moderated by CG score in the two groups of firms. This study primarily contributes to the literature on CSR, CG and REM by providing evidence of the moderating effect of CG on the relationship CSR-REM in innovative firms.

INTRODUCTION

In the wake of financial scandals, real earnings management (REM) practices have attracted increasing attention. Indeed, to manage their accounting results, managers have turned to real activities because they are difficult to control. These financial scandals have led to a tendency to develop and implement methods of corporate governance (CG) that limit opportunistic behavior and improve the credibility of financial statements (Watts and Zimmerman, 1986; Zouari and Zouari-Hadji, 2010; Gras-Gil et al., 2016). For this reason, innovative firms, in particular, seek to manage their results using a responsible governance system. Indeed, there are different practices of responsible governance among which corporate social responsibility (CSR) and corporate governance, which are the focus of the present work.

Over recent decades, there has been a considerable change in the nature of investments characterized by a shift towards intangible rather than tangible assets. To adapt to such a change and ensure their sustainability, many companies have specialized in the high-tech industry (Chandrasekaran and Linderman, 2015; Chen and Gavius, 2016; Chouaibi et al., 2019). In this way, innovation turns out to stand as an important source of economic growth (Romer, 1990).

Recent research has shown that REM is becoming the most dominant method in the business world (Graham et al., 2005; Roychowdhury, 2006). This work aimed to study the effect of CSR and good CG on REM as well as the moderating effect of the latter on the CSR-REM relationship within American innovative firms. To meet the research objective, the establishment of two samples of firms, innovative and non-innovative, was required. The first is a test sample

and the second is a control sample. The interest in the American context can be explained by the fact that it offers an interesting framework for research due to the diversity of normative choices and accounting and regulatory methods as well as the flexibility offered to managers in the choice of accounting practices. As a result, our work attempted to contribute to enriching the academic literature on the advantages and obstacles linked to this approach.

Indeed, this research work can enrich the existing literature on the relationship between REM, CSR and CG in high or low innovation-intensive firms. It presents several theoretical and practical contributions. Theoretically, we tried to broaden the concept of REM in innovative firms. Furthermore, we explored the contributions of behavioral finance to study the reality and prospects of REM for innovative firms in the presence of CSR. The moderating effect of the CG on the CSR-REM relationship was also investigated.

The remainder of this paper is structured as follows: Section 2 provides the literature review and hypotheses formulation. Section 3 presents the methodology used. The result and discussion are presented in Section 4. Section 5 concludes the paper.

LITERATURE REVIEW

Real Earnings Management has received increasing interest since the introduction of the Sarbanes-Oxley law (Cohen et al., 2008). The recent shift from accrual accounting to REM represents a gap in the literature. It is therefore important to study the use of REM (Beekhuis, 2017). Although REM has been defined differently by different authors, the same main idea persists in all these definitions. Our study is part of the work of Roychowdhury (2006) who defines REM as "deviations from normal operational practices, motivated by the desire of managers to mislead at least some stakeholders, in particular making them believe that certain financial reporting objectives have been met in the normal course of operations. These differences do not necessarily contribute to the value of the company even if they allow managers to meet certain reporting objectives." The author presents three types of real activities manipulation: an abnormal operating cash flow (AB_CFO), abnormal production costs (AB_PROD) and abnormal discretionary expenses (AB_EXP).

Over the last few decades, the level of R&D investment has undergone a remarkable evolution, especially in the United States, because these investments improve knowledge creation, leading to product and process innovation (Padgett and Galan, 2010). Similarly, R&D investment could give firms some monopoly power by exploiting cheaper ways of producing existing goods, lowering costs or developing new and better products to earn excess profits. Consistent with these arguments, empirical studies provide evidence supporting a positive relationship between firms' investment in R&D, firm performance (Ho et al., 2018) and firm value (Lev and Sougiannis, 1996; Aboody and Lev, 1998; Katila and Shane, 2005; Chandrasekaran and Linderman, 2015).

Moreover, the investment community of tenses R&D as an important driver for innovation for companies and as a potential source of economic rents that can be used to foster economic development. As a result, research has shown that R&D spending can lead to growth and competitive advantage for companies, but managers can also reduce R&D spending to

promote short-term results. Indeed, Bushee (1998) finds that some managers manipulate R&D investments to achieve short-term profit targets; thus, they have a negative impact on investors through their short-term R&D investment actions. Roychowdhury (2006) found that companies could increase revenues by reducing discretionary spending on R&D, advertising and repairs. Besides, Osma (2008) explains that reducing R&D spending reduces pressure on short-term results. In the same vein, Dechow and Sloan (1991) observe that managers often reduce R&D spending towards the end of their mandate to increase short-term results.

Managerial practices have attracted much attention after the accounting scandals that involved, for example, Enron, WorldCom and Parmalat. These financial scandals have led to the development and implementation of CG methods, which limit opportunistic behavior, and therefore improve the credibility of financial statements (Watts and Zimmerman, 1986; Zouari and Zouari-Hadji, 2014; Gras-Gil et al., 2016).

Indeed, the latest financial scandals have created a climate of uncertainty and mistrust of the market and stakeholders. To distinguish themselves, companies have started to voluntarily engage in socially responsible business approaches and implement good governance mechanisms. In fact, CSR improves the economic and financial performance of companies. Furthermore, it contributes significantly to economic development (McWilliams and Siegel, 2000; Dhaliwal et al., 2012) and reflects the continued commitment of companies to behave ethically. Recently, technological firms have also resorted to earnings management. Good CG provides a structure that facilitates the determination of a company's objectives as well as a means of determining techniques for monitoring work (Darmawati et al., 2004; Lutfi et al., 2016). Agency theory asserts that this problem of earnings management can be minimized by oversight through good corporate governance. CG is a concept aiming to improve management performance in terms of management supervision or monitoring while guaranteeing shareholder management responsibility on the basis of a regulatory framework (Dalimunthe et al., 2016; Lubis et al., 2016; Muda et al., 2016). The concept of CG has been proposed to achieve more transparent management of the company for all users of the financial statements. If the concept is used correctly, economic growth is expected to strengthen in parallel with more transparent business management, which will ultimately provide benefits to many parties (Nasution and Setiawan, 2007).

This work highlights the importance of the commitment of innovative firms to CSR activities to reduce REM practices. CSR activities can help gain and maintain a competitive advantage by establishing a solid relationship with key stakeholders of firms (Carroll and Shabana, 2010). Furthermore, this study has implications for the development of the link between responsible governance and REM. To our knowledge, this is the first study that examines this relationship based on a sample of 280 U.S. companies listed on the S&P 500 during the period between 2012 and 2018.

Methodologically, we made a considerable effort to collect data on high or low innovation-intensive American firms. We used several data collection methods. Our basic idea was to determine the impact of CSR and CG on REM in innovative firms. To date, this is the first study to examine this relationship in two sub-samples: innovative and non-innovative American companies.

On the managerial level, this research work can be important in showing the importance of the behavioral approach in understanding the function and the important roles of CG and CSR in limiting REM. This research can be a springboard for future research as it provides useful information to the various users. Similarly, our results can be useful in convincing investors to establish good CG and conduct CSR activities to reduce REM within innovative firms and increase their assets. Moreover, they would also help investors when selecting securities by emphasizing the R&D intensity associated with CSR and REM activities. To maintain sustainable development and progress in their competitive and innovative position, companies must continually invest in R&D and participate in CSR activities (Ho et al., 2018). Finally, this study helps decision-makers to understand the common functioning of CSR and CG within innovative firms. In short, this study proves that the interaction between proactive CSR and good CG helps promote effective resource allocation in the capital markets by providing reliable information upon which investors can base their investment decisions (Cho et al., 2015).

HYPOTHESES DEVELOPMENT

CSR and REM of innovative firms

Our study presents REM in the context of innovative firms because most of the evidence regarding REM relates to the opportunistic reduction of R&D expenditure in order to reduce declared expenditure (Roychowdhury, 2006). Dechow and Sloan (1991) found that CEOs cut their R&D spending towards the end of their tenure to increase their short-term earnings.

To fight against these practices of real activities and reduce the opportunistic behavior of managers, companies have implemented more responsible CG mechanisms and thus engage in CSR activities. Indeed, recent trends suggest that more and more companies are adopting CSR approaches to help ensure efficiency, stimulate innovation and induce continuous organizational growth (Asongu, 2007). CSR is often explained as being an economic, social and environmental development. Moreover, the study by Baumgartner (2014) showed that CSR is generally considered as an approach to integrate social and environmental aspects in the activities of the company. In the same context, the studies of McWilliams and Siegel (2000), Surroca et al. (2010) and Martinez-Conesa et al. (2016) argue that CSR should be integrated into business management models because they are useful for justifying strategic choices and for allowing the company to generate valuable intangible strategic assets in order to obtain competitive advantages and high level of financial performance. The main reason for choosing a sustainability approach is to reduce the negative environmental and social impacts of business activities while improving the economic performance of the company (Baumgartner and Rauter, 2017). For this reason, innovative firms have turned towards sustainable development. Sun and Stuebs (2013) state that companies must become more innovative to maintain or improve their competitiveness while fulfilling their various CSR with the stakeholders. CSR can encourage companies to be more productive by aligning their activities with their strategies to create innovation and competitiveness (Bocquet et al., 2013).

The study of REM is part of research into the positive accounting theory, which focuses on the analysis of the accounting choices observed by Watts and Zimmerman (1986) to influence the decisions of current and potential investors and other stakeholders in the aim of transferring wealth to shareholders or managers. According to social norms theory, earnings management is negatively associated with CSR (Lim and Choi, 2013; Cho et al., 2016; Ho et al., 2018). Finally, in the light of the signaling theory, CSR is considered to be dissociated from earnings management. Lim and Choi (2013), focusing on the effect of the ethical implication of CSR on financial reporting, indicate that companies with good CSR activities constrain REM. Similarly, the results found by Cho et al. (2016) confirm the negative relationship between CSR and REM. In the same vein, Prior et al. (2008) and Martinex-Ferrero et al. (2016) point out that companies use CSR activities strategically to protect themselves against negative perceptions of earnings management.

Almahrog et al. (2018) argue that since earnings management is seen as an irresponsible act that is incompatible with the principles of CSR, companies that are strongly committed to CSR are more inclined to act responsibly when they present their financial statements. The authors also believe that CSR can be used as an effective tool to combat stakeholder activism when managers manipulate financial statements.

However, in our research work, we consider that the relationship between CSR and REM of innovative firms can be negative, since innovative companies with high CSR activities are encouraged to reduce REM in order to obtain a good reputation and a better corporate identity by establishing good relationships with stakeholders. In addition, CSR activities are considered to be a discretionary field which remains among the hidden acts of manipulation by the managers of firms with high R&D intensity, which negatively affects the relationship with stakeholders. Hence our first hypothesis is as follows:

Hypothesis 1: CSR has a negative effect on REM in innovative firms.

Moderating effect of CG

Accounting discipline has received increasing interest over the last decade and formed the basis of good corporate governance. Corporate behavior is further examined by all stakeholders, including regulators and financial press.

Technological and economic development has led to integrating CG mechanisms in order to heal financial crises and cope with financial instability. As a result, accounting results are more reliable and more informative when the opportunistic behavior of managers is controlled by a variety of monitoring systems (Dechow et al., 1996). After several financial scandals, companies resorted to CG to reduce the asymmetry of information and reduce the conflict of interest between stakeholders through engagement in CSR activities (Cho and Chun, 2016). These mechanisms help investors align the interests of managers with those of shareholders and improve the reliability and integrity of the financial reporting process (Watts and Zimmerman, 1986; Gras-Gil et al., 2016).

The relationship between earnings management and CG, ensuring the reliability and quality of accounting results, will be improved when managers' opportunistic behavior in terms

of recurrence management is monitored by CG mechanisms (Dechow and al., 1996). Similarly, the study by Stuebs and Sun, (2015) found a positive association between corporate governance and CSR. Their results suggest that good corporate governance leads to good CSR the year after. CG is a monitoring mechanism capable of controlling the decisions made by managers and limiting their opportunism (Cho and Chun, 2016). Thus, previous studies indicate that a company with good management capacity is more successful in preventing managers from exploiting its assets by monitoring their business decisions (Choi et al., 2013; Cho and Chun, 2016)

Cho and Chun (2016) used 1432 firm-year observations of Korean listed companies and found a negative and significant relationship between CSR and REM, which suggests that companies with high-level CSR tend to engage in lower REM. They also found that CG moderates the relationship between CSR and REM, i.e. good governance strengthens the negative relationship between CSR and REM. Overall, the results indicate that companies with a high CSR and a good corporate governance system can compel REM to improve brand image and reputation by maintaining good relations with the main stakeholders and by monitoring managers' opportunistic incentives to exploit CSR.

Based on previous studies, we expect the joint effect of desirable CSR and good CG on REM to be stronger than the individual effect of CSR or CG. As a result, we anticipate that good CG will strengthen the negative relationship between CSR and REM. This leads us to state our third hypothesis:

Hypothesis 2: CG strengthens the negative relationship between CSR and REM in innovative firms.

SAMPLE AND RESEARCH DESIGN

Sample

To test our hypotheses, we opted for American firms listed on S&P 500 index. Firms with missing data (220 firms) were eliminated from the initial sample, thus the final sample consisted of 280 firms. The observations were carried out over a 7-year review period. The Thomson Reuters Eikon database was used to collect financial and accounting data. To measure the CSR index, we used a panel dataset with environmental, social and economic performance scores as well as CG index obtained from Thomson Reuters ASSET4. Our sample selection is summarized in Tables 1.

In accordance with the existing literature on innovation, our study used R&D intensity (RDI) as a measure of firms' innovation degree (Hall et al., 2016). Companies with strong innovation potential are believed to be more involved in the REM process. In addition, firms that invest heavily in R&D are more likely to be competitive based on the level of innovation and technology.

However, to answer our research problem, it was necessary to subdivide our total sample according to the R&D intensity of American firms (companies with a high innovation potential and those with low innovation potential). To distinguish between these two classes to distinguish these two classes, we adopted the Brown (1997) method, which considers as firms with high innovation potential those with an RDI above the average of the sector to which they belong for

firms that have announced positive R&D expenditures. However, companies having an RDI below the average of the sector to which they belong are considered as potentially low in innovation. Our sample selection is summarized in Table 1.

Table 1: SAMPLE SELECTION AND BREAKDOWN BY R&D INTENSITY			
Panel A: Sample selection			
Sample		#firms	#Obs.
S&P 500 index		500	3500
- Firms with missing data		(220)	(1540)
Final sample		280	1960
Panel B: Sample distribution by R&D intensity			
Firms		#Obs.	%
sample test (highly intensive innovative potential)		792	40.35%
sample control (less intensive innovation potential)		1169	59.65%
Total		1960	100 %
Panel C: sample distribution by industry			
SIC code	Industry	#firms	%
1000-1999	Mining and construction	41	14.64%
2800-2890	Chemicals	73	26.08%
3000-3999	Manufacturing	63	22.5%
5063-5084	General Industrials	16	5.72%
5200-5999	Retail Trade	43	15.36%
7000-8999	Services	44	15.71%
Total		280	100%

The total sample was divided in to two subsamples based on the median¹ of the industry R&D intensity. Thus, following Kouaib and Jarboui (2016) and Chouaibi et al. (2019), we consider that firms with high innovation potential are those with an R&D intensity above the median. However, those with an R&D intensity below the median are considered to have low innovation potential.

For ease of data retrieval, DataStream offers the ability to search for up to eight standard industry codes (SICs) for each company, based on the level of revenue derived from each industry. In other words, to retrieve the "SIC 1" on DataStream for a certain company, it proceeds to provide the industry code following the highest share of the company's revenue. In the next step, industry classification information was extracted from DataStream for all companies in the entire ESG Asset 4 Universe and for American companies for which certain characteristics or necessary information was deleted. A total of 280 companies were selected for

¹The calculation of the median is commonly done to represent different distributions and is easy to understand. It is also more robust than average in the presence of extreme values.

this 7-year study (from early 2012 to late 2016). According to Table 2, our test sample contains 113 companies while our control sample contains 167 companies.

Table 2: SAMPLE DISTRIBUTION ACCORDING TO THE INDUSTRY-MEDIAN OF R&D INTENSITY					
SIC code	Industry	Median RDI	Test sample	Control sample	Total sample
1000-1999	Mining and construction	0,0581	15	26	41
2800-2890	Chemicals	0,0288	32	41	73
3000-3999	Manufacturing	0,0404	19	44	63
5063-5084	General Industrials	0,0474	12	4	16
5200-5999	Retail Trade	0,0302	17	26	43
7000-8999	Services	0.0623	18	26	44
Total			113	167	280

The dependent variable: real earnings management index (REMI)

To estimate the normal levels of REM, Roychowdhury (2006) constructed three empirical models that include three real-world manipulation techniques; cash flow from operations (M1), production costs (M2) and discretionary expenses (M3). According to this measure introduced by Roychowdhury (2006), and developed by Cohen et al. (2008); Cohen and Zarowin (2010) and Zang (2012), we calculated the sum of the residuals of the 3 models as proxy of the dependent variable while multiplying M1 and M3 by -1 (Table 3).

Table 3: SUMMARY OF REM INDEX MEASURE		
Variables	Measures	authors
Abnormal operating cash flows (AbnCFO)	$\frac{CFO_t}{TA_{t-1}} = \alpha_0 + \alpha_1 \left(\frac{1}{TA_{t-1}} \right) + \beta_1 \left(\frac{Sales_t}{TA_{t-1}} \right) + \beta_2 \left(\frac{\Delta Sales_t}{TA_{t-1}} \right) + \epsilon_t$ <p>Where: CFO t is cash flows from operations (net cash-flow-operating activities); Ait-1 is the total assets at the beginning of year t; SALESt is net sales; $\Delta Sales_t$ is the change in net sales.</p>	Roychowdhury (2006) Cohen et al. (2008), Cohen et Zarowin (2010) and Zang (2012)
Abnormal production costs (AbnPR)	$\frac{PRO_t}{TA_{t-1}} = \alpha_0 + \alpha_1 \left(\frac{1}{TA_{t-1}} \right) + \beta_1 \left(\frac{Sales_t}{TA_{t-1}} \right) + \beta_2 \left(\frac{\Delta Sales_t}{TA_{t-1}} \right) + \beta_3 \left(\frac{\Delta Sales_{t-1}}{TA_{t-1}} \right) + \epsilon_t$ <p>Where: PROt is production costs: Sum of cost of goods sold and change in inventory; $\Delta SALES_{t-1}$ is lagged change in sales.</p>	
Abnormal discretionary expenses (AbnDE)	$\frac{DEXP_t}{TA_{t-1}} = \alpha_0 + \alpha_1 \left(\frac{1}{TA_{t-1}} \right) + \beta \left(\frac{St-1}{TA_{t-1}} \right) + \epsilon_t$ <p>Where: DEXP t is discretionary expenses: Sum of advertising expenses, R&D expenses, and selling, general and administrative expenses (SG&A). Advertising expenses are excluded since data on this variable is not available on Thomson Reuters Eikon database.</p>	
REMI = (-1)*AbnCFO + AbnPR + AbnDE*(-1)		

Independent variables measurement

CSR index. Corporate social responsibility entails aligning company's activities with the social, economic and environmental expectations of its 'stakeholders' (OECD, 2003). In this study, we used the equally weighted average of the social, the environmental and the economic score for the innovative firm for every year in our panel dataset.

CG score. The corporate governance pillar measures a company's systems and processes, which ensure that its board members and executives act in the best interests of its long term shareholders. It reflects a company's capacity, through its use of best management practices, to direct and control its rights and responsibilities through the creation of incentives, as well as checks and balances in order to generate long term shareholder value. However, we use the CG scores obtained by companies as a proxy for corporate governance, and we call it Index CG for short thereafter in the paper.

Control variables

We included various control variables that have been documented in prior studies and that are related with REM. Thus, we retain as control variables: firm size, Leverage ratio (LEV), Return on Assets (ROA) and R&D intensity (IRD). Firm size (SIZE) is defined as the natural logarithm of total assets, LEV is defined in terms of debt as divided by total assets and ROA is the return on total assets. IRD is an indicator variable that takes the value of 1 if the firms are innovative and 0 if the firms are non-innovative.

Model specification

The research model that allows testing research hypotheses formulated in the previous section is as follows:

$$\text{Model 1: } \text{REMI}_{it} = \alpha_0 + \alpha_1 \text{CSR}_{it} + \alpha_2 \text{CG}_{it} + \alpha_3 \text{CSR}_{it} * \text{CG}_{it} + \alpha_4 \text{SIZE}_{it} + \alpha_5 \text{LEV}_{it} + \alpha_6 \text{ROA}_{it} + \alpha_7 \text{IRD}_{it} + \varepsilon_{it}$$

Where: REMI is real earnings management index; CSR is corporate social responsibility; CG is corporate governance, SIZE is firm size; LEV is leverage ratio; ROA is return on assets; IRD is intensity in R&D. α_0 ; α_1 ; α_2 ; α_3 ; α_4 ; α_5 ; α_6 and α_7 are the parameters subject of estimation and ε_{it} indicates a random error of firm i in year t .

RESULT AND DISCUSSION

Univariate analysis

Table 4, below, depicts the descriptive statistics of Test, control and full samples.

Table 4: DESCRIPTIVE STATISTICS				
Variables	Statistics	Full sample	Test sample	Control sample
REMI	Mean	0.014571	.0185974	0.0118466
	Std. Dev.	0.1932046	0.1634824	0.2109789
	Min	-0.8923254	-0.6527995	-0.8923254
	Max	0.8678847	0.6577299	0.8678847
CSR	Mean	0.6333789	0.6779143	0.6088628
	Std. Dev.	0.238721	0.2211326	0.2454135
	Min	0.0664	0.1022333	0.0664
	Max	0.9625667	0.9625667	0.9545333
CG	Mean	0.7927584	0.8150659	0.7796119
	Std. Dev.	0.1447996	0.1255403	0.1534076
	Min	0.0299	0.258121	0.0229
	Max	0.9802	0.97653	0.9802
CSR*CG	Mean	0.5219166	0.5688068	0.4955713
	Std. Dev.	0.2435005	0.2274846	0.248691
	Min	0.003002	0.0430167	0.003002
	Max	0.926093	0.9222641	0.926093
SIZE	Mean	16.64816	16.92291	16.48594
	Std. Dev.	1.39421	1.403443	1.359732
	Min	12.7037	13.73247	12.7037
	Max	21.66839	20.65385	21.66839
LEV	Mean	0.2758443	0.2769451	0.2747982
	Std. Dev.	0.1854793	0.1815865	0.1874445
	Min	0	0	0
	Max	1.9403	1.9403	1.1922
ROA	Mean	0.0743628	0.0836818	0.068849
	Std. Dev.	0.071656	0.0741101	0.0695309
	Min	-0.6135	-0.3526	-0.6135
	Max	0.4855	0.4855	0.3257
IRD	Freq	0.3494898	1	0
	Std. Dev.	0.4769305	0	0
	Min	0	1	0
	Max	1	1	0

Bivariate analysis

To verify our hypotheses, we used the difference between means test on the two samples considered in our study. The variable (IRD) is then dichotomous: firms having R&D intensity higher than the median value take 1 (group G1) and firms having an R&D intensity lower than

the median value take 0 (group G2). Subsequently, we calculated the REM index for both groups of companies to check if there is a significant difference in their average.

The hypothesis to be tested H0: there is no significant difference between means of the REMI of the two groups of companies (more IRD intensive/ less IRD intensive).

Table 5 below presents the difference between the means of the variable to be explained and that of the explanatory variables of the two groups.

Table 5: VARIABLES' DIFFERENCES BETWEEN MEANS				
Panel A:The explanatory variables' difference between means with respect to R&D intensity				
Variables	Level of innovative firms	No. of observations(firms-years)		Means
REMI	More R&D intensive 1	791		0.018
	Less R&D intensive 0	1169		0.011
CSR	More R&D intensive 1	791		0.514
	Less R&D intensive 0	1169		0.496
CG	More R&D intensive 1	791		0.770
	Less R&D intensive 0	1169		0.740
CSR*CG	More R&D intensive 1	791		0.532
	Less R&D intensive 0	1169		0.483
SIZE	More R&D intensive 1	791		16.852
	Less R&D intensive 0	1169		16.510
LEV	More R&D intensive 1	791		0.275
	Less R&D intensive 0	1169		0.275
ROA	More R&D intensive 1	791		0.080
	Less R&D intensive 0	1169		0.069
Panel B: t test on explanatory variables and variable to explain as a function of R&D intensity				
Variables	R&D Intensity Hypothesis	T-test for equality of means		
		T	Significance	Difference between means
REMI	<u>The unequal-variance assumption</u>	<u>-1.472</u>	<u>0.070</u>	<u>-0.012</u>
CSR	<u>The unequal-variance assumption</u>	<u>-2.371</u>	<u>0.008</u>	<u>-0.026</u>
CG	<u>The unequal-variance assumption</u>	<u>-2.898</u>	<u>0.001</u>	<u>-0.027</u>
CSR*CG	<u>The unequal-variance assumption</u>	<u>-4.006</u>	<u>0.000</u>	<u>-0.048</u>
SIZE	<u>The unequal-variance assumption</u>	<u>-5.595</u>	<u>0.000</u>	<u>-0.371</u>
LEV	<u>The unequal-variance assumption</u>	<u>-0.542</u>	<u>0.293</u>	<u>-0.004</u>
ROA	<u>The unequal-variance assumption</u>	<u>-2.891</u>	<u>0.001</u>	<u>-0.009</u>

As can be seen from table 5, there is a significant difference in the REM index between the two groups of firms (more IRD intensive/less IRD intensive). R&D intensive firms are more involved in REM practices (the average of R&D intensive firms (0.018) is higher than the average of firms that are less intensive in R&D. However, the same table reveals that the difference between means test (for unequal variance assumptions) has a student value equal to -1.472 statistically significant at the 10% threshold ($p\text{-value}=0.070$).

Regarding the explanatory variable, the CSR score, the results show that there is a significant difference between the two groups of companies. Thus, companies with a high R&D intensity (the mean equals 0.514) practice REM more than firms with a low R&D intensity (the mean equals 0.496, Table 5). By observing the difference between means test for the unequal variance hypotheses, the results show a significant difference between means of the two groups ($t\text{ student} = -2.371$ with $p\text{-value} = 0.008$).

For CG variable, the results show that there is a significant difference in the CG score between the two groups of companies. This shows the importance of the presence of good governance in the monitoring and control of investment strategies for innovation. The average score of the CG of R&D intensive firms (0.770) is higher than that of firms with low R&D intensity (0.740, Table 5). By observing the test of difference between means for unequal variance hypotheses, we find that the $t\text{ student} = -2.898$ is significant at the 1% threshold.

Subsequently, the results of the moderating effect of CG on the relationship between CSR and REM show that there is a significant difference between the two groups of companies. Moreover, for this variable, the mean of R&D intensive firms (0.532) is greater than that of firms that are less intensive in R&D (0.483, Table 5). The difference between means test for unequal variance hypotheses shows that the $t\text{ student} (-4.006)$ is significant at the level of 1%.

With regard to the control variables, the results show that there is a significant difference in firm size between the two groups of firms. The average size of R&D intensive firms (16.852) is higher than the average size of those with low R&D intensity (16.510). Similarly, this difference between means is significant and has a $t\text{-student}$ equal to -5.595 significant at the 1% threshold.

For the LEV performance variables, the results show that there is no significant difference between the two groups. Indeed, the difference between means tests for unequal variance hypotheses reveals $t\text{ student}$ of respectively -0.542 and 0.468 with significance thresholds greater than 10%. Therefore, these variables are not considered to be determining factors for R&D intensive firms.

Return on assets presents a significant difference in the results between the two groups of companies. Therefore, companies with a high R&D intensity (the mean is 0.080) are more profitable than companies with a low R&D intensity (the mean is 0.069). Regarding the difference between means test for unequal variance hypotheses, the results show that $t\text{ student}$ with a value of -2.891 is significant at the 1% level.

Multivariate analysis

Before running multiple regressions based on panel data, we performed several specification tests to ensure that the regression specification matches the data. We carried out the following tests: Correlation test, ~~normality test for residuals~~, Homogeneity test, Hausman test and heteroskedasticity test. This implies that the regression models are estimated using multiple regression analysis for panel data using the STATA 13.0 software.

Indeed, based on the correlation matrix (Table 6), we can conclude that according to Pearson's test, the problem of bi-variatemulti-collinearity between the two sample groups is perfectly absent in the model to be tested.

Table 6: PEARSON CORRELATION MATRIX BETWEEN INDEPENDENT VARIABLES							
	CSR	CG	CSR*CG	SIZE	LEV	ROA	IRD
CSR	1						
CG	0.022 (0.328)	1					
CSR*CG	0.021 (0.336)	0.018 (0.414)	1				
SIZE	0.030 (0.171)	0.017 (0.445)	0.011 (0.599)	1			
LEV	-0.016 (0.460)	0.004 (0.859)	-0.007 (0.729)	-0.026 (0.254)	1		
ROA	-0.007 (0.731)	0.014 (0.532)	-0.003 (0.884)	-0.013 (0.560)	0.008 (0.702)	1	
IRD	-0.020 (0.366)	-0.015 (0.498)	0.021 (0.347)	0.009 (0.668)	0.022 (0.310)	-0.008 (0.697)	1

Notes: Corporate social responsibility (CSR), corporate governance (CG), firm's size (SIZE), leverage ratio (LEV), return on assets (ROA), R&D intensity (IRD).

All correlations between variables are significantly smaller than 0.8 (threshold at which we begin to experience serious problems of multi-collinearity, Gujarati 2004). In the Pearson test (T-statistics are reported in parentheses) and the index of conditioning we have found that these variables are distinct from each other and are not significant (correlation thresholds above 10% and the packaging is less than 1000).

Furthermore, given the special nature of panel data, it is necessary to follow the order of certain econometric steps and carry out certain tests to obtain robust estimates. The first is intended to test the presence of any individual effects, culminating in an "F-Statistic". Thus, this test produced a significant Chi-square value. This result does actually confirm the presence of individual effects, testifying the sample's heterogeneous character (full sample, test sample and control sample). Subsequently, a Hausman test gave a chi-square value equal to 25.42 and a probability equal to 0.000 (full sample, Table 7). This result suggests the presence of a fixed effect for our model, allowing us to accept the implementation of the Ordinary Least Squares (OLS) regarding the fixed-effects model while rejecting the generalized least squares (GLS) as provided by the random-effect model. Finally, a panel-level heteroscedasticity test needed be performed through the application of the Breusch–Pagan test, as shown in Table 7. The result of

this test is a significant Chi-square and hence the null hypothesis of constant variance is rejected indicating that the three models have heteroskedasticity problem. In this case, we use the Eicker-White method with the "robust" option to correct the standard deviations. Indeed, it is recommended to use heteroskedasticity-robust standard errors in hypothesis testing to make the test results more convincing.

Table 7 reports the regression analysis results associated with our hypothesis, which tests the relationship between R&D intensity and firm REM activities. As part of this study, a multivariate regression analysis on panel data was used to empirically test this hypothesis. The results from the various tests reveal that the majority of the explanatory variables have a significant impact on the REM. The multiple regression brings out Fisher statistics (F), measuring the global significance of the model, significant at the 1% threshold. Therefore, these models are overall significant. As the R²adjusted for the total sample is 0.046, the explanatory variables contributed to the explanation of the dependent variable at 4.6%.

Table 7: REGRESSION RESULTS				
Variables	Pred. Sign	Full sample	Test sample	Control sample
CSR	-	-0.021** (-2.33)	-0.029** (-2.08)	-0.020 (-1.47)
CG	-	-0.046*** (-2.92)	-0.066*** (-3.52)	-0.0394 (-1.54)
CSR*CG	-	0.038*** (2.58)	0.066*** (2.82)	0.060** (2.51)
SIZE	+	0.023*** (4.10)	0.030*** (4.44)	0.037*** (4.58)
LEV	-	-0.072*** (-3.56)	-0.036** (-1.11)	-0.124*** (-3.60)
ROA	-	0.203*** (5.64)	0.176*** (4.88)	0.197*** (3.50)
IRD	+	0.017* (1.83)	0.015** (2.09)	0.020 (1.12)
Firmfixedeffects		Included	included	included
Yearfixedeffect		Included	included	included
Adj R-squared (%)		4.6%	5.8%	5.7%
Nb. Of Obs.		1960	791	1169
Fisher test		44.98***	43.73***	41.23***
Normality test				
Prob(Skewness)		0.0000***	0.0000***	0.0000***
Prob(Kurtosis)		0.0000***	0.0000***	0.0000***
Homogeneity test		44.98***	43.73***	41.23***
Hausman test		25.42***	19.69***	20.93 ***
Breusch-Pagan test forHeteroskedasticity		28.03***	28.47***	11.33***

Notes: REMI is real earnings management index; CSR is corporate social responsibility; CG is corporate governance; SIZE is firm size; LEV is leverage ratio, ROA is the return on assets, IRD represents the R&D-associated expenses divided by total sales. Year and firms are included in our regression model but their coefficients are not shown in this Table. The Asterisks ***, ** and * appearing close to a coefficient indicate the significance levels of 1%,5% and 10%,respectively.

In testing H1, The CSR score seems to be important in explaining the level of REM of innovative firms. This finding indicates that companies engaged in CSR activities are less likely to manipulate real activities. This also implies that the more strongly involved in CSR activities companies are, the more inclined to act responsibly they are when they present their financial statements. The coefficient estimated on CSR is negative ($\beta=-0.029$) and significant ($p=-2.08$) when the intensity of R&D is high. However, the negative relationship between CSR and REM is not significant ($\beta=-0.020$; $p=-1.47$) for firms that have a low R&D intensity. Therefore, the validation of our research hypothesis is consistent with the assertion that CSR activities reduce REM within innovative firms, by focusing on the effect of the ethical implication of CSR on financial reporting which ensures a good relationship with stakeholders (Cho et al., 2016). As a result, the context characterized by a higher R&D intensity constitutes a favorable environment for the application of sustainable development from CSR activities which leads to the reduction of REM practices. This result is in line with several previous studies which state that companies with high CSR practices are less likely to engage in REM activities (Lim and Choi, 2013; Cho et al., 2016; Ho et al., 2018). Hence our first hypothesis (H1) is accepted.

The second hypothesis consists in verifying the moderating effect of CG score on the relationship between CSR and the REM practices of innovative firms. We tested this relationship in the three sub-samples used in our work. The results of the test sample show that the CSR score has a positive ($\beta=0.066$) and significant ($p=2.82$) effect at the 1% threshold on the relationship between the CSR score and REM of high innovation-intensive firms. The control sample provides statistical evidence, the coefficient is positive ($\beta=0.060$) and significant ($p=2.51$) at the 10% threshold in firms with low innovation intensity. For the total sample, the results show a positive sign ($\beta=0.0386$) of good corporate governance score on the CSR-REM relationship at the 1% level. Initially, we found interesting results regarding the active role played by CSR in reducing the extent of REM of innovative firms. However, in the phase where we integrated governance, the effect of CSR became positive, i.e., the interaction between CSR and CG does not allow to reduce REM. In other words, governance takes precedence over CSR practices in explaining the REM of highly innovative firms. Based on the results found, we can conclude that hypothesis H2 is rejected. With a positive coefficient interaction term, it can be concluded that corporate governance is less effective in reducing REM for firms with high CSR commitment, or a high CSR commitment may contribute to more REM for firms with high CG scores. As a result, CSR and CG have competing effects on REM, and therefore a company may benefit from engaging in one, but not both, to mitigate REM.

Furthermore, the results pertaining to some of the subsample firms' control variables are not similar. For the firm size variable, it proves to positively and non-significantly influence the REMI with regard to the three (Test, control and full samples) samples. However, the larger the size of the innovative and non-innovative firm, the more managers will be encouraged to engage in REM. As a result, this variable has an explanatory power of our model. As for the leverage variable, the results from the estimation of the model reveal a negative and non-significant correlation for firms with high R&D intensity. Nevertheless, the control sample and the total sample have a negative and significant effect at threshold of 1%. This shows that this variable is a determining factor for companies that are less intensive in R&D but not for R&D intensive

companies. Therefore, an increase in the level of debt leads to a decrease in the level of REM of less innovative firms. Regarding the return on assets variable for the 3 samples, it has a positive and significant effect on the level of REM of innovative and non-innovative firms. This implies that when ROA increases, leaders of innovative and non-innovative firms are engaged in the practices of manipulation of the real activities. As a result, ROA is not a determining variable for firms with a high R&D intensity. We finish with R&D intensity which has a positive and significant impact on the REM practice of firms that are more intensive in R&D. This affirms that innovation is considered as a favorable environment for the manipulation of real activities. However, it has no significant impact on REM within firms that have low R&D intensity.

CONCLUSION

The aim of this paper was to demonstrate, theoretically and empirically, the impact of CSR on the REM and we also investigate the moderating effect of CG on CSR-REM relationship in American innovative firms. We conducted our empirical study on a sample of 280 U.S. companies listed on the S&P 500 during the period from 2012 to 2018. The results obtained made it possible to conclude that the means of the REM index between the two groups are significantly different. This difference is explained by the fact that R&D intensive firms are less involved in the manipulation practices of real activities than those with a low R&D intensity according to the study by Chouaibi et al. (2019). In addition, the empirical results show that CSR has a negative and significant effect on REM and that the moderating effect of CG does not strengthen the negative relationship between CSR and REM.

This article has implications for the development of the relationship between CSR, CG and REM. To our knowledge, this is the first study to examine this relationship on two sub-samples: innovation and non-innovation American companies. It provides new evidence on the link between CSR index and good corporate governance on REM in innovative firms.

The regression results are almost similar to the difference between means test results. It is also necessary to state that like all research works, our study has certain limitations in terms of data collection and the size of the studied sample which was reduced to 280 American companies due to the non-availability of all the necessary data for the period from 2012 to 2018. As the sample is not very large, this could distort the results. As this study was based on data from American companies, the results cannot be generalized to all contexts and this highlights the need for further researches and obviously open up new perspectives.

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RELATIONSHIPS BETWEEN STOCK PRICE, TRADING VOLUME, AND BID-ASK SPREAD ON THE US STOCK EXCHANGE: AN EMPIRICAL INVESTIGATION

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ABSTRACT

This study investigates the relationships between stock price, stock trading volume, and bid-ask spread for 45 firms on the US stock market. To study the nature, extent, and direction of these relationships, we used the Johansen co-integration test, the Vector Error Correction Model (VECM), and the Vector Autoregressive Model (VAR).

The analysis indicated that in 62% of the firms, price and volume were co-integrated in the sense that they had a long-run positive equilibrium relationship. On the other hand, the majority of firms showed no relationship between price and spread or volume and spread. In 73% of the firms, there was no relationship between price and spread. Also, 78% of the firms showed no relationship between volume and spread. There was little evidence for co-integration between price and spread or volume and spread. Price and spread were co-integrated in only three firms and volume and spread in two firms.

Of interest was the fact that the group of firms that showed a co-integrated relationship between price and volume had group means for return on equity (ROE), return on equity per share, (ROE-S) and return on assets (ROA) that were twice as high as those for the group of firms where volume and price were not related. Also, they had a smaller group mean for total debt to assets ratio than the firms with no relationship between price and volume. These financial ratios are of importance in investment. They give investors the ability to assess a company's financial structure and determine if the company is a suitable investment. Hence, they could be a driving force behind the co-integrated relationship between price and volume.

INTRODUCTION

Investors in the stock market have three indicators that could help them make informed investment decisions. These indicators are stock price, stock trading volume, and stock bid-ask spread. The trading value of a stock is often a reflection of the company's market value. As ascertained from its financial statement, the company's value can determine its stock price since investors will trade in securities of companies that are strong financially. The price of a stock is important in making investment decisions. However, this can be misleading since a stock's price is not necessarily a reflection of a company's strength or fundamentals. The stock price can be influenced by stock buyback, stock dividends, and stock splits, without a significant change in the company's value.

The trading volume of a security represents the number of shares traded. Volume is often an indicator of the performance of the market. An increase in volume can be an indication of a healthy and bullish market. There is evidence in the literature that volume and price are related.

It is known that trading volume affects price movement, but there is a lack of agreement about the nature and direction of the relationship between returns and trading volume (Gagnon and Karoivi (2009). Volume can also indicate price reversal and can occur when a stock price is stagnant, but stock volume is high. Volume is also an indicator of stock liquidity. A stock with high volume is good to buy since many buyers and sellers are ready to trade the stock. Furthermore, the trading volume reveals important information about trading activities by speculators. As a result, the trading volume may be important in forecasting stock price (Blume et al., 1994).

The difference between the bid and ask prices of a stock is known as the bid-ask spread. The bid-ask spread is set by a market maker to address inventory-holding cost, order processing cost, and information cost, resulting from information asymmetry (Stoll (1989)). The liquidity of a security is important in trading. The main measure of liquidity is the bid-ask spread. One expects that the larger the trading volume of a security, the narrower is its spread. A narrow spread indicates that the stock is liquid and has a high trading volume. As such, one would expect a negative relationship between spread and volume. Spread is also known to be related to volatility. A small spread indicates low volatility (<https://www.investopedia.com/>).

Price, volume, and spread provide useful information for investors in the stock market. There are indications that the three variables are related, but it is not clear about the extent, nature, and direction of this relationship. Most of the literature analyses use least squares regression on time series data, which can lead to misleading results due to non-stationarity and the autocorrelation in the residuals. Hence, this study's interest is to determine, using time series methodology, the extent, nature, and direction of the relationship between price and volume, price and spread, and volume and spread. In particular, we investigate the relationships between price, volume, and spread using the Johansen co-integration test, the Vector Error Correction Model (VECM), and the Vector Autoregressive Model (VAR).

REVIEW OF LITERATURE

Amihud et al. (1999), in a study of the Japanese stock market, reported that when a company reduces its minimum trading unit or lot size of its stock, it increases the number of shareholders. The increase in the number of shareholders has the effect of increasing the stock price. This result confirmed the hypothesis put forth by Merton (1987), which states that stock price appreciation is positively associated with an increase in the stock's investor base. Boujedra and Ismailia (2019) examined the relationship between stock return and trading volume on the Tunisian stock market. In their study, the authors were interested in testing the investor overconfidence hypothesis of Gervais and Odean (2001), which predicts a causality running from stock returns to trading volume. Authors used the Granger causality test and the vector autoregressive (VAR) test, over the period from April 1, 1999 to July 10, 2016, to test for a relationship between stock return and trading volume. Both tests showed that there was no significant relationship between stock returns and trading volume. Dodonova (2016) using least squares regression models on monthly data for the 2005–2014-time period reported on the effects of lagged stock returns and lagged dispersion of stock returns on trade volume. Dispersion of stock returns and the absolute value of returns positively affected future trade volume. Extreme negative returns caused high future trade volume, while extreme positive returns did not affect future trade volume.

Lee and Swanminathan (2000) reported that past trading volume could predict future stock price momentum. This observation was supported in later studies by Chen et al. (2001) and Gervais et al. (2001). A study by Westerhoff (2006) found that high trading volumes were associated with persistent positive price trends. On the other hand, low trading volume was considered to be associated with uncertainty on investors, causing a reversal in positive price trends. Murphy [1999] reported that volume was positively related to the price trend. A high volume indicates a strong positive trend and a low volume, a weakening trend. In his study, Brown et al. (2009) found a positive relationship between trading volume and stock returns. Stocks with high trading volume tend to have higher future returns than stocks with lower trading volume.

Tuna and Bektur (2015) investigated daily temperature shocks' psychological effect on trading volume and stock returns on the Istanbul market for 1987-2006. The temperature has an impact on investors' moods, which in turn can affect investment decision making. Hacker and Hatemy-J (2006) bootstrap causality test showed that there was causality from temperature to trading volume and stock returns, which proved true for high-temperature and low-temperature shocks. An increase in temperature caused returns and trading volume to increase, and a negative temperature change caused returns and volume to decrease. Returns and trading volume were, in this case, positively related, but due to a third factor. Wang (1994) showed in his study, using a model involving information asymmetry, that trading volume can predict future returns. Volume was positively related to absolute changes in prices and dividends.

Kuo et al. (2004) examined the relationship between trading volume and cross autocorrelations in stock returns in the Taiwan stock market. Using cross-correlations and vector autoregressive analysis and controlling for portfolio size, the authors found that the correlation between low volume portfolio returns at time t and high volume returns at time $t-1$ exceeded that between high volume returns at time t and low volume returns at time $t-1$. The result indicated that returns on high trading volume lead returns on low trading volume. Also, trading volume had a significant effect on lead-lag cross-autocorrelations of stock returns.

Tripathy (2011) studied the relationship between stock return and trading volume on the Indian Stock Exchange. The author used a bivariate regression model, Johansen's co-integration test, and the VAR and VECM models for the analysis. Results showed that stock returns were co-integrated with the trading volume, indicating a long term relationship. Also, there was a bidirectional causality between the two variables. Zerena and Konukb (2016) investigated the relationship between trading volume and stock prices in 12 countries belonging to the Organization for Economic Co-operation and Development (OECD). The authors used a panel causality test developed by Dumitrescu-Hurlin (2012). Results showed that the stock market index caused trading volume. However, trading volume did not cause the stock market index.

Sawkut et al. (2008) investigated the determinants of bid-ask spread on 12 stocks of the Stock Exchange of Mauritius (SEM). Regression analyses were performed on individual stocks, pooled stocks, and panel data. Results indicated that trading volume did not affect the spread. However, the closing price of the stock and spread were positively related. Howe and Liu (1999) investigated the relationship between dividend policy and the bid-ask spread using stocks traded on the (OTC)/NASDAQ stock market for 1984 to 1987. The firms selected for the study were those that paid no dividends and those that paid only a cash dividend. Regression analysis was used on both firms and the dividend-paying firms only with control variables such as dividend

yield, volume, price, return variance, firm size, and listing length. It was concluded from the analysis that dividend yield was negatively related to spread. An increase in dividend yield narrowed the spread.

Menyah and Paudyal (1996) studied the determinants of bid-ask spread on the London Stock Exchange. The authors used a log-linear regression model where spread per share was the dependent variable and price per share, trading volume, number of market makers, and risk were the independent variables. All four independent variables were significant, and the model explained 91% of the variation in the spread. Price and risk were positively related to the spread. However, volume was negatively related to spread.

Narayana et al. (2015), using panel regression, examined the determinants of bid-ask spread using daily data for 734 US firms on the NYSE over the period from January 1998 to December 31, 2008. The independent variables used were average bid-ask spread, average trading volume, the average price per share, and share price volatility. It was found that price had a mixed effect on the spread, which was negative for some industry sectors and positive for others. Trading volume had a positive effect on the spread of all industry sectors. Also, volatility had a negative effect on the spread for all the industry sectors. Analysis by firm showed that a small percentage of firms showed a significant relationship between price and spread or between volume and spread.

RESEARCH OBJECTIVE

There are indications from the literature that Price, volume, and spread may be related, but it is not clear about the extent, nature, and direction of this relationship. Most of the analyses use least squares regression on time series data, which can lead to misleading results due to non-stationarity and the autocorrelation in the residuals. Hence, the interest in this study is to determine, using the appropriate time series methodology, the extent, nature, and direction of the relationships between price, volume, and spread. The paper contributes to the literature by investigating the long- term and short-term relationships between price, volume, and spread using the Johansen co-integration test, the Vector Error Correction Model (VECM), and the Vector Autoregressive Model (VAR).

DATA AND METHODS

Data

Utilizing the Wharton Research Data Services (WRDS), quarterly stock price, stock trading volume, and stock bid-ask spreads were obtained for each of forty-five companies for the years 1998 to 2017. Fifty companies were selected at random from a Compustat file in WRDS. Forty-five of the companies had complete data for the analysis. The sample size of 45 was deemed adequate for statistical analysis and inference. Also, the sample size per company was large enough (over 50 observations) for a meaningful time series analysis with no estimation bias (Wei, 2006). Our interest was in determining the long-term relationships over years between price, volume, and spread. For this reason, we chose a 20-year period from a data file that had, in addition to the quarterly data on price, volume, and spread, quarterly data on financial variables

for each company. The same quarterly frequency enables one to study the effects of a company's financial variables on price, volume, or spread and their relationships.

Statistical Analysis

We tested the 45 companies for relationships between stock price, stock trading volume, and bid-ask spread using SAS. We first determined if a long-term relationship or an equilibrium existed between two series based on the Johansen co-integration test. The test requires that the two series are both nonstationary and become stationary upon first differencing (i.e., I (1) stationary). If the two series were nonstationary, we determined the number or rank r of the co-integration vectors by the Johansen trace test. The null hypothesis for the trace test is that the number $r = r^* < k$, vs. the alternative $r = k$. Testing proceeds sequentially for $r^* = 1, 2, \dots$ and the first non-rejection of the null hypothesis is taken as an estimate of r . For all the bivariate series that were co-integrated, $r = 1$, as expected. When the two series were co-integrated, we ran the Vector Error Correction Model (Johansen, 1988, 1991) with $r = 1$, VECM (1), to determine the equational relationship between the two series. In the results, we present VECM (1) in terms of its equivalent Vector Autoregressive, VAR (1), representation. If the two series were not both I (1) stationary, we determined their relationship using the VAR (1) model, which was done after the series was made stationary through first differencing.

For two variables with one co-integrated vector, the VECM (1) can be expressed as:

$$D_Y_{it} = C + \alpha\beta' Y_{it-1} + \sum_{i=1}^{p-1} \delta_i D_Y_{it-1} + E \quad (1)$$

Where C is a constant, D_Y_{it} is a 2x1 column vector of first differences for the two variables (y_{1t} , y_{2t}), α is a 2x1 column vector, β' is a 1x2 row vector, δ_i is a 2x2 matrix, and E is the random error term. The expression $\alpha\beta' Y_{it-1}$ gives the long-term relationship or equilibrium between the two variables and $\sum_{i=1}^{p-1} \delta_i D_Y_{it-1}$ gives the short-term relationship. The value p , for the number of lags, was chosen based on the Schwartz and Akaike criteria

The equations for the VAR (1) relating two series Y_1 and Y_2 are expressed as:

$$\begin{aligned} Y_{1t} &= \phi_{11} Y_{1t-1} + \phi_{12} Y_{2t-1} \\ Y_{2t} &= \phi_{21} Y_{1t-1} + \phi_{22} Y_{2t-1} \end{aligned} \quad (2)$$

To test for stationarity, we used the Augmented Dickey-Fuller test and the Phillips-Perron test. Since these tests are model specific, we relied also on plots of the time series over time for trends and on the series autocorrelation function over lags (Wei, 2006).

Table 2 presents the results of the analysis. In all cases, we present only the equation (from Equation (2)) that showed significant relationships between price and volume, price and spread, and volume and spread. When a series was differenced for stationarity, this was indicated by the symbol Δ . For instance, the first difference for price is represented as $\Delta Price_t = Price_t - Price_{t-1}$. The Vecm (1) in the Table is expressed in its VAR (1) representation.

We used the Chow test (Chow, 1960) to test for structural breaks in the time series due to the 2008/2009 recession. A structural *break* is when a *time series* abruptly changes at a point in time. The Chow test tests whether the true coefficients in two linear regressions on different data

sets (before and after a structural break point) are equal. It is commonly used to test for structural change. It is an application of the F-test, and it requires the sum of squared errors from three regressions - one for each sample period (before and after the break point being tested) and one for the pooled data.

RESULTS AND DISCUSSION

Of importance in the results is the co-integration relationship between price and volume. This implies (Equation (1) that, in the long-run, there is an equilibrium positive relationship between price and volume. The two series move together and the equilibrium is stable in the sense that if the two series were to deviate from the equilibrium, they will in time return to their equilibrium value.

As far as structural breaks are concerned, the Chow test did not show any significant breaks in the data. Structural breaks can affect parameter estimates if one is using the regression analysis on time series data, since regression is affected by a sudden change in the trend of a time series. For the time series analysis in this study, the time series data were stationary, which means that there was no trend in the series over time. Hence, one does not expect a structural break as shown by the Chow test. Therefore, our models are accurate in determining the nature of the long-term relationships between price, volume, and spread.

Price and Volume

Results in Table 1 show that price and volume are co-integrated ($r=1$) in 28 (62%) out of the 45 companies. The two series are co-integrated in the sense that they move together over time and have a long-run equilibrium relationship from which they cannot deviate. The relationship at equilibrium is positive.

Only the VAR (1) equations, Equation (2), where the relationship between price and volume; price and spread; or spread and volume was significant, are presented in Table 2. From the equations in Table 2 for the price and volume column and from Table 3, 25 cases showed that price at time $t-1$ affected volume at time t , but volume did not affect price. In three cases, volume affected price, but price did not affect volume. In five cases, volume affected price and price affected volume. In 12 cases, there was no relationship between volume and price. These results point to the fact that, in the majority of cases, price and volume were related in the short-run and had an equilibrium relationship in the long-run. When they were related in the short-run, price predominantly had a positive effect on volume.

Price and Spread

Tables 2 and 4 show that in 33 out of 45 cases (73%), there was no significant relationship between price and spread. In only three firms were price and spread co-integrated. In 8.9% of the cases price affected spread and in 11% of the cases spread affected price. In 6.6% of the firms, spread affected price and price affected spread. Hence, in the majority of cases or companies, price and spread were not related.

Spread and Volume

Results in Tables 2 and 5 show that in 35 out of 45 cases, there was no significant relationship between spread and volume. In three cases, volume affected spread, and in three

cases, spread had an effect on volume. In four cases, spread affected volume and volume affected spread. There were only two cases where spread and volume were co-integrated.

It is clear from Tables 2, 3, 4, and 5 that price and volume were most related, and volume and spread were least related. In 56% of the cases, price affected volume. This effect was predominantly positive. The positive effect between price and volume is according to expectation and in agreement with the literature. In 62% of the companies, price and volume were co-integrated with a long-term equilibrium. In 73% of the firms, price and spread were not related. Also, there was little support for a relationship between spread and volume. In 77.7% of the cases, there was no relationship between them. That most firms did not show a relationship between price and spread and volume and spread, is in agreement with results by Narayana et. al. (2015).

Table 6 lists the financial variables (measured on a quarterly basis over the same time period) that were used to determine if they differ between the two groups of companies (Table 2): those that had a relationship between price, volume, and spread and those that did not. Table 7 presents the financial variables that differed significantly between the two groups of companies concerning the price and volume relationship. There was no difference between group of companies in the case of the price and spread relationship or the volume and spread relationship.

It is seen from Table 7 that the group of companies that showed a relationship between price and volume (PVR) differed significantly in mean from the group of companies that did not show a relationship between price and volume (NPVR). The difference was with regard to return on equity (ROE), return on assets (ROA), return on equity per share (ROE-S), and total debt divided by total assets (leverage). Group means for ROE, ROE-S, and ROA were higher for the PVR group than for the NPVR group. On the other hand, the leverage group mean was lower for the PVR group than for the NPVR group.

These financial ratios are of importance for investors to consider. They give investors the ability to assess a company's financial structure and determine if the company is a suitable investment. The ROE and ROE-S ratios provide investors an assessment of the efficiency of the company. They measure the profitability of a corporation in relation to stockholders' equity. The ROA is a measure of how efficient a company is in generating profit. The higher the ROA, the more efficient the company. A debt to asset ratio is a measurement of a company's financial leverage. It assesses the ability of a company to meet its financial obligations. The higher the ratio, the riskier the company.

Table 1 Frequencies of Co-Integrations (Rank $r=1$) Between Price and Volume, Price and Spread, and Volume and Spread	
Co-integration, $r=1$	Frequency
Price and volume	28
Price and spread	3
Volume and spread	2

TABLE 2
Vector Auto-Regression Models, VAR (1), and Vector Error Correction Models,
VECM (1), For Price and Volume, Price and Spread, And Spread and Volume

Company	Price and volume (Vol), VAR	Price and spread , VAR	Spread and Volume (Vol), VAR
<i>Bank of America</i>	$\Delta \text{Vol}_t = -472964 \Delta \text{Price}_{t-1} - 0.236 \Delta \text{Vol}_{t-1}$	Vecm(1) $\text{Price}_t = 0.962 \text{Price}_{t-1} - 10.21 \text{Spread}_{t-1}$ $\text{Spread}_t = -.00183 \text{Price}_{t-1} + 0.506 \text{Spread}_{t-1}$	
<i>Bristol-Myers</i>	Vecm(1) $\text{Vol}_t = 0.894 \text{Vol}_{t-1} + 35636 \text{Price}_{t-1}$		
<i>Caterpillar</i>	$\Delta \text{Price}_t = -0.028 \Delta \text{Price}_{t-1} - 0.69\text{E-}5 \Delta \text{Vol}_{t-1}$		
<i>Chase</i>	Vecm(1) $\Delta \text{Vol}_t = 0.642 \Delta \text{Vol}_{t-1} + 19.52 \Delta \text{Price}_{t-1}$	Vecm(1) $\text{Spread}_t = 0.381 \text{spread}_{t-1} - 0.00540 \text{Pricet}_{-1}$	
<i>Community health</i>	$\Delta \text{Vol}_t = -0.392 \Delta \text{Vol}_{t-1} - 6795.34 \Delta \text{Price}_{t-1}$		
<i>Diamond drilling</i>	Vecm(1) $\text{Vol}_t = 0.730 \text{Vol}_{t-1} + 1770.18 \text{Price}_{t-1}$		
<i>DTE Energy</i>	Vecm(1) $\Delta \text{Vol}_t = -0.276 \Delta \text{Vol}_{t-1} + 982.68 \Delta \text{Price}_{t-1}$		$\Delta \text{Vol}_t = -0.504 \Delta \text{Vol}_{t-1} - 24288 \text{Spread}_{t-1}$
<i>Edwards life sciences</i>	Vecm(1) $\text{Vol}_t = 0.543 \text{Vol}_{t-1} + 1069.75 \text{Price}_{t-1}$ $\text{Price}_t = 0.848 \text{Price}_{t-1} + 0.64\text{E-}4 \text{Vol}_{t-1}$		
<i>Eli Lilly</i>			$\Delta \text{Vol}_t = -0.374 \Delta \text{Vol}_{t-1} - 90836 \Delta \text{Spread}_{t-1}$ $\Delta \text{Spread}_t = -0.067 \Delta \text{Spread}_{t-1} + 4.914\text{E-}7 \Delta \text{Vol}_{t-1}$
<i>First Energy</i>			
<i>Fiserv Inc.</i>			
<i>G&K Services</i>			$\text{Spread}_{t-1} = -0.0476 \text{Spread}_{t-1}$

			$-0.00000302 \text{Vol}_{t-1}$
<i>GAP Inc</i>	$\text{Vecm}(1)$ $\text{Price}_t = 0.936 \text{Price}_{t-1} + 1.36\text{E-}6 \text{Vol}_{t-1}$ $\text{Vol}_t = 0.919 \text{Vol}_{t-1} + 3818.71 \text{Price}_{t-1}$	$\Delta \text{Price}_t = -0.1004 \Delta \text{Price}_{t-1} + 9.305 \Delta \text{Spread}_{t-1}$ $\Delta \text{Spread}_t = -0.513 \Delta \text{Spread}_{t-1} - 0.0112 \Delta \text{Price}_{t-1}$	
<i>Hain Celestial</i>	$\text{Vecm}(1):$ $\text{Vol}_t = 0.665 \text{Vol}_{t-1} + 1168.528 \text{Price}_{t-1}$		
<i>Halliburton</i>			
<i>Harris Corp</i>	$\text{Vecm}(1)$ $\text{Vol}_t = 0.745 \text{Vol}_{t-1} + 675.35 \text{Price}_{t-1}$		
<i>Hershey</i>	$\text{Vecm}(1)$ $\text{Vol}_t = 0.726 \text{Vol}_{t-1} + 749.58 \text{Price}_{t-1}$		
<i>I.D.Systems</i>	$\text{Vecm}(1)$ $\text{Vol}_t = 0.408 \text{Vol}_{t-1} + 1161.84 \text{Price}_{t-1}$		
<i>ICU Medical</i>	$\Delta \text{Price}_t = 0.430 \Delta \text{Price}_{t-1} + 0.000168 \Delta \text{Vol}_{t-1}$		
<i>J.B.Hunt</i>	$\text{Vecm}(1)$ $\text{Vol}_t = 0.89 \text{Vol}_{t-1} + 383.025 \text{Price}_{t-1}$		
<i>J.C. Penny</i>	$\text{Vecm}(1)$ $\text{Vol}_t = 0.858 \text{Vol}_{t-1} + 6498.13 \text{Price}_{t-1}$		
<i>Jewett-Cameron</i>	$\text{Vecm}(1)$ $\text{Vol}_t = 0.246 \text{Vol}_{t-1} + 185.35 \text{Price}_{t-1}$ $\text{Price}_t = 0.801 \text{Price}_{t-1} + 0.000807 \text{Vol}_{t-1}$		$\text{Vol}_t = 0.146 \text{Vol}_{t-1} - 1764.41 \text{Spread}_{t-1}$
<i>Kellog</i>	$\text{Vecm}(1):$ $\text{Vol}_t = 0.598 \text{Vol}_{t-1} + 2805.125 \text{Price}_{t-1}$	$\Delta \text{Price}_t = -.103 \Delta \text{Price}_{t-1} - 3.944 \Delta \text{Spread}_{t-1}$	
<i>Kewaunee Scientific</i>	$\text{Vecm}(1)$ $\text{Price}_t = 0.647 \text{Price}_{t-1} + 0.0043 \text{Vol}_{t-1}$ $\text{Vol}_t = 0.523 \text{Vol}_{t-1} + 39.14 \text{Price}_{t-1}$		$\Delta \text{Vol}_t = -0.604 \Delta \text{Vol}_{t-1} + 629.489 \Delta \text{Spread}_{t-1}$
<i>L.B. Foster</i>	$\text{Vecm}(1)$ $\text{Vol}_t = 0.725 \text{Vol}_{t-1} + 140.88 \text{Price}_{t-1}$		
<i>Laboratory Corp</i>	$\text{Vecm}(1)$ $\text{Vol}_t = 0.663 \text{Vol}_{t-1} + 631.12 \text{Price}_{t-1}$	$\Delta \text{Spread}_t = -0.494 \Delta \text{Spread}_{t-1} - 0.0029 \Delta \text{Price}_{t-1}$ $\Delta \text{Price}_t = 0.356 \Delta \text{Price}_{t-1} + 45.19 \Delta \text{Spread}_{t-1}$	

<i>M.D.C. Holding</i>	Vecm(1) $Vol_t = 0.651 Vol_{t-1} + 884.95 Price_{t-1}$		Vecm(1) $Vol_t = 0.967 Vol_{t-1} + 68619 Spread_{t-1}$ $Spread_t = 0.344 Spread_{t-1} + 3.09E-7 Vol_{t-1}$
<i>Manpower Group</i>	Vecm(1) $Vol_t = 0.648 Vol_{t-1} + 786.43 Price_{t-1}$	$\Delta Price_t = 0.077 \Delta Price_{t-1}$ $-20.987 \Delta Spread_{t-1}$	
<i>Nanometrics</i>	Vecm(1) $Vol_t = 0.671 Vol_{t-1} + 709.78 Price_{t-1}$		
<i>Nanophase</i>		$\Delta Spread_t = -0.554 Spread_{t-1}$ $-0.0073 \Delta Price_{t-1}$	
<i>Ocean Biochemical</i>			$Spread_t = 0.618 Spread_{t-1} - 0.00000255 Vol_{t-1}$ $Vol_t = 0.248 Vol_{t-1} - 19783 Spread_{t-1}$
<i>Oceaneering International</i>	Vecm(1) $Vol_t = 0.727 Vol_{t-1} + 1077.959 Price_{t-1}$		
<i>Panhandle Oil and Gas</i>	Vecm(1) $Vol_t = 0.761 Vol_{t-1} + 61.31 Price_{t-1}$		
<i>Par Technology</i>	Vecm(1) $Vol_t = 0.443 Vol_{t-1} + 563.74 Price_{t-1}$		
<i>Quacker Chemicals</i>			
<i>Quanta Service</i>	Vecm(1) $Vol_t = 0.84 Vol_{t-1} + 2292.34 Price_{t-1}$	$\Delta Spread_t = -0.0159 \Delta Price_{t-1}$ $-0.711 \Delta Spread_{t-1}$	
<i>Radisys Corp</i>		$\Delta Price_t = 0.154 \Delta Price_{t-1}$ $-12.347 \Delta Spread_{t-1}$	
<i>Rambus Inc</i>	$\Delta Price_t = 0.112 \Delta Price_{t-1}$ $-0.0000039 Vol_{t-1}$	$\Delta Price_t = 0.086 \Delta Price_{t-1}$ $+ 71.45 Spread_{t-1}$	$Spread_t = 0.435 Spread_{t-1}$ $-1.47E-8 Vol_{t-1}$ $Vol_t = 0.51 Vol_{t-1}$ $-8685767 Spread_{t-1}$
<i>Salem Media Group, Inc.</i>			
<i>Take-Two Interactive Software</i>	Vecm(1) $Vol_t = 0.587 Vol_{t-1} + 3078.29 Price_{t-1}$ $Price_{t-1} = 0.965 Price_{t-1} + 0.0000046 Vol_{t-1}$		Vecm(1) $Spread_t = 3.12E-9 Vol_{t-1} + 0.396 spread_{t-1}$
<i>Tampa Electric</i>	Vecm(1)	$\Delta Price_t = -0.013 \Delta Price_{t-1}$ $-6.119 \Delta Spread_{t-1}$	

	$Vol_t = 0.732 Vol_{t-1} + 4291.06 Price_{t-1}$		
<i>UGI Corp</i>	Vecm(1) $Vol_t = 0.727 Vol_{t-1} + 1021.005 Price_{t-1}$		
<i>W.R.Grace & CO</i>	Vecm (1) $Vol_t = 0.814 Vol_{t-1} + 376.58 Price_{t-1}$		
<i>Walt Disney</i>			$\Delta Spread_t = 5.069E-8$ $\Delta Vol_{t-1} + 0.0567$ $\Delta Spread_{t-1}$
<i>WW Grainger Inc.</i>		Vecm(1) : $Spread_t = 0.706 Spread_{t-1} - 0.0000718 Price_{t-1}$	

Table 3 Frequencies of the Effects of Price On Volume, Volume On Price, and Dual Effects				
	Price affected volume. Volume did not affect price.	Volume affected price. Price did not affect volume.	Volume affected price and price affected volume	No relationship between price and volume
Frequency	25 (56%)	3 (6.7%)	5 (11.1%)	12 (26.6%)

Table 4 Frequencies of The Effects of Price On Spread, Spread On Price, and Dual Effects				
	Price affected spread. Spread did not affect price	Spread affected price. Price did not affect spread.	Spread affected price and price affected spread.	No relationship between price and spread
Frequency	4 (8.9%)	5 (11.1%)	3 (6.6%)	33 (73.3%)

Table 5 Frequencies of The Effects of Volume On Spread, Spread On Volume, and Dual Effects				
	Volume affected spread. Spread did not affect volume.	Spread affected volume. Volume did not affect spread.	Spread affected volume and volume affected spread	No relationship between spread and volume
Frequency	3 (6.7%)	3 (6.7%)	4 (8.9%)	35 (77.7%)

Table 6 Financial Variables Used to Compare Two Groups of Companies: Those That Showed Relationships Between Price, Volume, and Spread and Those That Did Not.	
Financial Variables	
Income (Billion)	
Return on equity- ROE	
Return on assets-ROA	
Return on equity per share-ROE-S	
Long term debt divided by total assets-LTD/TA	
Total debt divided by total assets-Leverage	
Cash and short term investment divided by total assets- CI/TA	
Cash and short term investment divided by current assets- CI/CA	
Current equity-CE (billion)	
Current ratio-CR	

Table 7 Financial Variables That Differed Significantly Between the Group of Companies That Had a Relationship Between Volume and Price (PVR) and Those That Did Not (NPVR)				
	PVR- Group Mean	NPVR- Group Mean	t-value	p-value
ROE-S	17.873	8.662	1.93	0.06
ROE	16.045	8.01	1.66	0.10
ROA	6.985	3.443	1.78	0.08
Leverage	0.227	0.291	1.64	0.10

CONCLUSION

Stock price, stock trading volume, and bid-ask spread are three important stock market measures for investment. Of interest was to determine the relationships between any two of these variables. In this study, we investigated the extent, nature, and direction of these relationships for 45 firms on the US stock market using the Johansen co-integration test and the Vector Error Correction Model of order one (VECM (1) as well as the Vector Autoregressive Model, VAR (1).

Results indicated that price and volume were co-integrated in 62% of the companies. This means that the two variables have a long-term equilibrium relationship that is positive. On the other hand, there was no relationship between price and spread and volume and spread for most firms. In 73% of the cases there was no relationship between price and spread. Also, in 77.7% of the cases, there was no relationship between volume and spread.

With regard to the co-integration relationship, only in three firms were spread and price co-integrated in the sense of having a long-term relationship. Also, in only two companies volume and spread were co-integrated. Hence, investors cannot rely on a long-term relationship between price and spread or spread and volume in making investment decisions. Any relationship seems to be short-term. The most significant relationship was the co-integration between price and volume with an equilibrium relationship in which they are positively related.

As a result, the trading volume of a stock may be important in forecasting its price. An increase in the trading volume of a stock could be a signal for the investor that the price of the stock would increase.

Of significance is the fact that companies that had a relationship between price and volume were significantly larger with regard to ROE, ROE-S, ROA and lower with regard to leverage than those that did not show a relationship between price and volume. These financial variables are of importance in decision making regarding investment. Hence, they could be a significant driving force behind the co-integrated relationship between price and volume.

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THE DYNAMIC RELATION BETWEEN ECONOMIC POLICY UNCERTAINTY AND STOCK MARKET VOLATILITY IN TWO COUNTRIES: UNITED STATES AND S. KOREA

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ABSTRACT

The financial industry has become one of the most data-driven industries and the recent technological developments in big data, financial services, consumer-data management, social network services, and filtering data quality has made better interpretation of analyzed data possible in the finance industry. Financial data consist of a huge volume of quotes, market data, historical trade data, and time-sequenced transaction data used to model market and customer behavior. Many papers found that the stock market Volatility and Economic Policy Uncertainty (EPU) are closely correlated.

This study aims to find (1) the EPU index generated by big data can trace the volatility of the stock market and (2) the long-run equilibrium and short-run relation between EPU and Volatility index in the two countries are existed. The study has utilized the Vector Error Correction Model (VECM) to seek the dynamic relation between EPU and stock market volatility of the U.S. and S. Korea. The main findings of the study are (1) In most cases, the long-run equilibrium relation between EPU index and Volatility index exists, (2) a positive bi-directional relation between US_EPU and VIX and a positive uni-directional relation between KOR_EPU and VKOSPI, US_EPU and VKOSPI, KOR_EPU and VIX were found in the short-run, and finally (3) the EPU index in both countries affects the volatility of the stock market significantly. The paper concludes that the EPU index in different countries that have co-movements in stock price can provide useful information to investors in the stock and derivatives markets.

RESEARCH BACKGROUND

This paper utilized time series analysis that is one of the technics of traditional analytics and applied the important idea of data analysis derived from the current big data analytics. Lohr (2013) indicates that big data has been using since the 1990s and it represents the information assets characterized by such a high volume, velocity, and variety to require specific technology and analytical methods for its transformation into value. Kaplan and Haenlein (2018) define big data as data sets that are characterized by huge amounts of frequently updated data in various formats such as numeric, textual, images, and videos. Big data has attracted increasing attention

in data management and analytics companies and has already proved its importance and value in several areas including the financial industry.

The financial industry has become one of the most data-driven industries and the recent technological developments in big data, financial services, consumer-data management, social network services, and filtering data quality has made better interpretation of analyzed data possible in the finance industry. Financial data consist of a huge volume of quotes, market data, historical trade data, and time-sequenced transaction data used to model market and customer behavior. These financial data helped FinTech companies develop automated solutions and products for stock investment strategy and risk management.

However, the stock market is full of uncertainties and is affected by many factors that cannot be controlled and automated by computerized products. Among the many factors, the stock market volatility and economic policy uncertainty are closely correlated (Pástor and Veronesi, 2012; Li and Peng, 2017). S. Korea's stock market looks heavily influenced by its economic policy uncertainty for domestic and foreign country markets (Choi S. J., 2017; Cheng, 2017; Kim, 2009; Shin, 2014). A good example was when S. Korea applied for a bailout to the IMF in November 1997, the stock price fell to its lowest level in a decade. Many times, the U.S. economic uncertainty such as the collapse of Lehman Brothers in September 2008 plunged S. Korea's stock price to 27.2 percent. Lee (2002) insisted that the co-movements between the U.S. and S. Korea's stock prices started to deepen at the end of 1990s. As well as we can find the significant co-movement of non-fundamental factors between the U.S. and S. Korea's stock prices (Jeon, 2017; Jeon & Lee, 2017; Jeon, 2018; and Jun and Choi, 2003). This phenomenon continues, because the economic structures of the U.S. and S. Korea are closely linked in terms of trade and finance. (Lee and Yu, 2018).

LITERATURE REVIEW AND RESEARCH PURPOSE

There are many prior studies on EPU (Economic Policy Uncertainty) and stock market volatility in the field of finance and real estate (Andre et al., 2013; Antonakakis et al., 2013; Antonakakis et al., 2015; Antonakakis & Floros, 2016; and Gao et al., 2019). Jurado et al. (2015) have introduced new measures of time series analysis in their study of the U.S. macro-economic uncertainty. These indexes have two attractive features: (1) the proxies of uncertainty cover a broad range of indicators spanning the entire macro-economy, and (2) the indexes are more persistent than stock market volatility. The EPU index based on the data suggested by Baker et al. (2016) is made by the index value from the newspaper article on focusing the role of the policy uncertainty in the U.S. since 1985. The index is generated by three types of components. The first component quantifies newspaper coverage of policy-related economic uncertainty, the second one reflects on the reports by the congressional budget office that compiles lists of federal tax code provisions set to expire in future years and the third component draws on the survey of professional forecasters of the federal reserve bank of Philadelphia.

Many prior U.S. studies have used the VIX or EPU index as a proxy for uncertainty (Apergis, 2015; Baker et al., 2016; Choi and Shim, 2016; Karnizova, 2014; and Nodari, 2014). Prior studies in S. Korea investigated the dynamic relationships between the uncertainty (EPU) measure and aggregate economic activity volatility (VKOSPI) index (Choi, 2017).

As we have seen in the previous study, U.S. and S. Korea stock markets are closely related, but the research on the relation between economic policy uncertainty and stock market volatility in the two countries is insufficient. Thus, this study aims to find the EPU index generated by big data can trace the volatility of the stock market and the long-run equilibrium and short-run relation between EPU and Volatility index in the two countries are existed.

DATA AND METHODOLOGY

Data

The study used monthly data of EPU and volatility Indexes in the U.S. (VIX) and S. Korea (VKOSPI) spanning from January 2003 to December 2018 as you see in Figures 1 and 2. Figure 1 shows the US EPU and VIX by the events of U.S. economic policy of uncertainty such as Gulf War II, Stimulus Debate, Lehman Failure, TARP (Troubled Asset Relief Program), Eurozone Crisis, Debt Ceiling Debate, Fiscal Cliff, Brexit, Trump Election, Rising Tariffs & Trade Tensions between the United States & China, and Government Shutdown I & II.

Figure 1
US EPU and VIX indexes from January 2003 to December 2018
source : www.policyuncertainty.com and CBOE

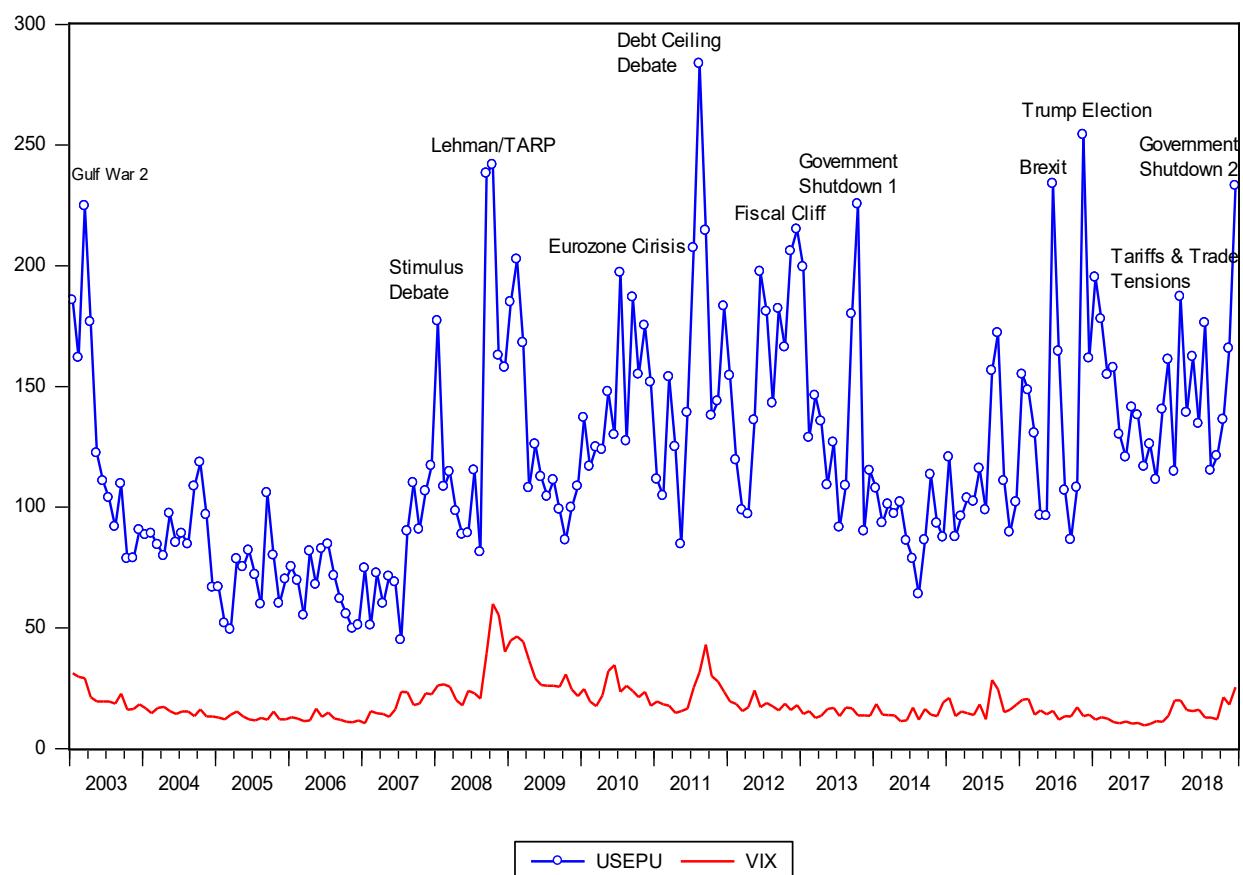
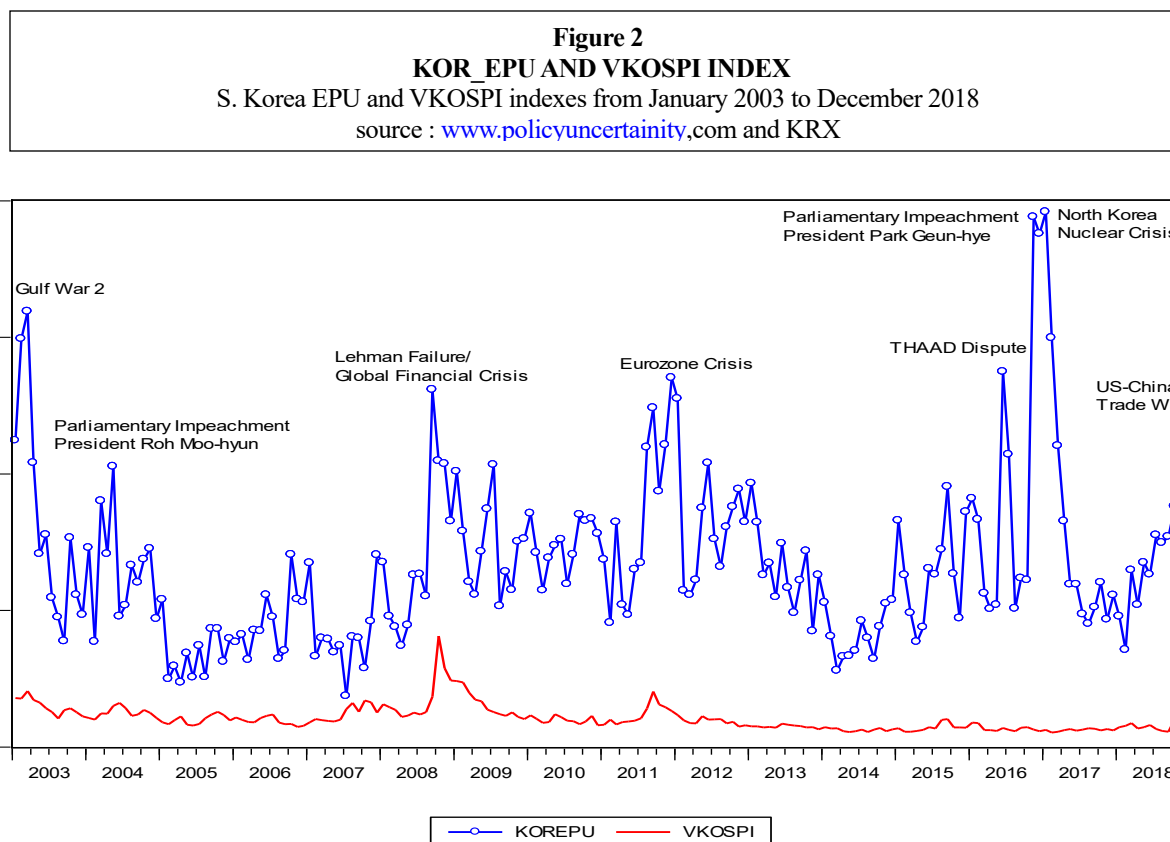


Figure 2 shows the Korean EPU and VKOSPI by the events of S. Korea economic policy of uncertainty such as Gulf War II, Parliament Impeaches President Roh, Lehman Failure & Global Financial Crisis, Eurozone Crisis, THAAD Dispute & Fears, Parliament Impeach of President Park, N. Korea Nuclear Crisis, and the U.S.-China Trade War.



EPU Index

The index is estimated by the data collected from 10 leading newspapers in the U.S. - USA Today, the Miami Herald, the Chicago Tribune, the Washington Post, the Los Angeles Times, the Boston Globe, the San Francisco Chronicle, the Dallas Morning News, the New York Times, and The Wall Street Journal. The basic data for the EPU index are derived from a monthly count of newspaper articles containing mainly three terms: “Economic,” “Policy,” and “Uncertainty.”

VIX and VKOSPI Index

The Chicago Board Options Exchange (CBOE) introduced the Volatility Index (VIX) in 1993 and the S. Korea Exchange (KRX) introduced the Volatility Index (VKOSPI) in 2009, VKOSPI index has been providing since 2003 by applying the fair variance swap method retrospectively. VKOSPI index was retrospective until 2003 because there was a lack of options needed to produce the index before that (Choi and Han, 2009; Lee, 2009).

The VIX or VKOSPI Index is a calculation designed to produce a measure of the constant, 30-day expected volatility of the U.S. or S. Korea stock market, derived from real-time, quote prices of S&P 500 or KOSPI 200 Index call and put options. These indexes have been acted as the benchmark for stock market volatility and have been proven to be very useful in forecasting the future stock market direction. (Corrado and Miller, 2005; Carr and Wu, 2006).

Methodology

This study searches for the relationships between economic policy uncertainties and stock market volatility in the U.S. and S. Korea for the period of 2003-2018 by time-series analyses. To determine the short run and long run equilibrium. relation between the uncertainties and the volatility, the Cointegration test and the VECM model were applied.

First, the study has conducted a unit root test to check whether the time series is stationary. The simple unit root test is valid only if the series is an AR (1) process. If the series is correlated at higher-order lags, the assumption of white noise disturbances is violated. If the series is described as a non-stationary process by the augmented Dicky-Fuller (ADF) tests and Phillips-Perron (PP) tests, differencing a series using differenced operations such as the first differenced values or the second differenced values is required.

Second, Engle and Granger (1987) pointed out that a linear combination of two or more non-stationary series may be stationary. If a linear combination exists, time series is said to be cointegration. The stationary linear combination may be interpreted as a long-run equilibrium relation between time series (Granger, 1969). Johansen's (1991) method can be used to test the restriction imposed by the cointegration term on the unrestricted VAR. The cointegration term is known as the error correction terms in the deviation from the long run equilibrium.

If several variables ($X_{i,t}$, $Y_{i,t}$) is found to be cointegrated, there always exists a corresponding error correction term which implies that changes in the dependent variable are a function of the level of disequilibrium in the co-integrating relation as well as changes in other explanatory variables. The VECM (Vector Error Correction Model) including the lagged error correction term is used in this study as the following 3-Equations:

$$\Delta Y_{i,t} = \alpha_i + \delta_i ECT_{t-1} + \sum_{j=1}^p \beta_{i,j} \Delta Y_{i,t-j} + \sum_{j=1}^p \gamma_{i,j} \Delta X_{i,t-j} + \varepsilon_{i,t} \quad (1)$$

$$\Delta X_{i,t} = \alpha_i + \delta_i ECT_{t-1} + \sum_{j=1}^p \beta_{i,j} \Delta X_{i,t-j} + \sum_{j=1}^p \gamma_{i,j} \Delta Y_{i,t-j} + \varepsilon_{i,t} \quad (2)$$

$$ECT_{t-1} = Y_{i,t-1} - \alpha_i - \theta_i X_{i,t-1} \quad (3)$$

Where $X_{i,t}$ & $Y_{i,t}$ are dependent and independent variables such as USEPU, KOREPU, VIX, and VKOSPI; α_i are coefficients of drift terms; β_i & γ_i are the coefficient estimates for independent variables that reflect short-run relationships between variables. i reflects country such as US and S. Korea; p is maximum of lag order; t is period (1, 2, ..., T); and δ_i denote the speed that deviations from the long-run equilibrium are removed due to variations in each variable. $\varepsilon_{i,t}$ is a random error term; ECT is the error correction term that reflects long-run relationships between variables; and θ_i is cointegrating coefficients.

So, the long-run equilibrium and short-run relation between the EPU index and Stock market volatility index is interpreted by the asset of coefficients on the lagged values of independence in the VECM as follows:

Table 1		
THE LONG- RUN EQUILIBRIUM AND SHORT- RUN RELATION IN VECM		
Relation	No Relation Exist	Relation Exist
Long-run equilibrium	$\delta_i = 0 \text{ or } \theta_i = 0$	$\delta_i \neq 0 \text{ and } \theta_i \neq 0$
Short-run	$\beta_i = 0 \text{ and } \gamma_i = 0$	$\beta_i \neq 0 \text{ or } \gamma_i \neq 0$

EMPIRICAL RESULTS

Unit Root Tests

Unit root tests are conducted to check whether the time series is stationary. Table 2 shows that the time series is stationary because there is no unit root in the level and first difference data.

Table 2					
UNIT ROOT TESTS					
		ADF Test		PP Test	
		Level	1st Difference	Level	1st Difference
US_EPU	Con.	-6.041***	-12.403***	-5.737***	-27.805***
	Con. & Trend	-6.833***	-12.427***	-6.686***	-28.912***
KOR_EPU	Con.	-5.580***	-10.886***	-5.422***	-21.958***
	Con. & Trend	-5.810***	-10.907***	-5.648***	-23.052***
VIX	Con.	-4.060***	-11.824***	-2.994***	-15.374***
	Con. & Trend	-4.013***	-11.818***	-3.946***	-15.353***
VKOSPI	Con.	-4.072***	-4.006***	-3.885***	-15.628***
	Con. & Trend	-12.282***	-12.275***	-4.579***	-15.601***

This table shows the unit root tests by ADF test and PP test. US_EPU & KOR_EPU indicate separately Economy Policy Uncertainty Index and VIX & VKOSPI indicate Stock market volatility Index. ADF and PP denote Augmented Dickey-Fuller (1979) and Phillips-Perron (1986) respectively. Con. and Con. & Trend denotes constant and constant & trend respectively. The asterisk ***, **, and * are significant levels at 1%, 5%, and 10%.

Lag Order Selection

Before examining the VECM, the optimum lag length should be selected by AIC (Akaike Information Criterion) or SIC (Schwarz Information Criterion). According to the principle of parsimony SIC is better than AIC. So, this study selected the optimal lag by SIC. Table 3 shows the optimum lag length and the optimal lag order selection for VECM. The asterisk * means the optimal lag selected.

Table 3
LAG ORDER SELECTION

Lag	US_EPU & VIX	KOR_EPU & VKOSPI	US_EPU & VKOSPI	KOR_EPU & VIX
0	17.327	18.238	17.725	17.969
1	15.768*	16.442*	16.010*	16.208*
2	15.814	16.500	16.015	16.300
3	15.872	16.582	16.090	16.382
4	15.906	16.674	16.110	16.475
5	15.969	16.754	16.175	16.540

Cointegration Test

The study checked whether time series has a long run equilibrium relationship through the cointegration test. As a result, it rejects the null hypothesis (H_0) of no cointegration existence at 1% and 5% level of significance and shows in Table 4. This table shows the results of the cointegration test by Johansen test. Here, ***, **, and * are significant levels at 1%, 5%, and 10%. The results of Cointegration in the U.S. and S. Korea indicate that there are existence long-run cointegrating relation among the variables.

Table 4
COINTEGRATION TEST

Country	H_0	Relation	Trace	λ_{\max}
US	None	US_EPU & VIX	15.494***	26.491***
	At most 1		14.741***	14.741***
S. Korea	None	KOR_EPU & VKOSPI	41.541***	29.553***
	At most 1		11.988***	11.988***
US & S. Korea	None	US_EPU & VKOSPI	36.432***	25.861***
	At most 1		10.571***	10.571***
	None	KOR_EPU & VIX	43.302***	14.939***
	At most 1		14.264***	14.939***

The Long-run Equilibrium and Short-run Relation Under VECM

Table 5 reveals the results of VECM. Here, ***, **, and * are significant level at 1%, 5%, 10% levels. The table shows that the coefficient of θ_1 (**-0.950**) is significant at a 1% level of significance and the coefficients of δ_1 (0.012) is not significant. It means that there is no long-run equilibrium relation between US_EPU and VIX. Table 5 also shows that the coefficient of $\gamma_{1,1}$ (**0.028**) in Equation (1) is significant at a 1% level of significance and the coefficients of $\gamma_{2,1}$ (1.099) in Equation (2) is significant at a 10% level of significance. It indicates that there exists a positive bi-directional relation between US_EPU and VIX in the short- run.

Table 5					
THE RELATION BETWEEN US_EPU AND VIX UNDER VECM					
Long- Run equilibrium	Equation (3): ECT (-1) = VIX (-1) + 96.295 - 0.950*** US_EPU				
Short -Run	Variable	Equation (1) D (VIX)		Equation (2) D (US_EPU)	
	ECT (-1)	δ_1	0.012	δ_2	0.363
	D (VIX (-1))	$\beta_{1,1}$	-0.1094	$\gamma_{2,1}$	1.099*
	D (US_EPU (-1))	$\gamma_{1,1}$	0.028***	$\beta_{2,1}$	-0.079
	C	α_1	-0.026	α_2	0.442
R-squared		4.746%		18.902%	
Adj. R-squared		3.210%		17.594%	
F-statistic		3.089		14.451	

Table 6 shows the results of VECM. Here, ***, **, and * are significant levels at 1%, 5%, and 10%. This table shows that the coefficient of θ_1 (**0.585**) is significant at a 1% level of significance and the coefficients of δ_1 (-0.022) is significant at a 10% level of significance. It means that there is a long- run equilibrium relation between KOR_EPU and VKOSPI. Table 6 also shows that the coefficient of $\gamma_{1,1}$ (**0.029**) in Equation (1) is significant at a 1% level of significance and the coefficients of $\gamma_{2,1}$ (0.820) in Equation (2) is not significant at all levels of significance. It indicates that there exists a positive uni-directional relation between KOR_EPU and VKOSPI in the short- run.

Table 6					
THE RELATION BETWEEN KOR_EPU AND VKOSPI UNDER VECM					
Long-Run equilibrium	Equation (3): $ECT (-1) = VKOSPI (-1) - 98.295 + 0.585^{***} KOR_EPU$				
Short-run	Variable	Equation (1) D (VKOSPI)		Equation (2) D (KOR EPU)	
	ECT (-1)	δ_1	-0.022**	δ_2	-0.460***
	D (VKOSPI (-1))	$\beta_{1,1}$	-0.095	$\gamma_{2,1}$	0.820
	D (KOR_EPU (-1))	$\gamma_{1,1}$	0.029***	$\beta_{2,1}$	-0.027
	C	α_1	0.348	α_2	-0.221
R-squared		8.051%		15.457%	
Adj. R-squared		6.568%		14.904%	
F-statistic		5.428		11.336	

Table 7 reveals the results of VECM. Here, ***, **, and * are significant level at 1%, 5%, 10% levels. The table shows that the coefficient of θ_1 (0.641) is significant at a 1% level of significance and the coefficients of δ_1 (-0.031) is significant at a 1% level of significance. It means that there is a long-run equilibrium relation between US_EPU and VKOSPI. Table 7 also shows that the coefficient of $\gamma_{1,1}$ (0.045) in Equation (1) is significant at a 1% level of significance and the coefficients of $\gamma_{2,1}$ (0.127) in Equation (2) is not significant. It indicates that there exists a positive uni-directional relation between US_EPU and VKOSPI in the short-run.

Table 7					
THE RELATION BETWEEN US_EPU AND VKOSPI UNDER VECM					
Long-run equilibrium	Equation (3): $ECT (-1) = VKOSPI (-1) - 98.131 + 0.641^{***} US_EPU$				
Short-run	Variable	Equation (1) D (VKOSPI)		Equation (2) D (US EPU)	
	ECT (-1)	δ_1	-0.031***	δ_2	-0.425***
	D (VKOSPI (-1))	$\beta_{1,1}$	-0.121*	$\gamma_{2,1}$	0.127
	D (US_EPU (-1))	$\gamma_{1,1}$	0.045***	$\beta_{2,1}$	0.074
	C	α_1	-0.092	α_2	0.377
R-squared		11.708%		16.148%	
Adj. R-squared		10.284%		14.795%	
F-statistic		8.222		11.939	

Table 8 shows the results of VECM. Here, ***, **, and * are significant levels at 1%, 5%, and 10%. This table shows that the coefficient of $\theta_1 (-0.156)$ is significant at a 1% level of significance and the coefficients of δ_1 (0.006) is significant at a 10% level of significance. It means that there is a long-run equilibrium relation between KOR_EPU and VIX. Table 8 also shows that the coefficient of $\gamma_{1,1} (0.012)$ in Equation (1) is significant at a 10% level of significance and the coefficients of $\gamma_{2,1}$ (1.561) in Equation (2) is not significant at all levels of significance. It indicates that there exists a positive uni-directional relation between KOR_EPU and VIX in the short-run.

Table 8					
THE RELATION BETWEEN KOR_EPU AND VIX UNDER VECM					
Long-run equilibrium	Equation (3): $ECT (-1) = VIX (-1) + 188.653 - 1.560^{***} KOR_EPU$				
Short-run	Variable	Equation (1) D (VIX)		Equation (2) D (KOR_EPU)	
	ECT (-1)	δ_1	0.006*	δ_2	0.194***
	D (VIX (-1))	$\beta_{1,1}$	-0.072	$\gamma_{2,1}$	1.561
	D (KOR_EPU (-1))	$\gamma_{1,1}$	0.012*	$\beta_{2,1}$	-0.018
	C	α_1	-0.025	α_2	-0.219
R-squared		2.414%		17.154%	
Adj. R-squared		0.840%		15.817%	
F-statistic		1.533		12.833	

CONCLUSIONS

This paper looked at whether the EPU index generated by big data has information capability in the volatility of the stock market and at whether there are existed the long-run equilibrium and short-run relation between the U.S. and S. Korea stock market. To determine the dynamic relation between Economic Policy Uncertainty (EPU) and Stock market volatility of the U.S. and S. Korea, the study utilized the Vector Error Correction Model (VECM). The data span to estimate the empirical analysis was from January 2003 to December 2018 in the study.

The main findings of the study are as follows. First, in most cases the long-run equilibrium relation between EPU index and Volatility index exist. This indicates that Volatility index converge long-run equilibrium level by Error Correction Term (ECT). Second, there exists a positive bi-directional relation between US-EPU and VIX and exists a positive uni-directional relation between KOR-EPU and VKOSPI in the short-run. These results support the previous studies and indicate that the U.S. and S. Korea also have a significant relation between economic policy uncertainty and stock market volatility in the short- run. But the relation has different characteristics. In the U.S., the relation is bi-directional that means economic policy affects the stock market and the volatility of the stock market also affects the economic policy uncertainty while it is uni-direction in S. Korea from economic policy uncertainty to stock market volatility.

Third, there are a positive uni-directional relation from US-EPU to VKOSPI, from KOR-EPU to VIX in the short-run. It shows that U.S. and S. Korea between stock market volatility and economic policy uncertainty exists co-movement phenomenon.

Overall, the paper findings reveal that the EPU index in both the U.S. and S. Korea affects the volatility of the stock market significantly, which in turn, indicates that the EPU index can provide useful and meaningful information to investors in the stock and derivatives markets in both countries.

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DO AWARENESS, RISK PERCEPTION, AND PAST EXPERIENCE INFLUENCE EQUITY INVESTMENTS? A CASE STUDY ON INDIA

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ABSTRACT

The purpose of this paper is to examine whether investor's awareness, risk perception, and prior investment experience have any effect on the equity investment. The study is based on primary data collected using multistage random sampling method. We apply binomial logistic regression for analysis and observe that both awareness and past experience influence equity investments. We, however, also observe that risk perception plays no role in equity investments. We propose that appropriate policy measures can enhance the awareness level and experience of the investors regarding equity investment. To increase the individual investors' participation in the equity market, in the context of India, we propose that regulators and policy makers focus on making people experienced in this field. Government should nudge individuals by incentivizing equity market investment to increase market participation. Employers can also impart investment education to the employees to make them aware about equity investment and consequently increase equity investment.

Keywords: *Awareness, Risk Perception, Equity Share, Investment, Experience, Individual Investor*

INTRODUCTION

Investor's awareness of the investment atmosphere, namely, financial products, their risk-return profile, market environment and its transparency, and market liquidity and monitoring authority, plays an instrumental role in the investment behavior of market participants (Acquah-Sam & Salami, 2013; Noctor et al., 1992; Das, 2011; Talluru, 1997; Rajeswari, 2014; Bhattacharjee & Singh, 2017; Geetha & Ramesh, 2011; Clancy, *et.al.* 2001, Bernheim, 2001; Singh & Bhowal, 2011; and Bernheim & Garrett, 2003). Bhatt and Bhatt (2012) found that occupation and education can influence investment behavior. Existing literature reveals that people with lower financial awareness do not plan effectively for their retirement (Lusardi & Mitchell, 2007; De Bondt, 1998; Devorak & Hanley, 2010; Almenberg & Soderbergh, 2011; and Klapper & Georgios, 2011). Srinivasan & Balachandran (2015) stated that a retail investor can be conveniently defined as one who does not know what he actually needs to know. Indian retail investors will go for trading in the market, not realizing what challenges are awaiting them. When this challenge does appear, it is also unclear how they will react to the large losses of their wealth. Pandit (2019) found that most of the Indian investors invest in the stock market lured by

its several success stories without having much knowledge about it. There is evidence in the existing literature that financial education can have a significant impact on the individual's savings critical for investing in the stock market (Lusardi & Mitchell, 2007, and Xia, et al. 2014). It is also observed that financial knowledge reduces stress, depression, mental illness, financial disputes, abuse of children, and conflict among the families (Fox, et al. 2005, Cleek & Pearson, 1991; Kinnunen & Pulkkinen, 1998; Yeung & Hofferth, 1998; and Wolcott & Hughes, 1999). In addition to awareness, 'risk perception' of the investors is another aspect that influence investments in financial markets (Yang & Qiu, 2005; Sitkin & Pablo, 1992; Weingart & Sitkin, 1995; Veeramani & Karthikeyan, 2014; and Riaz, et. al. 2012). An investor with a low risk perception shows a higher likelihood to diversify their portfolio. In addition, there is an inverse relationship between risk perception and equity investment (Prabhakaran & Karthika, 2011; Singh & Bhowal, 2009a; and Deb & Singh, 2016, 2018). Panda (2001), Singh & Bhowal (2009b) and Singh, (2011) have shown that there is an inverse relationship between the level of risk perception and entrepreneurial success. Weber (2003) found that due to the risk perception, people fail to allocate the attentional resources to retirement planning. Deb & Singh (2017) found that besides other variables, past investment in equity share is a significant factor in influencing the risk perception and awareness of equity shares that ultimately affect the investment decision. Literature reveals that past investment in equity shares influence the present decision to invest in equity shares (Singh & Bhattacharjee, 2010a; Singh & Bhattacharjee, 2010b; Deb & Singh, 2017). Literature also reveals that experience shows a positive impact on the investment decision-making process (Rakow & Newell, 2010; Brown & Ryan, 2003; Hau et al., 2010; Weber et al., 2004; and Mumtaz et al., 2018). We observe that although there have been substantial studies that independently investigate the impact of awareness, risk perception, and experience of investors on equity investment respectively, we are yet to find any study that investigates the combined effect of all three factors together on equity investments of individual investors. In this study, we intend to fill that gap in the literature in the context of the emerging market of India. In India, having a demat account is compulsory for making direct investment in equity shares. A person without demat account cannot directly invest in equity shares. Furthermore, a retail equity investor is also specifically defined in the context of the Indian equity market. According to the Securities and Exchange Board of India (SEBI), retail investors are considered those, whose total investment in the equity market is not exceeding Rs. 2 lakhs in a year. This account can be opened with either of the Depositories, NSDL (National Securities Depository Limited) and CDSL (Central Depository Services (India) Limited).

Demat or dematerialization is basically the process of converting the physical share certificates into electronic form. The account which helps the investors to hold shares in electronic format is known as demat account or dematerialized account. In India, after the introduction of the depository system by the Depository Act of 1996, the process for sales, purchases, and transfers of shares became significantly easier; most of the risks associated with paper certificates were mitigated. It also helps to minimize the time of transfer of shares.

We combine the effect of awareness about equity share investment, risk perception of equity shares, and past investment experience in equity shares on individual investor's equity investment decisions. The study is helpful in framing policy matters to facilitate awareness and provide financial education among savers in every part of India and to boost diversity in investors' choice of investments. It should also shed light on further investigation of other emerging markets in the world. The main objective of our research is to investigate the impact of investors' awareness about equity investment, risk perception in respect of equity shares, and

past investment on equity share investments of individual investors in the case of India. Key measurable questions that address these objectives are as follows:

- a. Does the awareness of investors about equity investment affect their decision to invest in equity shares? If yes, to what extent?
- b. Does the risk perception about equity investment affect the decision of the investors to invest in equity shares? If yes, to what extent?
- c. Does the experience of investing in equity shares in the past have any impact on the equity investments of the investor? If yes, to what extent?

The rest of the paper is organized as follows: Section 2 provides the theoretical background, literature review, and hypotheses development, section 3 presents data and methodology, section 4 highlights the analysis and findings, section 5 presents the conclusion and policy implications of the study and section 6 shows the scope of future research.

THEORETICAL BACKGROUND, LITERATURE REVIEW, AND HYPOTHESES DEVELOPMENT

There are several seminal theoretical works on awareness, risk perception, and experiential learning. A brief review of these works would be appropriate for our study.

Awareness about equity investment and equity investments of the investor

Various theories of awareness have been evolved over time. Some of the developments in respect of awareness are given below:

Types of awareness: There are seven levels of awareness resulting in different layers of awareness (Kanary, 2015). The first level is 'Animal' where, the individual is not aware about investment (Morin, 2006). Second level is 'Mass' level, which leads to follow of herds by individual (Christensen et al, 2019). Aspiration by the investors to earn more than the normal return is 'Aspiration' stage (Kosec, & Khan, 2017). The next level is 'Individual' where, individuals have discovered their own uniqueness through experiences (Oehmichen *et. al.* 2021). The 5th stage is 'Discipline' where, investors showcase discipline in their style of investment following rules and procedures to attain desired investment goals (Berger & Turk-Ariss, 2015). At the sixth level, the investors invest in the stock market directly and gain experience to decide the right avenues for investments and are called 'experienced investors' (Awais *et. al.* 2016). The ultimate level of awareness is 'Mastery'. Here, investors have extensive knowledge about the stock market and its knowledge (Greenwald *et. al.* 2020).

Level of awareness: Sigmund Freud has identified three levels of awareness (Smith, 1999). These are consciousness, precociousness and unconsciousness. The consciousness includes the person's instant thinking and reasoning. Nilsson (2008) found that conscious investors were more likely to invest in Socially Responsible Investment Portfolio. The preconscious contains information that is just below the surface of awareness. It can be retrieved with relative ease and usually can be thought of as memory or recollection. Albert *et al.* (2009) found that preconscious mind plays an important role in accessing trust than previously believed. The unconsciousness contains thoughts, memories, and desires that are buried deep within us. Even though all investors are not aware of financial decision-making stages (preparation,

decision making, execution, feedback), they exert great influence on their behavior (Lan *et. al.* 2018). Thus, the level of awareness about the stock market among the individual equity investors must be assessed where it is believed that the investor has all the information. It also must be designed considering the consciousness, precociousness, and unconsciousness level of mind.

The current literature demonstrates that the awareness about equity investment enables an investor (i) to make better financial decisions, (ii) to appreciate their rights and responsibilities, and (iii) to understand and manage the risk as an investor (Bhattacharjee & Singh, 2017). Kadariya *et. al.* (2012) found that aware equity investors have more chances of holding a high volume of equity investment. Ivkovic *et. al.* (2008) suggest that informed investors have good knowledge on managing their stocks than uninformed investors. Linnainmaa (2010) suggests that informed investors trade better than uninformed investors. Financial literacy seems to affect behavior (Sivaramakrishnan, *et. al.* 2017). Financial awareness strengthens the link between education and investment decisions (Fachrudin & Fachrudin, 2016; Bordoloi *et. al.* 2020; and Singh & Kar, 2011). Kaur (2018) finds that investor's awareness is an important factor in solving their financial problems. Lusardi & Mitchell (2014) reveal that the existence of a large number of financially “unaware” investors opens the door for financial fraud. These unaware investors are attracted by unrealistically high returns who don't understand the underlying high risks and the possibility of financial fraud (Gui et al, 2020). Graham *et. al.* (2009) found that investors with higher competence are more likely to invest in international assets. Bhushan & Medury, (2013); Bhushan, (2014); Bonte & Filipiak, (2010); Seth, *et. al.* (2010); and Thilakam (2012) describe the low level of awareness about modern investment avenues among the Indian masses. Nash (2012) finds that about 98% of the Indians do not have a Demat account which testifies their lack of awareness about equity share investment. Thus, from the above discussion, it is clear that awareness plays a significant role in the equity investment decision-making process, and this has given the impetus to frame our first hypothesis as follows:

H₀₁: There is no significant association between investors' awareness about equity investment and investment in equity.

Risk perception about equity investment and equity investments of the investor

There are various theories of risk perception which have been evolved over time. Some of the theories are briefly mentioned here:

- a. Protection Motivation Theory: Developed by Rogers (1975), this theory describes that individual is motivated to react in a self-protective way when they foresee negative consequences. In the context of equity investment, the practices of putting ‘stop-loss’ by the equity traders/investors can be explained by this theory.
- b. Risk Compensation/Risk Homeostasis Theory: Lave & Weber (1970) and Peltzman (1977) originally proposed the idea of risk compensation in response to the "technological approach" to traffic safety. In the context of investment, this theory implies that people tend to take more risks when they feel a greater sense of security (Wilde 1994). It is observed in the stock market that financial advisors advise young people, who have a secure family background, to have more equity exposure.
- c. Situated Rationality Theory: Developed by Lawson (1997), situated rationality theory argues that it is incorrect to imagine that low-risk behavior is essentially rational and

high-risk behavior is essentially irrational. Finucane et al. (2000) note that the greater the perceived benefit of activity is, the lower the perceived risk is.

- d. Habituated Action Theory: Developed by Sokolov (1963), this theory claims that involvement with high-risk behavior without a negative outcome often decreases the perceived risk connected with this behavior. Those who frequently perform a high-risk activity without an opposing consequence eventually they become anaesthetized to the risk (Kasperson et. al., 1988; Weyman & Kelly, 1999).
- e. Social Action Theory: Social Action theory was introduced by Weber (1922). It states that human behaviors relate to cause and effect in the social realm. Individuals conform to group norms to avoid teasing/ bullying and start to identify themselves with the group (Cooper, 2003). For example, Islamic community follows Shariah law for investment. Certain actions confirm the social action theory of becoming a victim of fraud committed by others; De-motivation among investors to invest due to the pattern of price changes in equity shares (Deb & Singh, 2016; Singh and Bhowal, 2011).
- f. Social Control Theory: Social Action Theory was first introduced by Hirschi (1969) and states that connectivity to organizations promotes behavior conformity, which can reduce the probability of high-risk behavior. For example, it is often viewed that people prefer to buy stocks of the companies where they work.
- g. Bounded Rational Theory: Bounded rational theory was coined by Simon (1955). It tells that, in decision making, the rationality of individuals is limited by the information they have, the cognitive boundaries of their minds, and the limited amount of time they have to make a decision. For example, if an investor needs to sell off his/her stocks immediately due to immediate financial requirements, it might not be possible for him/her to wait for the stock price to be conducive enough to yield optimum results due to time constraints.

Risk perception of a person is the function of his/her internal as well as external environment such as the person's attitude, heredity, environment, upbringings, etc. Therefore, all theories have collectively mixed influences on the risk perception of the individuals who act collectively (Singh & Bhattacharjee, 2019). In this study, the scale to measure risk perception is constructed by extracting the variables from each of the theories and a few studies conducted in this area.

Ishfaq et. al. (2017), in the context of India, observe that risk perception plays a mediating effect between cognitive biases and equity investment decisions. Singh & Bhowal (2011); Singh & Bhowal (2012) develop a scale to measure risk perception using elements of marketing strategy. They find that product and price-driven measure of risk perception do not influence the overall risk perception in the case of equity shares of employees' own companies, whereas all the four elements of marketing influence the overall risk perception in the case of other companies in India. Singh (2012) measures the risk perception of investors in the case of IPOs in India using the same scale and methodology and finds that product features of IPO influence the risk perception of investors' significantly. Tripathi & Chattopadhyay (2013) find a significant difference in the risk perceptions of experts and laymen regarding equity shares in India. Singh & Bhattacharjee (2019) find that the overall risk perception level of equity investors in economically backward region in India is moderate and that the main factors affecting their risk perception are information screening, investment education, fear psychosis, fundamental expertise, technical expertise, familiarity bias, information asymmetry, understanding of the

market, etc. Wang *et. al.* (2011) conclude that the respondents perceive those easier-to-understand products as less risky. Tep *et. al.* (2017) identify semantics and presentation sequence linked with risk perception. Thus, theories and studies, mentioned above, show that risk perception is a significant factor in influencing the equity investment decision of the equity investors giving the impetus to frame the second hypothesis as follows:

H₀₂: There is no significant association between investors' risk perception and investment in equity.

Experience and equity share investments of the investor

If individuals put themselves in play, it modifies them profoundly in a way that, after having crossed, endured, and traversed it, they will never be the same again (Romano, 1998). Based on the groundwork of Dewey (1938), Kolb & Fry (1975) has coined the concept of experimental learning, which stressed the importance of learning by doing. The central tenet is that “learning is the process whereby knowledge is created through the transformation of experience. Knowledge develops from a combination of grasping and transforming experience” (Kolb, 1984). Kolb & Kolb (2005) suggests that previous experiences, hereditary characteristics, and current environment together drive the development of a preferred way of grasping and processing experiences. Experience is one of the personal factors that enhances investor’s awareness of risk and influences investment decisions (Rakow & Newell, 2010). Literature reveals that individuals’ experience of investing in equity shares has a significant role in determining their success (Camerer & Hogarth, 1999; List, 2003; Agarwal *et al.*, 2007; Kaustia & Knüpfer, 2008; and Malmendier & Nagel, 2011). Roszkowski & Davey (2010) found that experienced investors have a better ability to identify the risk associated with the equity investment. An experienced investor is confident about the skills and past experience that make him/her familiar with the condition. Several securities companies that provide online stock trading game facilities for beginner investors provide an opportunity for novice investors to get an education as well as effective experience (Frijns *et al.*, 2014). Duval & Wicklund (1972) find that most investors consider their last experience as a sign of their next move. Grinblatt & Keloharju (2000) find that investors with lesser experience earn poor returns. Levišauskaitė & Kartašova (2012) conclude that the experiences gained are important factors, affecting the behavior and decisions in the capital market. As it is evident from the literature that previous experiences of investing in equity shares have a significant role in affecting the equity investment decision, this has given the impetus to frame the third hypothesis as follows:

H₀₃: There is no significant association between investors' experience in equity investment and investment in equity

Literature shows that these three variables independently cannot decide on equity investment decision. However, this remains unexplored whether the combined effects of awareness about equity investment, risk perception in respect of equity shares, and past experience in equity shares have on their investments in equity shares in the context of India. Awareness, risk perception, and experience of a person is the function of his/her internal as well as external environment such as the person’s attitude, heredity, environment, upbringings, etc., and therefore, all the related theories work collectively in influencing the person’s awareness, risk perception and experience in a mixed way. They are acting collectively and not in isolation; therefore, the scale to measure awareness, risk perception, and experience is constructed by

extracting the variables from each of the theories. So, it is important to know if these three variables have any impact on the equity investment decision of investors. So, it is important to know if these three variables have any impact on the equity investment decision of investors. In this context, we make an attempt to examine the influence of awareness, risk perception, and past experience of subjects towards equity investments to gain meaningful insights on their equity investment decisions in an emerging market setting such as India.

DATA AND METHODOLOGY

Our data consists of all those individuals with Demat accounts with depository institutions in India. These institutions are National Securities Depository Limited (NSDL) and Central Depository Securities Limited (CDSL) of India. There are 5,31,73,699 Demat account holders with spread over 99.23% of all pin codes in the country (NSDL, 2020). It is believed that Demat account holders have some uniform characteristic irrespective of their location. A multistage sampling process is adopted for this study. Individual investors from the Cachar district in the state of Assam in India are chosen randomly. There are 19,869 numbers of Demat account holders in the district as of 31st March 2019. Therefore, at a 5% level of significance, a sample of 358 investors was obtained. The primary data for the study is collected through a structured questionnaire that consists of three parts. The first part of the questionnaire is meant to measure the awareness level of the investors towards equity investment. This part of the questionnaire is adopted from the work of Bordoloi et. al. (2020). The second part of the questionnaire is meant to measure the risk perception of the investors towards equity shares which are adopted from the work of Singh & Bhattacharjee (2019). Finally, the third part of the questionnaire is meant to assess the experience of equity investment by the individual investors. To assess the experience of the investors in equity investment, the question asked is about their past investment in equity shares if it is of more than two years. Investors, who are having more than two years of investment history in the equity market, are considered experienced investors (Grinblatt & Keloharju, 2000). The questionnaire used in the study is provided in appendix A.

All the identified investors' mobile numbers and addresses are collected from respective depository participants' offices on the assurance that the data collected would be used exclusively for academic research. It is also assure that the confidentiality of the respondents' information would be maintained. Confirming their convenient time and place over phone, the questionnaire was distributed among them. After a period of 15 days, the first reminder call was made, followed by the second, third reminder with a gap of 15 days to complete and collect the data.

For accessing the impact of awareness, risk perception, experience towards equity share investment, a binary logistic regression is used considering present investment as a dependent variable. Singh & Bhattacharjee (2010a) and Singh & Bhattacharjee (2010b) have used this tool in a similar analysis. Binary logistic regression estimates the probability that a characteristic is present, given the values of a single categorical variable. The binary logistic model is as follows:

$$\pi = P_r(Y_i = 1 | X_i = x_i) = \frac{\exp(\beta_0 + \beta_1 x_i)}{1 + \exp(\beta_0 + \beta_1 x_i)} \quad (1)$$

or

$$\begin{aligned} \text{logit}(\pi_i) &= \log\left(\frac{\pi_i}{1-\pi_i}\right) = \beta_0 + \beta_1 x_i \\ &= \beta_0 + \beta_1 x_{i1} + \dots + \beta_k x_{ik} \end{aligned} \quad (2)$$

Here, β_0 is constant, β_i are coefficients of independent variables, and x_{ik} are independent variables.

ANALYSIS AND FINDINGS

First, we measure the level of awareness and risk perception of individual equity investors towards equity share investment. There are 25 questions in the questionnaire where, each question carries a score of one. A total score is found by adding the scores of all the questions. Since there are 25 questions, the maximum possible score is 25 (25×1). The minimum possible score is zero (25×0). The difference between the maximum and minimum possible score is 25. In order to ascertain the information level at five levels, this range is divided by 5. Bordoloi *et. al.* (2020) and Singh & Kar (2011) have framed a similar interpretation table using the similar upper limit exclusive scale. In Table 1, the interpretation of the awareness score is given.

Table 1
Interpretation of Awareness Score

Score value	Interpretation of score value
0-5	Very low level of awareness
5-10	Low level of awareness
10-15	Moderate level of awareness
15-20	High level of awareness
20-25	Very high level of awareness

Source: Compiled by authors

The overall findings on investors' awareness level of equity shares are presented in table 2. The mean score of the respondents is 10.78. It falls within the range of moderate level of awareness as per table 1. It means individual equity investors pose a moderate level of awareness towards equity share investment in the case of India. It is similar to the findings of Bordoloi *et. al.* (2020).

Table 2
Overall Awareness Level

Level of awareness	Frequency	Percent
Very High level of awareness	3	0.8%
High level of awareness	43	12%
Moderate level of awareness	149	41.6%
Low level of awareness	117	32.7%
Very low level of awareness	46	12.8%
Total	358	100.0
Mean	10.7821	
Std. Deviation	4.27323	

Source: Compiled by authors using questionnaire presented at the appendix

The second part of the questionnaire is designed to measure the level of risk perception of investors towards equity share investment. The scale considered to measure equity-related risk perception contains 30 items. Since a score of 5,4,3,2 and 1 is given to the respondents for their

response of strongly agree, agree, moderately agree, disagree, and strongly disagree, the maximum one respondent can score in each of the items is 5. Therefore, the maximum possible score is 150 (30X5). Similarly, the minimum one respondent can score in each of the items is 1, therefore, the minimum possible score is 30 (30X1). The difference between the maximum and minimum possible score is 120 (150-30). In order to ascertain the risk perception at five levels, this range (120) is divided by 5, which comes out to be 24. Adding 24 with 30 (lowest possible score), the very low level of risk perception range (30-54) is obtained. Similarly, by adding 24 with subsequent values, the next higher range is obtained. In table 3, the risk perception score is interpreted.

Table 3
Interpretation of Risk Perception Level

30-54	Very low level of risk perception
54-78	Low level of risk perception
78-102	Moderate level of risk perception
102-126	High level of risk perception
126-150	Very high level of risk perception

Source: Compiled by authors'

Overall risk perceptions of the respondents are calculated by adding their score on the Likert scale. Then its value is interpreted using table 3. The overall level of risk perception is then presented in Table 4.

Table 4
Overall Risk Perception Level

Level of risk perception	Frequency	Percentage
Very low	5	1.40%
Low	155	43.30%
Moderate	186	52.00%
High	12	3.40%
Very high	0	0.00%
Mean	90.9050	
Std. Deviation	15.21745	

Source: Compiled by authors using questionnaire presented in the appendix

Table 5 shows that the mean value of the scale statistics is 90.90, which lies in the interval of 78-102, representing a moderate level of risk perception. Our findings are similar to the findings of Singh & Bhowal (2011, 2012); Singh (2012); Singh & Bhattacharjee (2019).

The depiction of individual equity investors' awareness level and their investment in equity shares are presented in table 5.

Table 5
Investment in Equity Shares and Its Awareness Level

			Awareness level towards equity shares					Total
			Very Low Level of Awareness	Low Level of Awareness	Moderate Level of Awareness	High Level of Awareness	Very High Level of Awareness	
Investment in equity shares	No	Count	26	42	17	5	0	90
		% of Total	7.3%	11.7%	4.7%	1.4%	0.0%	25.1%
	Yes	Count	20	75	132	38	3	268
		% of Total	5.6%	20.9%	36.9%	10.6%	0.8%	74.9%
Total		Count	46	117	149	43	3	358
		% of Total	12.8%	32.7%	41.6%	12.0%	0.8%	100.0%

Source: Compiled by authors using questionnaire that is presented in the appendix

The depiction of individual equity investors' risk perception level and their investment in equity shares are presented in table 6.

Table 6
Investment in Equity Shares and Its Risk Perception

			Risk perception level				
			Very Low Level of Risk Perception	Low Level of Risk Perception	Moderate Level of Risk Perception	High Level of Risk Perception	Total
Present investment in equity shares	No	Count	0	46	43	1	90
		% of Total	0.0%	12.8%	12.0%	0.3%	25.1%
	Yes	Count	5	109	143	11	268
		% of Total	1.4%	30.4%	39.9%	3.1%	74.9%
Total		Count	5	155	186	12	358
		% of Total	1.4%	43.3%	52.0%	3.4%	100.0%

Source: Compiled by authors using questionnaire presented in the appendix

Now, to measure the impact of awareness, risk perception, and experience of investing in equity shares on actual investment in equity shares at present, binary logistic regression is performed. We consider current investment in equity shares as dependent variable and awareness score, risk perception score, and past investment in equity share as independent variables. Total seven regression models are run by considering each of the given three independent variables in different combinations.

Table 7
Model Summary

tep	Independent Variables	-2 Log likelihood	Co x & Snell R Square	Nag elkerke R Square
	Awareness Score	35 4.884 ^a	.12 8	.189
	Risk Perception Score	40 2.309 ^a	.00 4	.006
	Past Investment	38 9.700 ^a	.03 8	.057
	Awareness Score and Risk Perception Score	35 2.944 ^a	.13 2	.195
	Awareness Score and Past Investment	33 7.714 ^a	.16 8	.249
	Risk Perception Score and Past Investment	38 8.433 ^a	.04 2	.062
	Awareness Score, Risk Perception Score and Past Investment	33 8.510 ^a	.16 7	.246

Source: Compiled by authors using questionnaire that is shown in appendix

The overall fit of the model is assessed using the log-likelihood method. Here the value is multiplied by -2 to make it possible to compare values against those that might be expected to get by chance alone. Large values of the log-likelihood statistic indicate poorly fitting statistical models. Cox & Snell R Square and Nagelkerke R Square are also known as *pseudo* R^2 , which are methods of calculating the explained variation.

Results of binary logistic regression are presented in table 7 where it is evident that awareness score and past investment as independent variable explain variation in the dependent variable slightly more than awareness score, risk perception score, and past investment together as an independent variable.

Table 8
Variables in the Equation

	B	S.E.	Wald	df	Sig.	Exp(B)
Awareness score	.231	.036	41.480	1	.000	1.260
Past investment in equity shares (1)	-1.279	.310	17.010	1	.000	.278
Constant	-.875	.357	6.010	1	.014	.417

a. Variable(s) entered on step 1: Awareness Score, and Past Investment (1)

In table 8, past investment in equity shares (1) denotes those who have a past investment in equity shares as a reference category. B denotes the coefficient of variables, where S.E. is the standard error around the coefficient for the constant. The Wald test is used to determine the statistical significance of the independent variables and reflected in the 6th column. The 7th column (df) lists the degrees of freedom for each variable entered in the model. The 8th column

(Exp (B)) is an indicator of the change in odds resulting from a unit change in the predictor. This is the exponentiation of the B coefficient. It is clear from the Significance column that awareness about equity share investment ($p= 0.000$) and past investment in equity shares ($p= 0.000$) are significant in determining the equity investment of the investor. Thus, the null hypothesis H_{01} (*There is no significant association between investors' awareness about equity investment and investment in equity*) and H_{03} (*There is no significant association between investors' experience in equity investment and investment in equity*) cannot be accepted. It means that the awareness about equity investment of the investors (Bhattacharjee & Singh, 2017) and his/her experience of investing in equity shares (Singh & Bhattacharjee, 2010a and 2010b) have an influence on his/her investment in equity shares.

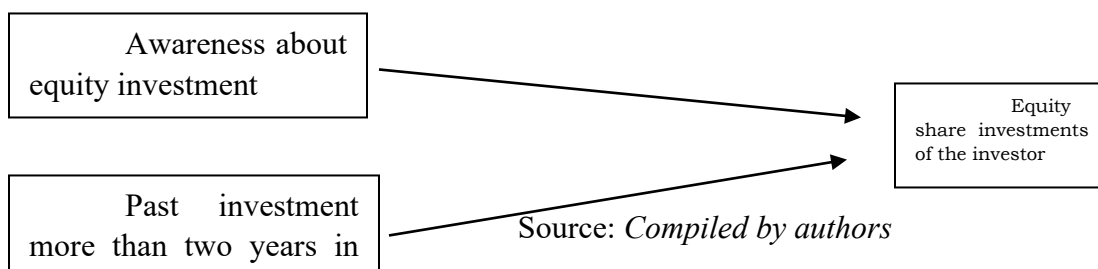
We apply our results of table 8 in equation 3 in order to show the logistic equation model as follows:

$$\begin{aligned} \text{logit}(\pi_i) &= \beta_0 + \beta_1 x_{i1} + \beta_2 x_{i2} \\ &= -.875 + .231(\text{Awareness Score}) - 1.279(\text{Past Investment}) \dots \end{aligned} \quad (3)$$

From Exp(B) we observe an indicator that shows how an increase in one unit of awareness score affect the chances of making investment decision. More specifically, if awareness is expected to increase by 26%, there is less than 72.2% chance that those who do not have an investment in past will make the investment. Our findings confirm that risk perception is not affecting investment in equity shares which is consistent with the findings of Gang & Li (2014) that risk perception does not have an impact on the equity investment and thus, the null hypothesis H_{02} (*There is no significant association between investors' risk perception and investment in equity*) is accepted.

Hence, the ultimate model can be given as follow:

Figure 2: Model showing the relationship between awareness and past investment inequity investments of the investors



CONCLUSION AND POLICY IMPLICATIONS

The purpose of this paper is to examine whether individual investor's awareness, risk perception about equity investment, and past experience have any impact on the equity investment of the investor. Taking a primary sample of investors from India, we apply multistage random sampling method for data collection and binomial logistic regression for analysis to

investigate our research objective. Like Al Tamimi & Kali (2009) and Kavitha (2015), we find that the awareness level of equity investors is significant. However, the risk perception level of the equity investor does not have any impact on investors' equity investments which is consistent with the findings of Gang & Li (2014); Kusumaningrum, *et. al.* (2019) and contrasts findings of Singh & Bhowal (2009a); Singh, (2010); Deb & Singh, (2016) and Ainia & Lutfi (2018). We anticipate that the lack of influence of risk perception on actual investment in equity share might be due to the reason that these respondents are actual investors and they have the ability to recognize whether an investment is at risk than the ability of investors who have no experience (Roszkowski & Davey, 2010). Experience is one of the personal factors that can enhance responsiveness of an investor and minimizes risk perception to make investment decisions (Rakow & Newell, 2010). Christanti & Mahastanti (2011) suggest that there is a relationship between past experiences in stock investment and investment in the stock market. Richards & Biaett (2017) conclude that experience increases the overconfidence of investors. An experienced investor feels confident about the skills and past experience that make him/her familiar with the condition and lead to believe in them that they have control over the situation. When people feel they have control over the situation, they underestimate the risk (Schneier, 2011).

Moreover, cultures also have an impact on equity investment, and it also affects risk perception (Yamin & Golesorkhi, 2010). Besides, the level of knowledge measured in terms of awareness about equity investing has an impact on risk perception (Olsen, 1997). Thus, the idea of risk and human reaction to this has great relevance to the realm of investing. Kumar (2019) reports that individuals investing in equity shares suffer from the illusion of control. They underestimate risk because they believe that they know enough to be in control of the situation. This is an evidence of the presence of the theory of rationality bias.

To increase the individual investors' participation in the equity market, in the context of India, we propose that regulators and policymakers should focus on making people experienced in this field. The opening of the Learning Investors' Club can be one such initiative (Singh & Barman, 2011) that can promote the culture of equity investing. Learning investors association/club comprises a group of people who pool their money together to make the investment with the purpose of learning the art and science of equity investing.

Government should also nudge individuals by incentivizing equity market investment (Thaler, 2018) to increase market participation. Imparting investment education to the employees can also be one method to make the employees aware of equity investment and consequently increase equity investment (Singh & Bhowal, 2010a). Offering own equity shares to the employees can motivate the employees to start investing in equity shares because employees perceive the equity shares of their own company as less risky than the other shares (Singh & Bhowal, 2010b).

Risk perception turns out to be irrelevant in the case of India. This, though similar in findings with existing literature, requires further investigation in various market participants in other emerging countries, cultures, and investors' groups. Besides, to have a generalized finding, this study needs to be replicated at cross-cultural and at cross country levels to provide more insights into this important issue.

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APPENDIX QUESTIONNAIRE

(Kindly put ✓ (tick mark) in the appropriate (box)) ☐

PART - 1

(Kindly put ✓ (tick mark) in the appropriate ☐) for the following questions)

1. Generally, a company can issue shares :
 - a. Once in one year ☐
 - b. Once in five year ☐
 - c. Once in ten year ☐
 - d. Generally company raises capital once or twice in its lifetime as it is very critical activity ☐
 - e. Not aware of ☐
2. To buy shares of a company, I need to go to:
 - a. Stock exchange ☐
 - b. Share trading terminal ☐
 - c. Any Bank ☐
 - d. None of these ☐
 - e. Not aware of ☐
3. Continuous market session timing.....
 - a. 9 -3.30, ☐
 - b. 9.15 – 3.30 ☐
 - c. 9 – 4 ☐
 - d. 9.15 – 4 ☐
 - e. Not aware of. ☐
4. Upward market movement is named after which animal...
 - a. Bull ☐
 - b. Ship ☐
 - c. Bear ☐
 - d. Rat ☐
 - e. Not aware ☐
5. Presently market settlement in practice for cash segment of Stock Market.....
 - a. T+1 ☐
 - b. T+2 ☐
 - c. T+3 ☐
 - d. T+5 ☐
 - e. Not aware of ☐

6. When a company raises first time capital from market, it is known as...

- a. FPO ☐
- b. IPO ☐
- c. NFO ☐
- d. OFS ☐
- e. Not aware of. ☐

7. In Cash market

- a. One can make transaction in cash ☐
- b. One can own the shares if took delivery ☐
- c. One can get immediate delivery of shares ☐
- d. Both (b) & (c) ☐
- e. Not aware of ☐

8. At the time of buying shares, each time I need to:

- a. Issue cheque equivalent to the amount of shares bought ☐
- b. Transfer adequate fund to the broker ☐
- c. Both (a) & (b) ☐
- d. None of these ☐
- e. Not aware of ☐

9. As per BSE/NSE Bye Laws what is the maximum brokerage a broker can charge?

- a. 3% ☐
- b. 2.5% ☐
- c. 2% ☐
- d. 1.5% ☐
- e. Not Aware of. ☐

10. For What kind of transaction Demat a/c is necessary?

- a. For making first time market investment. ☐
- b. For making transaction in secondary market ☐
- c. For Non – Resident a/c ☐
- d. Both (a) & (b) ☐
- e. Not Aware of. ☐

11. One of the compulsory document reqd for demat a/c opening is....

- a. Cancel cheq ☐
- b. Adhar card ☐
- c. Voter ID ☐
- d. PRAN no. ☐
- e. Not aware of. ☐

12. Nifty comprises of...

- a. 30 shares ☐

- b. 50 shares ☐
- c. 100 shares ☐
- d. 500 shares ☐
- e. Not aware of. ☐

13. Which of the following is not a sectoral index?

- a. Bankex ☐
- b. BSE-Tech index ☐
- c. BSE-Pharma index ☐
- d. BSE-Midcap index ☐
- e. Not aware of. ☐

14. Financial assets are also called as

- a. Tangible asset ☐
- b. Physical asset ☐
- c. Real asset ☐
- d. Securities ☐
- e. Not aware of. ☐

15. Which of the following technical indicator is used to determine if an asset is over bought or oversold?

- a. Price rate of change (ROC) ☐
- b. Coincident indicator ☐
- c. Relative strength index (RSI) ☐
- d. Money flow index ☐
- e. Not aware of. ☐

16. Transaction in securities is regulated by...

- a. Depositories Act ☐
- b. SCRA ☐
- c. Companies Act ☐
- d. RBI ☐
- e. Not aware of. ☐

17. The power under the SEBI act and Depositories Act is mostly administered by....

- a. SEBI ☐
- b. NSDL ☐
- c. CDSL ☐
- d. RBI ☐
- e. Not aware of ☐

18. Tax levied on long term capital gain on equity shares

- a. 10% ☐
- b. 20% ☐
- c. Taxable ☐

- d. Not taxable ☐
- e. Not aware of. ☐
19. Equity investment can be used as a tax saving tool...
- a. Yes ☐
- b. Yes, only if the person is a first time investor in the market ☐
- c. Both(a) & (b) ☐
- d. No ☐
- e. Not aware of. ☐
20. Dividend declared 10%, means...
- a. 10% on FV ☐
- b. 10% on MV ☐
- c. 10% on BV ☐
- d. 10% on income earned by the company ☐
- e. Not aware of ☐
21. Dividend income is taxable in the hands of shareholders...
- a. Yes ☐
- b. 10% of the dividend income is taxable ☐
- c. 20% of the dividend income is taxable ☐
- d. No ☐
- e. Not aware of. ☐
22. The gain/loss of increase/decrease in the value of shares in the market is borne by:
- a. Exclusively by the company whose shares is raising/falling in value ☐
- b. Shared by the company and the investor in certain ratio ☐
- c. Exclusively by the investors in the secondary market and not at all by the company ☐
- d. None of these ☐
- e. Not aware of ☐
23. STT stands for...
- a. Standard Transaction Tax ☐
- b. Securities Transfer Tax ☐
- c. Securities Transaction Tax ☐
- d. Standard Transfer Tax ☐
- e. Not aware of. ☐
24. STT levied on delivery based equity share is...
- a. 0.25% of total transaction ☐
- b. 0.01% of total transaction ☐
- c. 0.017% of total transaction ☐
- d. NIL ☐
- e. Not aware of ☐

25. Long term capital loss arising from sell of securities on which STT has been paid can be set off against

- a. Long term capital gain ☐
- b. Short term capital gain ☐
- c. Both (a) & (b) ☐
- d. Cannot set off ☐
- e. Not aware of. ☐

PART - 2

(Kindly put √ (tick mark) in the appropriate ☐ (box) according to you.)

Sr No.	Items	Responses				
		Strongly Agree	Agree	Un decided	Dis agree	Strongly Disagree
1	I have very little idea about the Investment in equity shares.					
2	There is no certainty of income from equity					
3	It is difficult to calculate income from Investment from equity shares.					
4	I am less aware of the complex rules and regulations of equity.					
5	I do not understand the complex rules and regulations of equity shares investments.					
6	There is no guarantee of the return of the invested sum.					
7	It requires daily monitoring of the share market and I do not have time to track and monitor.					
8	I do not know how to utilize share market information for equity investment related decision making.					
9	Investment in share market is very complex.					
10	It is very much likely to become a victim of fraud committed by others in equity market.					
11	It is very difficult to monitor macro-economy for making equity market investment.					
12	It is very difficult to select a company for the investment.					
13	It is difficult to select type of equity shares for investment.					
14	It is very difficult to monitor the financial performance of the company.					
15	It is very difficult to monitor the non-financial performance of the company.					

16	It is difficult to understand the buying and selling price fixation mechanism related to equity shares.					
17	I feel less confident regarding time at which equity shares are to be bought and sold for a best bargain.					
18	I feel less confident regarding the price at which equity shares are to be bought and sold for a best bargain.					
19	Pattern of change in the price of equity shares de-motivates me in regard to the investment in shares.					
20	It is very difficult to track the daily price movement of equity shares of the companies.					
21	I do not have sufficient education required for investment in equity shares					
22	Others told me that investment in equity shares is risky.					
23	There is no coaching/counseling /share investors' forum locally.					
24	There is little availability of the information /article/papers in vernacular medium regarding the equity share investment.					
25	Information /article/papers in vernacular medium regarding the equity share investment in papers of vernacular medium are irregular.					
26	An information/article/paper in vernacular medium regarding the equity share investment in papers of vernacular medium carries little information					
27	Very often Equity Shares scandals are reported in papers and I am afraid of investing in shares.					
28	I have seen others to suffer loss in share investment rather than amassing huge money.					
29	There is no office of the company locally.					
30	In case of grievances I am not sure where I should register my protest and get my grievances redressed.					

PART - 3

Do you have investment in equity share for more than two years?

a. Yes ☐

b. No ☐

GOVERNANCE THEORY AND BOARD DIVERSITY, WHERE DO THE RATIONALES FOR BOARD DIVERSITY AND GOVERNANCE THEORIES CONVERGE?

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ABSTRACT

Extensive previous research has discussed the merits of corporate board diversity, but less has been written about whether there exist points of convergence between the merits of board diversity and governance theories. In this paper, in order to investigate the existence of points of intersection, we first review in their historical context four of the most influential governance theories—agency theory, stakeholder theory, stewardship theory, and resource dependency theory—and then we discuss points of articulation between these theories and governance diversity literature. We then discuss whether board diversity rationales are supported in these governance frameworks. That is, we present a theoretical discussion viewing board diversity through the lens of various governance models: agency theory, stakeholder theory, stewardship theory, and resource dependency theory; it will perhaps provide further support for its merits.

Agency theory primarily focuses on board oversight and principal versus agent problems. We discuss why board diversity presents a possible deterrent to self-serving behavior by enhancing firm oversight. Stakeholder theory focuses on the representation of all stakeholders, and it appears to provide a robust theoretical basis for board diversity. Our discussion of stewardship theory focuses on issues of trust, altruism, and board competency to exercise its own shared mission with management. Our discussion of resource dependence theory presents literature on how diverse board members' resources are thought to improve board resources and span diverse networks. We conclude with a summary discussion and table where we present the significant objectives of governance theory as it relates to board diversity. We define objectives as 1.) Control of managers by the board, 2) Control of managers by incentives, 3) Inclusion of all affected parties in decision making, and 4) Control social and financial environment. We conclude that stakeholder theory followed closely by resource dependency theory presents obvious articulation points to diversity theory that arises from their own theoretical frameworks. In contrast, agency and stewardship theories seem to have a more tenuous relationship to diversity theory, though not antithetical to it.

INTRODUCTION

Whether we attribute the beginnings of the theoretical concepts of Corporate Governance to Berle and Means in 1932 or to earlier debates of appropriate models of separation and control in the 1920s (Wells, 2010), the controversy surrounding how best to govern modern firms has been ongoing for almost 100 years. Yet, there are limitations to what we currently know about effective board governance and governance research. For example, no one approach to governance has been proven by credible, replicated research to be the best governance (Carver, 2001; Aguilera, 2020). Carver (2001) argued that there is no single definitive approach to governance because the corporate community has not decided all of what governance is supposed to accomplish.

In addition to the discussion of what theory of governance is most appropriate or successful, there is also the consideration of what specific actions and if there is a positive correlation between board composition and board effectiveness. One aspect of board composition is its demographic diversity. Its net impact on governance remains an important subject in the conversation of how best to protect the firm's owners' interest from managers' assumed self-interested behavior. The positive effects of diversity on board governance, for example, have been studied as a possible means of reducing corporate fraud (Butler, 2012), enhancing corporate disclosure (Gul et al., 2011), improving decision making (Elstad and Ladegard, 2010), and other positive outcomes.

Three major theories of board governance – agency, stakeholder, and stewardship resource dependency– contend as overlapping alternative governance paradigms capable of either explaining existing board behavior or offering a prescription for future board governance success (Huse, 2005). Agency theory argues that the firm's owners and the firm's managers are distinct entities, often with contrary or conflicting interests on firm-related decision-making matters (Smith, 1776; Berle and Means, 1932; Jensen and Meckling, 1976). In contrast, stewardship theorists argue that there is no real core conflict between owners and managers and that whatever conflicts may exist can be reconciled (Donaldson and Davis, 1991; Davis, 1997). Triangulating the agency-stewardship opposition, stakeholder theory offers its own form of reconciliation by including multiple constituents who have a vested interest in the firm's activities (Freeman, 1984; Jensen, 2000; Donaldson and Preston, 1995; Heath and Norman, 2004; Hsieh, 2009). In addition to these three main modes of governance, resource dependency theory offers another popular viewpoint by emphasizing how directors provide resources to the firm based on their unique characteristics (Booth-Bell, 2018). No single theory is used universally as the underpinnings of corporate governance research; consequently, the purpose of this paper is to extend the understanding of the literature and application of governance frameworks to corporate board diversity by discussing the theoretical-based frameworks of agency theory, stakeholder theory, stewardship theory, and resource dependence theory. Although other governance theories exist, these four frequently appear in the literature when researchers compare frameworks for governance (Durisin and Puzone, 2009; Daily et al., 2003;

Smallman, 2004, Rodriquez-Fernandez, 2016). As such, we have chosen these theories to discuss in this paper.

The remaining portions of this paper are structured in the following manner: First, each section discusses the following theories, agency theory, stakeholder theory, stewardship theory, and resource dependency theory. The discussion of these theories and the important historical literature for each is followed by a discussion of how rationales of board diversity may converge with the related literature of each governance theory.

GOVERNANCE THEORY, CORPORATE GOVERNANCE, AND BOARD DIVERSITY

Agency Theory

Early agency theory, a recognition of the divergence of the interests of the owner (principal/joint-stock owners) and the interests of the managers (agents of the owners), can be traced back to the late 18th Century and Adam Smith's *The Wealth of Nations* (1776). According to agency theory, governance problems arise when owners and managers have different goals (Jensen and Meckling, 1976; Ross, 1973), and, most importantly, the owners (principals) are unable to write contracts for the managers (agents), which anticipate every possible point of conflict (Hart, 1995). Agency theory-based governance is thought to mitigate these problems by ensuring adequate monitoring of managers prone to act in their own self-interest. Given the assumptions about the nature of being human, agency theory further assumes that such self-centered behavior on the part of the agents, unless constrained, will result in counterproductivity for the firm and its owner(s). According to agency theory, this self-interested, bounded rationality, opportunistic, risk-averse converge on behavior is detrimental to the firm's health and the owner's wealth. Agency theory focuses on determining the best way to govern the contract between owners and managers (Eisenhardt, 1989). Owners can use the board as an information system to control and monitor executives and their assumed opportunistic behavior (Fama and Jensen, 1983; Eisenhardt, 1989). As firms seek to reduce owners' and managers' divergent interests and their potential cost to the organization, owners elect representatives or intermediaries to monitor their interests. According to agency theory advocates, this monitoring role is most often performed primarily by the boards of directors, who are best used as monitors. The board of directors is responsible for reducing owner/manager problems and their associated costs by astute monitoring managers' behavior and decision-making activities. According to agency theory, boards are the primary and first line of defense for controlling a manager's opportunistic behavior. Fama and Jensen (1983), Bebchuk et al. (2004), Fields and Keys (2003), Hart (1995), Sternberg (1999), Fama and Jensen (1983), and Moldoveanu and Martin (2001), and others use agency theory as the preferred framework to help explain the important role of governance. In governance research, agency theory is often the primary framework used as the theoretical basis for developing standards of good governance.

Agency theory has also often been used as a basis for those who argue the merits of board diversity. Several researchers (Butler, 2012; Dobbin and Jung, 2010; Carter et al., 2010; Fanto et al. 2011; Nielsen and Huse, 2010; Galbreath, 2011; Luckerath-Rovers, 2011) who take the agency view of governance, argue that diverse boards present a possible deterrent to self-serving

behavior. For example, Butler (2012) argues that diversity can help the board eradicate CEOs' "stacking the board." A diverse board, arguably, can influence the board nomination process and curtail the CEO clone syndrome or CEO parity concept—that is, selecting board members who are the CEOs of other companies who are happy to aid the CEO in his agendas through their voting preferences (Butler p 76).

Adams and Ferreira (2009) argue that diversity is a tool for decreasing self-serving management behavior, risk reduction, and greater management due diligence. They further explain that women arguably monitor more aggressively than men and indicate that women attend more meetings and are more likely to be assigned to monitoring-related committees than men (Adams and Ferreira p 301). Brown et al. (2002) found that boards with three or more women explicitly monitor whether the corporate strategy is being implemented. Gul et al. (2011) argue that gender-diverse boards result in more corporate transparency. Fondas and Salsalos (2000) found that boards with larger proportions of women were less likely to let CEOs dominate the board.

Other agency theory principles are thought to be enhanced with a diverse board in addition to their increased monitoring role. Diverse boards are thought to be more independent (Fondas and Salsalos, 2000). Women directors ask more questions and are less likely to allow board decisions without discussion (Terjesen et al., 2009). Kamalnath (2017) argues that diverse boards are less likely to fall victim to groupthink.

Most US corporations have adopted some aspects of an agency theory incentive-based model with unsuccessful results (Dobbin and Jung 2010). This model includes paying managers for increasing stock price through stock options (shareholder focus) and financing new expansion with debt to leverage shareholders' investment. While many US firms have applied the agency theory principles that increase corporate entrepreneurialism and risk, they have not applied agency theory principles that bolster monitoring and increase executive oversight (Dobbin and Jung, 2010). Board Diversity, and the argued rationales, could perhaps be one such principle that strengthens monitoring and prevents groupthink (Rameriz, 2003). With its focus on the need for a board that limits management's self-interested behavior through monitoring, the agency theory model of governance would suggest that a diverse board of directors could be instrumental in assisting the board with its monitoring and oversight roles.

Other than agency theory, there are other theoretical foundations to describe and predict effective board governance (Roberts, 2002; Roberts et al., 2005). The singular use of agency theory to explain effective board governance might limit and prevent us from understanding the broad series of roles board diversity may play in board dynamics and success.

Stewardship Theory

Agency theory, discussed above, purports to constrain the opportunistic behavior of managers. In the absence of tight constraints, they act in their own interests even when those interests are contrary to the owners' desires and often in conflict with the firm's overall viability. In the most egregious of such cases, management's actions will not only not maximize the profit to the owner but may also bring ruin upon the firm. This understanding of board dynamics is the basis of the principal-agent argument for agency theory. Stewardship theory assumes that

organizational managers are practically motivated to perform their tasks with the firm's best interest in mind.

Consequently, there is no apparent need for any incentives or sanctions to get the managers to fulfill their functions, as they are guided by altruism towards the firm rather than their own self-interests. The parties are described as principal and steward, where the principal delegates their collective responsibilities to the steward to act on the principal's behalf. Trust is considered one of the core philosophies of stewardship frameworks (Mayer et al. 1995). The stewardship theory argues that the board as steward and management act as a single collective stewardship team. The board's role is to support and assist management in accomplishing the firm goals. Stewardship paradigms and their advocates argue that management recognizes that its interest and those of the firm are virtually the same: what is preferable for the firm is good for the manager. By working towards the collective success of the firm, managers also meet the needs of the steward. For stewardship theory, managers seek other ends besides financial ones; these include a sense of worth, commitment to firm goals, job satisfaction, and a sense of accomplishment. Stewardship theory suggests that executives inherently seek to do a good job, maximize firm profits, and maximize shareholder returns. Their work is not necessarily for financial self-interest but because of a sense of duty to the firm. Stewardship theory highlights the need for all board members (regardless of independence of position) to operate at the highest levels of performance. For example, an examination of Fortune 500 corporations by Kesner (1987) found a significant positive relationship between the proportion of inside directors and returns to investors, lending support that management seeks to advance the firm in a manner that also benefits investors.

Davis (1997) explains that in stewardship theory, the underlying premise is that the executive's behaviors are aligned with the owners' interests. Davis also states that most stakeholders' interests are addressed in the stewardship model since the organization's successful performance adds value to most organization stakeholders. However, who defines 'successful performance' and who is the best judge of performance since the board and management act as a cohesive team in the stewardship model? For example, higher salaries for stakeholding employees may cause the price of the firm's products to increase. Price increases would not be in the best interest of customer stakeholders. Similarly, closing a plant in one location and consolidating to another may be best for financials but may decrease government entities' tax revenues. Stewardship structures may not correct the problem of competing accountabilities.

Stewardship theory has been used to support arguments for the single CEO/Chairman position's appropriateness. "Specifically, as regards the role of the CEO, stewardship structures will assist them in attaining superior performance by their corporations to the extent that the CEO exercises complete authority over the corporation and that their role is unambiguous and unchallenged." (Donaldson and Davis, p. 52) This situation is attained more readily where the CEO is also chair of the board, "Power and authority are concentrated in one person" (Donaldson and Davis, p 52). Corporations whose board structures had a dual CEO chair were compared with those where the chair was independent of the CEO. Research has found that dual CEO structures outperform independent chair structures. Thus, contrary to agency theoretic

expectations, CEO duality is associated with a higher return to shareholders than is an independent chair of the corporate board.

Stewardship theory also rests on ideas of ethical leadership. Caldwell et al. (2008) offer a discussion of ethical stewardship in governance. One of the governance elements they discuss is the meeting of organizational goals. They argue that ethical stewardship includes creating long-term wealth and achievement in the best interests of all. To accomplish this, they believe leaders are responsible for creating, articulating, clarifying goals, and pursuing outcomes that benefit the firm. It follows from their perspective that everyone will do well when the firm does well. Board diversity or board heterogeneity is thought to be one vehicle to one approach that may improve governance decision-making and enhance firm growth and development.

Board diversity is not limited to simple changes in the demography of board members but also a diversification of goals and objectives of the board and the corporation. Of course, whatever changes are recommended by boards and corporate executives are subject to profit optimizing constraints. Still, just as the natural environment over the past sixty years has begun to force the business community to internalize at least some of the externality costs of pollutions, the social environments are also unable to continue to absorb the externalities of inequitable distribution of resources based on gender, race, and socio-economic status.

Caldwell et al. argue that ethical stewardship, which focuses on ethical leadership and trust, is critical to the achievement of "long-term organizational wealth by generating increased employee commitment." (2008, 161). Within this context of generating organizational wealth through ethical leadership and trust, the question of females' role on the board is discussed.

Given the historical role of women within the corporate business environment, even if there is some hesitation about the changing role of women as CEO, perhaps there will be more acceptance of increasing the representation of women on governance boards. There is some empirical evidence that women approach and respond to ethical questions in statistically different ways from men. (Kennedy & Kray 2014, Gavius et al. 2012, Gill 2010, Valentine & Rittenburg 2007, Loo 2003, Franke et al. 1997). Other studies show a significant association between the presence of at least one woman on the board and a lower likelihood of financial restatements, signaling greater financial oversight (Abbott et al., 2012, Wahid 2019). Wahid (2019) argues that firms with diverse boards commit fewer financial reporting mistakes and engage in less fraud. Diverse boards also appear to engage in less aggressive tax strategies (Chen et al., 2019). It is much too early to attempt to predict whether increasing the proportion of women in executive and board positions within major corporations will have any long-term impact on the health of the corporation itself and its profits or on the social environment in which it operates, either due to the ethical leadership model or due to some other contributor factor.

What does appear to be certain is that role of women in the corporate world is moving towards greater decision-making authority. Therefore, stewardship theory supports board diversity, as a diverse group of directors may be more likely to act ethically in its stewardship role.

A diverse board can be a tool for creating outcomes that will benefit all firm stakeholders. Solomon (1992) argues that ethical stewardship integrates long-term wealth creation, a commitment to stakeholders' interests, and reinforcing goals of organizational fairness. This

aspect of stewardship speaks directly to board diversity. Therefore, those that govern the firm should be the most interested in providing leadership that results in the most significant outcome for all stakeholder interests. Just as directors under stewardship theory have the firm's best interest at heart, they must also have the necessary skills and diversity of ideas to meet these noble intentions best. Historical context leads to a difference in thoughts and ideas in diverse individuals, resulting in higher quality board decisions. Directors only know what they know, no matter the right intentions. Diversity can enhance stewardship by leveraging the additional positive outcomes a diverse board can provide.

Board diversity research suggests that the financial performance of diverse boards is often superior to the financial performance. (Farrell and Hersch 2005, Smith et al. 2006, Hussein and Kiwia 2009). Peterson Institute for International Economics (Noland et al. 2016) studied 22,000 global companies and found that firms that went from zero women at the board and executive levels to a 30 percent representation at these levels saw an average increase of 15 percent in net revenue margin. Similarly, due to differences in knowledge, experience, and values, diversity influences board decision-making and board activities that ultimately affect firm performance. Post and Byron (2015) find that firms with more female directors tend to have higher accounting returns. Adams and Ferreira (2009) find that boards with one or more women reported better attendance from all members. Diversity has been directly linked to an increase in innovation in Fortune 500 companies. Miller and del Carmen Triana (2009) find that racial and gender diversity positively affects firm innovation and reputation. As a result, stewardship theory would appear to support efforts for a diverse board due to literature that provides rationales for board diversity as a means to accumulate the most effective board. The most effective board can thereby exercise its altruistic stewardship governance most beneficially.

Stakeholder Theory

Stakeholder theory argues that firms are accountable not only to shareholders but to a larger and sometimes more vague assemblage of individuals and groups who have tangential, intersecting, and overlapping interests with those of the firm and its principals. This larger assemblage is called stakeholders. Consideration of these additional stakeholders will assist the firm with long-term success. The term stakeholder is widely used to describe the many groups of people with a vested interest or 'stake' in an organization (Freeman, 1984; Key, 1999; Donaldson and Preston, 1995; Coates et al., 1995; Carney et al. 2011). Stakeholder theory's premise is that the firm has multiple constituents who have a vested interest in the firm's activities. These constituencies' interests may often diverge or even conflict with each other, and the firm's expressed interest. These stakeholders are not only comprised of financial stakeholders but also those who are in some way directly or indirectly affected by the firm's decisions and behavior. Thus, a firm's stakeholders and customers, as well as those communities that experience the firm's ecological, economic, political, and social influence, are stakeholders, direct and indirect, visible and invisible, voluntary and unconscious in the actions and decisions of the firm (Freeman, 1984, p. vi).

Stakeholder theory expands beyond the viewpoint of good governance from one purely concerned with financial gain to one of ethical treatment of stakeholders. These expanded

viewpoints include being perceived as a good corporate citizen and gaining a sense of legitimacy, credibility, and integrity amongst the firm's stakeholders (Fondas, 2000, Mattis, 2000). A strong stakeholder-based board can encourage the firm's strategies to include ethical treatment of stakeholders (Van der Walt, N. and Ingley, C., 2003).

Managers must develop and implement processes that satisfy all groups who have a stake in the business (Freeman, 1984). This process aims to manage and integrate the relationships and interests of shareholders, employees, customers, suppliers, communities, and other groups to ensure long-term success. A stakeholder approach emphasizes the management of the firm's business environment and ecological environment, relationships, and the promotion of shared interests. Freeman rejects the single aim of maximizing shareholder wealth, and instead, stakeholder management is a task of balancing and integrating multiple relationships and objectives. A stakeholder approach encourages management to develop strategies by looking out from the firm and identifying and investing in all the relationships that will ensure long-term success.

Donaldson and Preston (1995) also compare and contrast the stakeholder theory to the classical agency theory. They describe and explain some of the more important distinctions, problems, and implications of the stakeholder concept and clarify and justify its essential content and significance. They believe that stakeholder theory is comprised of three distinct aspects. The third of these aspects they describe are normative viewpoints. Normative stakeholder theory's primary concern is to ensure that all individuals and groups who share the costs of the firm's activities play a role in the firm's decisions making. Those who follow a normative stakeholder theory of management are concerned with the moral or philosophical implications of how corporations ought to manage their stakeholders. All stakeholders' interests have intrinsic value, and only considering shareholders is 'morally untenable' (p.88). The firm must identify, and properly weigh all stakeholders for the company and pursue strategies that balance those frequently competing interests.

A more significant concern of using a stakeholder theory model is the subjectivity involved in identifying all stakeholders and their relative importance to each firm. This subjectivity can leave firms without clear indications of which actions they should pursue, given the conflicting interests often present among various stakeholder groups. Jensen (2001) presents similar concerns regarding stakeholder theory. According to Jensen, "stakeholder theory should not be viewed as a legitimate contender to value maximization because it fails to provide a complete specification of the corporate purpose or objective function. While agency theory provides a clear direction for companies and boards, shareholder value, stakeholder theory provides no such definition and can result in frustration and blurred goals. Without the clarity of mission provided by a single-valued objective function, companies embracing stakeholder theory will experience managerial confusion, conflict, inefficiency, and perhaps even competitive failure" (Jensen, 2001 p.9.).

Sternberg (1999) also takes issue with stakeholder theory. Sternberg argues that stakeholder theory is misguided, giving no guidance on how multiple benefits to stakeholders should be balanced or how stakeholder groups should be defined. Additionally, she disagrees with the sense that stakeholder management not only must take all stakeholders into account, but

that management must be accountable to these stakeholders (Sternberg, p. 7). Additionally, she highlights several concerns with the stakeholder theory and particularly with stakeholder entitlements. Sternberg believes that although it is correct and ethical to consider the effects of a firm's actions on various stakeholders, firms cannot reasonably be accountable to all of their stakeholders. Sternberg further argues that stakeholder theory is incompatible with good corporate governance because stakeholders as a class are too diverse in interest. She writes that a critical element of good corporate governance is accountability. According to Sternberg, good corporate governance must provide mechanisms for aggregating these accountabilities into measurements to be successful. Without a clear set of guidelines to whose benefits should be balanced or how to balance their divergent needs, it is impossible to have a sufficient standard to measure managers and directors.

Heath and Norman (2004) argue that the breakdown of the governance relationship in the Enron era's scandals was at heart a failure of these firms and their shareholders to protect themselves against agency problems. Consequently, corporations that conform to a stakeholder governance paradigm may be less likely to engage in such excesses because of a genuine altruistic commitment to stakeholder rights. They conclude that the employees, managers, and shareholders all have a common interest in the enterprise's success.

Board diversity presents a potential opportunity in managing the difficult decisions of identification and ranking the plethora of stakeholder interests. This is achieved by the way board diversity may impact firms' stakeholder management. Boards can affect a firm's stakeholder management in two ways; first, by establishing its strategy to recognize non-financial and financial shareholders. Second, by providing valuable insights that will help the firm to manage different and often competing interests. Fernandez & Thames (2018) find that boards with high levels of gender, ethnic and international diversity will help firms adopt a stakeholder orientation and will be able to provide the firms with essential knowledge for superior stakeholder management (Fernandez & Thames, 2018). Homogenous boards often do not understand how similar they think due to their similar demographic characteristics and backgrounds (Fondas and Sassalos, 2000). A diverse board will include members representing different ranges of experiences and potentially holding differing values and perspectives. While board diversity does not prevent the subjectivity of addressing stakeholder importance between groups, this diversity could give voice to a more diverse group of stakeholder voices. It could also encourage management to identify previously overlooked stakeholder groups and invest in the long-term success of stakeholder relationships.

The stakeholder theory viewpoint is based on a belief that various groups are essential to a firm's survival and success. This belief would seem to suggest that a stakeholder viewpoint would naturally lead to consideration of multiple groups and multiple interests, including diversity, as a beneficial element. As such, the stakeholder theory of governance should support board diversity arguments from the normative viewpoint of representation, equality, and fairness rather than increased returns. Normative perspectives on board diversity are associated more with corporate ethics than financial performance. Consequently, the normative viewpoint to increasing board diversity means diversifying the board should be done because it is the right thing to do, not because of any particular business rationales. If stakeholder theory values

acknowledging diverse stakeholders, representation on the board of diverse groups seems to be consistent with this value set.

While stakeholder theory is concerned primarily with identifying which stakeholder's interest takes precedence in firm decisions, there also remains the question of how managers and directors share power when making these decisions. Determining who has the ultimate power of decision-making is a question discussed within the context of stakeholder theory and stewardship theory.

Resource Dependency Theory

Pfeffer and Salancik (1978) argue that to survive, an organization must acquire needed resources. Resource dependency theory explains that all organizations depend on other organizations to provide these resources and seek ways to attain them while maintaining their autonomy. In the context of boards, resource dependency theory is based on the assumption that director relationships with those outside of the board result in capital consisting of both human capital such as experience, expertise, reputation; as well as social (relational) capital such as the network of ties to other firms and external groups (Hillman and Dalziel, 2003, p. 383). Additionally, resource dependence theory examines how this type of firm capital, based on board relationships, should provide resources to the firm. Board directors can help acquire resources from important elements outside the firm, including financial capital, political capital, or various forms of influence held by stakeholder groups (such as customers, suppliers, and communities). Resource dependency theory suggests that directors serve as both providers of resources and monitors of managers as purported in the agency view.

Thus, in addition to their monitoring managers, directors provide expertise and resources including (1) strategic advice and expertise; (2) communication channels to external organizations; (3) support from important elements outside the firm; and (4) legitimacy (Pfeffer and Salancik, 1978). Wernerfelt (1984) defines resources, as anything that is thought of as a firm's strength or weakness (Wernerfelt, 1984 p 172). Resource dependence suggests that a board's provision of resources is directly related to firm performance (Hillman and Dalziel, 2003, p. 386). Zahra and Pearce (1989) describe the board's role from the framework of resource dependency. This includes company reputation, establishing contacts with the external environment, and giving advice and counsel to executives (p. 292). According to resource dependency theory, one way that directors assist the board is by reducing external dependency. Specifically, resource dependence literature argues that boards of directors are a primary method for absorbing critical elements of environmental uncertainty into the firm (Boyd, 1990). Hillman (2005) argues that because of the uncertainty government regulation creates for business; many firms have sought to "co-opt" government by creating linkages between the firm and politicians.

Consequently, firms in heavily regulated industries were more likely to have directors who were former politicians than firms in less-regulated sectors. Government officials can provide valuable advice and counsel regarding the public policy environment of a firm; communication links to existing government officials, bureaucrats, and other political decision-makers; influence over political decisions; and legitimacy. Hillman found that ex-politicians serve as conduits of information and offer access to important political resources that are

incredibly beneficial to firms operating in highly regulated environments. Political connections are just one example of how board members provide vital resources to the board. Board capital can also help acquire resources from helpful elements outside the firm, such as financial capital influence and influence with political bodies or other important stakeholder groups (such as customers, suppliers, and communities).

Resource dependency theory supports board diversity rationales primarily in two ways:

1) firm environmental pressure: some firms are more directly impacted by pressures from diverse groups either through the supply or demand side of the firm's market; 2) diverse resources to diverse firms. Firm environmental pressures are constantly putting pressure on firms to adjust their behavior. Some of those environmental pressures arise from demographic heterogeneity of the environment. For instance, women board members appear to be more valuable to certain types of companies (Hillman et al., 2007; Brammer et al., 2009). Specifically, women appear to provide unique attributes to the boards of large firms that face demands for greater female visibility because the products that these firms offer are purchased primarily by or for females, firms operating in industries heavily dependent on female employees, and firms with ties to companies with female board members were likely to have women directors on their board. Thus, the make-up of boards appeared to incorporate the environmental pressures faced by firms. They argue that firms strategically select board members as a means to reduce environmental pressure and uncertainty.

Similarly, Brammer et al. (2009) find a reputational effect of women directors in certain firms where firms operate closely to consumers. Gaining a diversity advantage may be attained not only by increasing the number of members of diverse groups but also by changes in the quality of board representation. Pfeffer and Salancik (1978), for example, argue that prestigious or legitimate persons or organizations represented on the organization's board signal to the rest of the world the value and worth of the organization (p.145); this is an example of the legitimizing role that members of the board play as signifiers of diversity (even in the absence of significant numbers of the underrepresented group) both to other board members as well as to external stakeholders. Consistent with resource dependency theory, Provan (1980) finds that firms that can attract and entice influential community members onto their boards can acquire critical resources from the environment. In one study, women directors were shown to have greater community influence and have statistically significant differences in their backgrounds compared to male directors (Singh et al. 2008). Thus, with respect to the role of females in the executive corporate environment, in some cases, executive females are the symbolic and actual appeasement of the claim not only for greater female representation by females as consumers and by underpaid female workers, but also as de facto spokeswomen for women rights and in the case of black women for the rights of black people and other non-white peoples as well.

Second, resource dependency theory supports board diversity due to diverse directors' distinctive attributes and backgrounds and the opportunity to exploit these board members' unique contacts and social capital. According to Booth-Bell (2018) and Van der Walt and Ingley (2003), diverse directors enjoy different types of network ties and social capital. Additionally, diverse directors belong to different social or community groups; therefore, the firm should acquire (with their appointment) the ability to span critical structural holes. Board diversity

presents an opportunity for firms to access the diverse connections brought to the board, thus enabling it to span different contacts. These connections may be critical to providing a bridge to new and diverse firm resources. Board diversity offers the opportunity for the firm to access the diverse groups of contacts, relationships, and social ties that diverse directors may bring, thus increasing the potential resources available for the firm.

SUMMARY DISCUSSION

Table 1: Major Objectives of Governance Theories				
Objectives	Agency	Stewardship	Stakeholder	Resource Dependency
Control of managers by boards	X			X
Control of managers by incentives		X		X
Include all affected parties in decision making			X	X
Control social and financial environment				X

This paper has attempted to review four theories of board governance – agency, stakeholder, stewardship, and resource dependence theory- not only to highlight their impact on boards governance but also to ask how these four theories serve to advance or inhibit board diversity. While diversity was seldom specifically addressed until the last few decades, corporate governance theory is important to board diversity researchers and policymakers, as board behavior and norms may be directly influenced by the type of governance model the firm has chosen to adopt. Suppose a board adopts an attitude of agency theory type governance. In that case, good governance may place a strong focus on diligent board oversight of management, an almost singular focus on shareholder value in their decision making, and directors who are motivated to establish themselves as expert directors and have an incentive to develop reputations as experts in their monitoring function (Fama and Jensen, 1983). Conversely, suppose one adopts an attitude of stakeholder theory type governance. In that case, good governance may strongly emphasize how well the board manages the interests and needs of its many stakeholders. Stakeholder governance would result in a board that can successfully prioritize competing stakeholder claims (Mitchell et al. 1997). A resource dependency theory of governance would result in a board that emphasizes connecting the firm to information and contacts to help the firm reduce its external dependencies (Pfeffer and Salancik, 1978). Lastly, suppose one adopts a viewpoint of stewardship theory type governance. In that case, good governance may take a strong emphasis on board and management collaboration, ethics, board competency and diversity, an assumption of trust in management, no need to separate CEO and Chairman (Donaldson and Davis 1991), and an assumption that everyone is working for the firm's best interest (Davis 1997). The selection of these four theories for discussion does not seek to ignore other theories' legitimacy and provides an opportunity for subsequent discussions using other alternative governance frameworks to inquire about the validity of board diversity rationales.

Table 1 above summarizes the finding concerning the points of convergence between governance theory and diversity theory. The column heading represents the four theories

investigated, and the row headings are the major objective of each of the four theories. Reading across a row, the question answered is who has a primary concern with a particular object. Thus, reading across the first row of the four theories, which is primarily concerned with using the board to control managers? Agency and Resource Dependency. What is immediately apparent is that agency and stewardship theory both focus on controlling managers. Stakeholder theory focuses on the board where the various interests concerned with the products or services produced by the firm can be shared in the firm's governance. The manager-owner conflict is not an essential concern for stakeholder theorists. Finally, it becomes apparent that resource dependency theory, because of its focus on controlling the environment in which the firm does business, has an interest in managers, owners, their conflicts, and their resolutions. The dependency theory is equally concerned with the organizations that are external to the firm.

Not surprisingly, stakeholder theorists are interested in diversity to the extent that the diverse interests are stakeholders in the environment that the firm either produces or to whose production it contributes. Thus, stakeholders for a multinational corporation would engender a rainbow of stakeholders, while a mom-and-pop corner store would not. Moreover, to the extent that the stakeholder theory is concerned with those impacted by the firm, then searching for stakeholders, by necessity, would include all those impacted. Thus, although diversity is not a direct concern of stakeholders, to the extent that diversity is embedded in the stakeholder population, stakeholder theory embraces diversity.

Similarly, resource dependency theory recognizes diverse groups to the extent that those groups, organizations, and individuals influence the firm's survival and health. Thus, in both the resource dependency theory and stakeholder theory, there seem to be both obvious and immediate points of articulation, points of convergence between the interests of diversity theory and these two theories of governance.

The points of articulation for agency or stewardship and diversity theory are not quite as obvious. It would seem that unless these two theories expand and reformulate themselves beyond manager-owner conflict, then diversity theory's point of articulation will be on a case-by-case basis. Diversity will find itself swinging between the interests of agency and stewardship depending on the social, economic, and political environment in which the firm finds itself doing business.

Understanding which governance theory is being assumed helps provide an enhanced discussion on how board diversity may help the board within that government framework. For example, board members' behavior may directly follow stewardship norms and cooperation versus agency theory-based oversight. The governance theory will also influence the types of primary responsibilities the directors seek to fulfill, such as focusing on stakeholder accommodation. Perhaps, unlike the other two governance theories, stakeholder theory and stewardship theory seem to have explicitly extended the concerns of governance beyond the classical concerns of Adam Smith—i.e., beyond the joint holding companies, charter companies, like the East India Company, where business interests were the interests of owners, managers, and the King of England—to include all those who were affected by business owners and those who worked or collected income from their business ventures. Although a particular board or members of a board may find agreement between their own social concerns and one specific

governance framework, the literature is not able to provide much empirical guidance at this time as to whether there is a practicable relationship between board diversity and the board's theory of governance.

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GIG WORKERS' FINANCIAL CONFIDENCE AND BEHAVIOR

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ABSTRACT

This paper offers critical perspectives on the relationship of financial confidence of non-traditional workers and their financial and work behavior. Understanding the socioeconomic characteristics of gig workers could empower their standard of living, affect how they impact gig workers' healthcare, and illustrate a more complete economic picture of gig workers. The gig economy is changing the work and lifestyle of many people and has captured worldwide public attention. Supplemental income and flexible working style increasingly attract people to the gig economy, but there are both positive and negative consequences for the workers and society. We show that the majority of gig workers have higher debt loads, engage in predatory lending, and suffer from cost-prohibitive healthcare utilization. However, we also find that gig workers have relatively high financial confidence. These findings have implications for the motivation to do gig work and to survive in difficult times.

INTRODUCTION

The rapid expansion of the gig economy has attracted increasing attention from the academic field and industry. There are a variety of terminologies to describe the phenomenon of the gig economy. Kalleberg and Dunn (2016, p.11) argued that the gig economy represents “a digital version of the offline atypical, casual, freelance, or contingent work arrangements;” thus essentially it is not new. Todolí-Signes (2017) emphasized the “sharing” and “collaborative” characteristics. Fleming (2017) examined the gig economy from the perspective of Human Capital Theory (Becker, 2009). Pichault and McKowen (2019) categorized the gig economy by the level of autonomy, and scholars further defined gig work as being shaped by the algorithmic control of the specific platforms (Jarrahi & Sutherland, 2019). Block and Hennessy (2017) highlighted the feature of “on-demand.” All these definitions and perspectives present different ongoing aspects of the gig economy.

Approximately 16.5 million people worked in the gig economy in 2018 (Bureau of Labor Statistics, 2018). Holtz-Eakin, Gitis, & Rinehart (2017) estimated that gig economy workers increased between 9.4 percent and 15.0 percent, depending on the definition of gig workers, while the total employment increased by 7.5 percent from 2002 to 2014. Moreover, many universities are starting to integrate the study and practice of the gig economy into their curriculum or career services in order to steer students to prepare well for the gig economy (Cheng, 2019; Mulcahy, 2019).

The purview of “gig worker” includes freelancers, contractors, consultants, and those on-demand working on a temporary basis (Chang, 2017). According to a study from the Manpower Group (2017), a high percentage of Americans were willing to join the freelancing or

independent contracting market. In 2018, Upwork (2018) identified that Americans spent 1.07 billion hours per week working as gig workers in 2018 which is roughly 72 million hours per week more than in 2015.

Gig workers are not only engaging passionately in the gig economy, but they generally regard gig work as beneficial for the whole society (Hollowell, Rowland, Kliestik, Kliestikova, & Dengov, 2019), and support the notion that gig work provides beneficial opportunities for workers to earn supplemental income through the flexible job platforms (Healy, Pekarek, & Vromen, 2020). Fountain (2019) indicated that most millennials (born between 1981 and 1996), Gen Xers (born between 1965 to 1980), and baby boomers (born between 1946 to 1964) recognize the positive effect of the gig economy. Generation Z workers (born between 1996 and 2015) have the most positive attitudes.

Despite the exploratory discussions of the significance of the gig economy, few studies have examined the personal socioeconomic factors and their related association or impact on participation in gig work. This study selected variables based on the Serido et al (2013) financial capability development model and use multivariate logistic regression analyses to explore the relationship between personal socioeconomic factors and related financial confidence of gig workers. This study aims to assess gig worker's socioeconomic factors and financial confidence and suggest directions for future research.

LITERATURE REVIEW

Although the definition of gig workers is not well-understood (Donovan, Bradley, & Shimabukuru, 2016), studies have found common demographics of gig workers: a) the majority of gig workers are White (Codagnone, Biagi, & Abadie, 2016), although a few studies indicated that gig workers are more likely to be Hispanic or African-Americans (Edison Research, 2018); b) gig workers mainly live in urban areas because most gig jobs are in cities (Balaram, Warden, & Wallace-Stephen, 2017); and) they are more likely to be male than female (Manyika et al., 2016).

Generally, these features match the analysis of Uber drivers by Hall and Krueger (2015). Of the 162,037 active Uber drivers they surveyed in 2014, males accounted for 86.2 percent, the majority were 30-49 with almost half having at least a college degree, 31 percent had full-time employment, and 30 percent had part-time employment, apart from the Uber job.

Motivation to Participate in Gig Work

There is a consensus that the main reason for workers to participate in the gig economy is to earn supplemental money (Allon, Cohen, & Sinchaisri, 2018; Bajwa et al., 2018; Bernhardt & Thomason, 2017). However, job flexibility, being in control, working from home, pursuing more meaningful work and developing employability (Barnes, Green, & Maria, 2015; McCafferty, 2017; Nemkova, Demirel, & Linda Baines, 2019) are also incentives for gig work. Sinchaisri, Allon, & Cohen (2019) found that financial incentives had a significant positive influence on the decision of gig workers to work and on the number of hours worked. They also found that gig workers exhibit income targeting so that they work less when they get close to their income goals or work more when their earning is far from their targets. These researchers discuss their findings in the context of labor elasticity.

Doucette and Bradford (2019) indicate that while men are driven to spend more time on gig jobs to increase their income, women were more motivated by insecurity in their main job

and also earned less in their gig job. They also found that higher risk aversion reduced income from gig work for men, it did not for women. Rosenblat (2016) showed that turnover is high in platform workers and more than half of participants quit within a year

Employment Status

The literature defines two types of gig workers: those fully working in gig work and those having a full-time job with gig work as a part-time job to earn extra income (Allon et al., 2018; Kalleberg & Dunn, 2018) and for job security (Douchette & Bradford, 2019). Most reports indicate that less than half of the workers rely on gig work full-time (Bajwa et al., 2018; Fos, Hamdi, Kalda, & Nickerson, 2019; EdisonResearch, 2018).

Education Background

Prior surveys and reports have pointed out that the gig workers as a whole are slightly more educated than the overall workforce, with just a small portion of gig workers without a high school diploma (Codagnone et al., 2016; Schor, 2017). About half of all gig economy workers have a college education (Bureau of Labor Statistics, 2018). This educational attainment varies in different countries: there were 66.1 percent of American gig workers with at least a college education (Bernhardt & Thomason (2017, p.11), while 44 percent of British (Balaram et al., 2017, p.18) and 64 percent of Canadian (Block & Hennessy, 2017, p. 6) gig workers have the equivalent education. In addition, different education levels were observed in different work types. For example, freelancers are more likely to have a postgraduate degree, compared to traditional workers while temp-agency and on-call workers noticeably have a lower education level, such as a high school diploma (Upwork, 2017).

Married Status & Age

Younger generations are leading the gig market because of the flexibility and the potential higher income offered by the gig economy (Lepanjuuri, Wishart, & Cornick, 2018). Millennials and Generation X dominate gig work (Balaram et al., 2017;), and 18.73 percent of the Generation Z freelancers have engaged in gig jobs (Fountain, 2019). This can partly explain why the highest percentage of gig workers are child-free or single (Holtz-Eakin et al., 2017; Johal & Thirgood et al., 2016). However, Dmitrieva (2018) cites US Labor Department reports that indicate a significant uptick of baby boomers joining the gig economy because these jobs supplement income and are easier to get. Cook et. al. (2019) show that Uber earnings are essentially flat from age 20 to 40 and steadily declining with age thereafter. Their results suggest that the gig compensation-based-on-productivity character can pose a challenge for older workers.

Income Level

Interestingly, many studies stated that more than half of gig workers report their annual household income as relatively high - more than \$60,000 (Block & Hennessy, 2017; Lepanjuuri, 2018). This is similar to the U.S. national median household income of \$61,937 in 2018 (Guzman, 2019). However, some reports argued that most gig workers are in the lower and mid-level income brackets (Tran & Sokas, 2017). This discrepancy between different studies may be due to the different sampled populations. and/or incomplete sampling. For instance, Frederico (2019) showed that women who joined multi-level marketing companies with low start-up costs earned about 20 percent of those who joined companies with high expenses. Regardless, one third of their respondents left their organizations due to unmet income expectations. These

findings highlight not only the discrepancies possible in the different populations studied but the financial vulnerabilities of individuals in the gig economy.

Koustas (2019) shows that households entered the gig economy after facing declines in income and a significant running down of assets. He suggests that such income decline can come from gearing up for gig work or facing outside shocks, such as unemployment or wage cuts. This latter explanation has potentially important implications for the validity of previous studies focusing on gig economy activity only and debt. Implications of financial distress from outside the gig economy have largely been ignored in the recent literature on the gig economy, but are likely to matter given the economic stresses today.

Financial Mindfulness

Gig workers are more likely to be financially precarious than those working in traditional employment (Petriglieri, Ashford, & Wrzesniewski, 2019). Over 50 percent of those taking gig jobs as a primary income source have an Anxiety Index score higher than 50, whereas only 24 percent of those who have another full-time job have an Anxiety Score over 50 (EdisonResearch, 2018). In addition, 85 percent of gig workers with a gig job as the primary income source worry about the potential impact of economic recession in the U.S. T.RowePrice (2018) found that 78 percent of gig workers in the U.S. stated that they are more involved in personal finances since their participation in gig jobs, and 39 percent of gig workers claimed that they check their accounts more frequently. Some scholars found that gig workers economize their spending habits since joining the gig markets (Madonia, 2017). However, Newcomer (2018) argues that gig workers often do not calculate their costs well.

Health Challenges & Medical Debts

Gig employment shares some common dimensions with precarious employment, such as temporality, social vulnerability, inadequate benefits, and low levels of income (Bajwa et al., 2018; Benach & Muntaner, 2007). Due to these characteristics, especially the financial uncertainty and job insecurity, gig workers are quite vulnerable to mental health tension that includes the anxiety of identity and emotional vacillation (Ashford, Caza, & Reid, 2018; Petriglieri, et al., 2019). In addition, gig employment or precarious employment poses relatively high perceived risks because of the nontraditional working condition and unregulated job issues, such as working overtime and inadequate protection, which further affect the overall health of these workers (Benach et al., 2014; Christie & Ward, 2019; Tran & Sokas, 2017).

Prudential (2017) revealed that only 40 percent of gig workers who take gig jobs as the primary income source have access to employer-sponsored medical insurance. Hill (2019) reports that respondents without a traditional job did not have health insurance because they could not afford it, and that many of these workers deferred healthcare due to the cost. Gig workers are among the most vulnerable workers because they are not eligible for sick leave or employer insurance (Bond, 2020, Liss-Riordan, 2020, Tran and Sokas, 2017). With the exacerbating of the COVID-19 pandemic, on March 14th, 2020, the House of Representatives in the United States has passed legislation that mandated 2 weeks of paid leave for workers who were affected by the crisis, but excludes gig workers (Liss-Riordan, 2020). However, so far, no studies have precisely examined the relationship between the medical hardship and medical debts of gig workers.

Other Debt

Individuals often enter the gig economy in order to cope with some financial challenges or difficulties (Koustas, 2019). The incomes from gig jobs are usually lower than their full-time traditional jobs. Hence, gig workers have more difficulties in managing their finances (Prudential, 2017; Manyika et al., 2016). Eighty percent of gig workers who earn most of their income from their gig work expressed that they have difficulty in paying an unforeseen expense of \$1,000 (EdisonResearch, 2018), while 58 percent of full-time gig workers said that they cannot afford a \$400 emergency bill, compared to 30 percent of non-gig workers. Meanwhile, Aegon (2016) identified that 44 percent of gig workers have zero savings for retirement and only 22 percent occasionally save for retirement. In addition, for low-income millennials gig workers, the student loan is an important driver for their participation in gig jobs (Wylie, 2018).

Financial Confidence

The concept of financial confidence is composed of three aspects: (1) financial awareness of how to use money as a tool to achieve goals, (2) financial literacy (Sabri & Juen, 2014), and (3) financial advice availability (Zalis, 2018; Chatterjee & Salter, 2011). Financial confidence is a perpetual cycle among these three factors (Palameta, Nguyen, Hui, & Gyarmati, 2016). Financial confidence affects financial decision-making and financial behavior (Arifin, Kevin, & Siswanto, 2017; Assad, 2015; Milam, 2019), such as saving, spending behavior, and retirement planning. People who have high financial confidence with actual low financial knowledge were more likely to engage in risky financial behavior. (Tokar, 2015). When measuring routine financial and debt management outcomes, financial confidence is a more effective predictor than financial knowledge. Financial confidence is a more effective determinant for self-control in one's financial behavior (Palameta et al., 2016). Moreover, financial confidence is associated with economic locus of control (Sakalaki, Richardson, & Bastounis, 2005). Although many studies discussed the concept of financial confidence, gig workers have up to this point remained absent from such studies.

RESEARCH QUESTIONS

Although the characteristics of gig workers vary among different countries, different industries, and different generations, there are still some common characteristics. While previous studies emphasized the economic trend and social impact of the gig economy, this study focused on the individual financial characteristics of gig workers and will address the following research questions:

1. What are the personal-finance characteristics of gig workers?
2. Is there a correlation between the people who engage in gig work and their financial confidence?

METHOD

Data Source

Analyses were conducted using data from the 2018 FINRA National Financial Capability Study ("Financial Capability Study," n.d.). The study was funded by the FINRA Investor

Education Foundation and conducted by Applied Research and Consulting. The objectives of the study were to benchmark key indicators of financial capability and how they vary with demographic, behavioral, attitudinal, and financial literacy factors. The survey was conducted online from June through October 2018, among a national sample of 27,091 American Adults. Prior to 2018, the National Financial Capability Study was conducted in 2009, 2012, and 2015. Weights are calculated by Census distributions according to the American Community Survey. The entries are weighted to be representative of each state by age, gender, ethnicity, and education, and Census Division.

Dependent Variables

Dependent variables used in this analysis were questions from the 2018 NFCS related to gig work and financial confidence. Initial models used two separate dependent variables: Additional work for pay in the last 12 months [1:Yes (28.0%); 2:No (70.5%)] and “In the Past 12 months, how often have you taken on a work assignment through a website or mobile app, such as Uber, Task Rabbit, Care.com, etc? [1: Frequently (4.9%); 2: Sometimes (10.8%); 3: Never (81.7%)]. We constructed models to describe the personal and financial characteristics that were associated with workers who responded “Yes” to “Additional work for pay in the last 12 months”, “frequently engage in technology-driven gig work”, and “sometimes engage in technology-driven gig work”.

Secondary analysis examined financial confidence by using the following survey question as a dependent variable: “If you were to set a financial goal for yourself today, how confident are you in your ability to achieve it? [1: Not at all confident (6.7%); 2: No very confident (15.2%) 3: Somewhat confident (41.5%); 4: Very confident (31.6%)]. We combined “Not Very” with “Not at all” and “Somewhat” with “Very” to create a dichotomous dependent variable. We then ran a logistic regression, modeling the personal and financial characteristics that describe individuals that responded “Somewhat / Very” confident.

Our variable selection was guided by the Serido et al (2013) financial capability development model. The work of Ranta and Salmela-Aro (2017) used a similar model to study subjective financial situations and financial capability. In Serido et al.’s model, changes in Financial Knowledge are initiated by changes in Self-Beliefs, which then improve changes in financial behavior, which then finally promote changes in financial well-being. The present study examines the relationship between self-beliefs (financial confidence), behavior (participation in gig work and additional work for pay), and well-being (financial well-being markers) in successive models. We first describe the financial and personal characteristics of people who engage in additional work for pay and gig work. We then measure the relationship between additional work / gig work participants and their financial confidence. In this final model, certain control variables measure aspects of financial well-being (income & debt loads).

Statistical Analyses

Initial analysis described the study sample across certain personal finance variables (as mentioned above). Multivariate logistic regression analyses (PROC SURVEYLOGISTIC) were performed to determine individual and financial characteristics of workers that take on additional work for pay, individuals that frequently use technology for gig work, and individuals that sometimes use technology for gig work. Secondary analysis (multivariate logistic regression) was carried out to determine level of confidence in achieving a financial goal due to gig work

status and other control financial and individual characteristics. Bivariate differences were tested using Wald Chi Square Tests.

All analyses were conducted with SAS (SAS Institute Inc., Cary, North Carolina). Weights were provided by the National Financial Capability Study and were applied based on the probabilistic factors affecting the selection of the survey. PROC SURVEYLOGISTIC allows for the use of weights to account for the data's complex survey design. The weights incorporated: gender, age, ethnicity, and education.

RESULTS

A description of study participants is represented in Table 1. Out of the 27,091 participants, 48.57% had an emergency fund of 3 to 6 months of expenses, 18.83% spent more than their income, 46.48% carried a credit card balance, 33.82% had an auto loan, 18.45% had a student loan, 22.77% had unpaid medical debt, 27.37% self-reported having "too much debt" (6 or 7 out of a Likert scale of 1-7), and 19.88% reported having a drop in income during the past year. Groups that reported higher rates of having an emergency fund were: being older than 55, White Ethnicity, having a Bachelor's or Post-Graduate Degree, having an income of \$50k or more, and either working full time for an employer, being self-employed, or retired.

Individual characteristics that represented higher rates of spending more than income included: female, younger than 45, Non-White Ethnicity, not having a high school degree or having a high school GED, being single or separated, an income of \$50,000 or less, and not being retired. Individual characteristics that represented higher rates of carrying a credit card balance included: being between 25 and 54 years of age, Non-White Ethnicity, not graduating high school, high school GED, some college, or an Associate Degree, being single, separated, or divorced, earning between \$15,000 and \$75,000, and being self-employed, working full time for an employer, homemaker, sick, disabled, or unable to work, and unemployed.

Individual characteristics that represented higher rates of auto loans included: males, between 25 and 54 years of age, White Ethnicity, some college education or higher, being married, earning \$35,000 or more, and working full time for an employer or being a homemaker. Individual characteristics that represented higher rates of student loans included: female, between 18 and 44 years of age, Non-White Ethnicity, having some college education or higher, earning <\$15,000-\$50,000 or \$75,000-\$100,000, being self-employed, working full or part time for an employer, being a full-time student, or being unemployed. Individual characteristics that represented higher rates of unpaid medical debt included: being female, between 25 and 54 years of age, Non-White Ethnicity, earning an Associate's degree or lower education, earning an income of less than \$100,000, having any type of employment other than full time student or retired. Individual characteristics that represented higher rates of self-reported too much debt included: being female, between 25 and 54 years of age, Non-White Ethnicity, earning a High School GED, Some College, or an Associate's Degree, earning an income of less than \$50,000, and having an employment status of anything except full-time student or retired. Individual characteristics that represented higher rates of experiencing an income drop in the past year included: being 44 years of age or younger, Non-White Ethnicity, having Some College education or less, and earning an income of less than \$50,000.

Table 1. Description of Study Participants Across Multiple Financial Characteristics

		Emergency Fund	Spend More than Income	CC Balance	Auto Loan	Student Loan	HC Unpaid	Too much debt	Income Drop
Overall (n=27,091)		48.57%	18.83%	46.48%	33.82%	18.45%	22.77%	27.37%	19.88%
Sex	Male (n=13,253)	54.00%	18.50%	43.79%	34.77%	17.70%	20.38%	25.83%	19.11%
	Female (n=13,837)	43.37%	19.15%	49.26%	32.91%	19.17%	25.07%	28.83%	20.62%
Age	18-24 (n=3,086)	35.24%	22.21%	36.07%	20.58%	35.19%	22.86%	22.75%	25.99%
	25-34 (n=5,037)	43.40%	26.70%	54.27%	41.51%	37.74%	33.54%	40.87%	30.44%
	35-44 (n=4,337)	39.90%	22.28%	56.59%	41.82%	27.09%	30.99%	36.76%	24.66%
	45-54 (n=4,460)	41.81%	17.82%	56.30%	38.06%	11.90%	25.49%	30.80%	19.70%
	55-64 (n=4,852)	55.31%	13.89%	44.14%	32.13%	4.67%	17.86%	20.51%	14.82%
	65+ (n=5,315)	67.82%	11.94%	32.25%	25.66%	1.48%	8.03%	12.96%	7.19%
Ethnicity	White (n=19,281)	50.72%	17.05%	44.81%	34.41%	15.07%	20.93%	26.12%	17.26%
	Non-White (n=7,809)	43.26%	23.23%	50.97%	32.35%	26.81%	27.34%	30.47%	26.34%
Education	No HS (n=747)	17.76%	25.09%	48.28%	15.84%	3.89%	32.39%	27.43%	29.12%
	HS Grad – Regular (n=5,277)	42.00%	17.43%	45.86%	30.32%	7.00%	24.63%	24.24%	20.46%
	HS Grad – GED (n=2,073)	35.21%	19.69%	48.33%	28.52%	7.94%	28.73%	28.05%	23.27%
	Some College (n=7,947)	43.90%	21.05%	54.32%	35.98%	23.60%	28.38%	32.40%	23.76%
	Associate's Degree (n=3,137)	47.72%	19.43%	52.99%	37.47%	23.30%	23.19%	28.85%	19.05%
	Bachelor's Degree (n=4,947)	61.51%	16.92%	40.41%	35.52%	23.01%	14.49%	23.68%	14.61%
	Post-Grad Degree (n=2,960)	69.24%	15.71%	32.84%	35.81%	23.34%	11.21%	23.51%	13.39%
Marital Status	Married (n=14,100)	56.97%	16.79%	44.49%	43.27%	13.46%	21.55%	25.23%	17.18%
	Single (n=8,443)	38.83%	22.54%	47.18%	23.10%	30.50%	23.90%	30.67%	25.02%
	Separated (n=401)	23.95%	25.33%	60.62%	28.07%	19.37%	39.03%	38.64%	30.95%
	Divorced (n=2,975)	39.52%	18.10%	55.41%	25.36%	13.09%	24.50%	29.54%	18.41%
	Widowed (n=1,170)	49.11%	16.21%	43.58%	20.74%	4.97%	19.47%	19.95%	15.23%
Income	< \$15,000 (n=3,248)	19.47%	23.75%	45.25%	9.92%	22.79%	27.47%	30.23%	29.38%
	\$15k-\$25k (n=2,901)	27.03%	24.68%	55.31%	17.29%	19.24%	31.74%	33.12%	28.12%
	\$25k-\$35k (n=3,006)	35.07%	22.75%	51.80%	27.40%	20.11%	28.61%	30.94%	22.25%
	\$35k-\$50k (n=3,983)	45.54%	19.82%	49.50%	34.58%	18.76%	25.38%	29.43%	20.85%
	\$50k-\$75k (n=5,256)	54.44%	16.87%	48.19%	39.37%	17.66%	21.16%	25.99%	16.01%
	\$75k-\$100k (n=3,783)	64.71%	17.99%	47.98%	48.27%	20.22%	23.18%	28.82%	19.23%
	\$100k-\$150k (n=3,255)	69.44%	13.16%	39.49%	47.53%	14.97%	12.20%	21.10%	12.55%
	>\$150k (n=1,656)	78.69%	8.69%	29.68%	41.88%	10.10%	6.00%	13.61%	8.33%
Employment	Self-Employed (n=2,024)	53.52%	19.62%	48.46%	30.85%	19.51%	26.10%	30.62%	30.02%
	Full-time for employer (n=10,825)	50.50%	19.61%	52.79%	46.08%	25.13%	25.10%	32.57%	19.57%
	Part Time for employer (n=2,406)	40.74%	22.60%	45.24%	29.66%	20.60%	24.73%	28.08%	26.89%
	Homemaker (n=2,037)	35.69%	19.88%	51.31%	35.19%	15.71%	30.97%	29.97%	22.68%
	Full time student (n=1,020)	35.77%	21.82%	34.38%	15.92%	49.20%	17.28%	20.94%	23.50%
	Sick, disabled, unable (n=1,486)	16.86%	25.77%	67.51%	19.76%	12.44%	39.59%	40.30%	21.95%
	Unemployed (n=1,332)	21.97%	22.80%	51.30%	13.41%	20.70%	28.64%	31.50%	38.83%
	Retired (n=5,957)	67.02%	12.12%	31.71%	24.90%	1.76%	9.26%	12.57%	7.84%

Adjusted odds ratios and their 95% confidence intervals for taking on additional work, frequently using technology for gig work, and sometimes using technology for gig work are represented in Table 2. Table 2 shows six successive logistic models; Models 1-3 examine

healthcare utilization and financial characteristics and their association with the 3 dependent variables (taking on additional work for pay, frequent technology-driven gig work, and sometimes technology-driven gig work). Models 4-6 include the previous independent variables using in Models 1-3, but add individual characteristics (age, sex, education, and marital status).

In Model 1, significant positive associations to taking on additional work for pay included: having unpaid medical debt, not going to the doctor due to cost, not filling a prescription due to cost, strongly agreeing with “I have too much debt”, being a full-time student or unemployed, having an auto loan, student loan, or using predatory loans. Significant negative associations to taking on additional work for pay include: being self-employed, being a homemaker, being permanently sick or disabled, being retired, and spending the same as income. In Model 2, significant positive associations to frequently using technology-driven means for gig work included: having unpaid medical debt, not going to the doctor due to cost, not filling a prescription due to cost, not having health insurance, having an auto loan or student loan, and using predatory loans. Significant negative association to frequently using technology-driven means for gig work included: moderate (between 4-6 on 1-7 Likert Scale) self-reported debt loads, earning between \$25,000 - \$74,999, working part time for an employer, being a homemaker, being permanently sick or disabled, or being retired. In Model 3, significant positive associations to sometimes using technology-driven means for gig work included: not filling a prescription due to cost, not having health insurance, being a full-time student, spending more than income, having student loans, and using predatory loans. Significant negative association to sometimes using technology-driven means for gig work included: either earning between \$25,000-\$34,999 or \$50,000 - \$74,999, being a homemaker, being permanently sick or disabled, being retired, and not carrying a credit card balance. In Model 4, significant positive associations to taking on additional work for pay included: having unpaid medical debt, not going to the doctor due to cost, not filling a prescription due to cost, strongly agreeing with “I have too much debt”, being a full time student, being unemployed, having an auto loan, having a student loan, using predatory loans, being male, and having a High School diploma or higher. Significant negative association to taking on additional work for pay included: being self-employed, being a homemaker, being permanently sick or disabled, being retired, spending equal to income, older than 25 years of age, and being married. In Model 5, significant positive associations to frequently using technology-driven methods for gig work included: having unpaid medical debt, not going to the doctor due to cost, not filling a prescription due to cost, not having health insurance, having an auto loan, having a student loan, using predatory loans, being male, and being of Non-White Ethnicity. Significant negative associations to frequently using technology-driven methods for gig work included: having moderate amounts of self-reported debt, being permanently sick or disabled, being retired, being between older than 35 years of age, and being married. In Model 6, significant positive associations to sometimes using technology-driven methods for gig work included: having unpaid medical debt, not going to the doctor due to cost, not filling a prescription due to cost, not having health insurance, having an auto loan, having student loans, using predatory loans, being male, and being of Non-White Ethnicity. Significant negative association to sometimes using technology-driven methods for gig work included: moderate amounts of self-reported “Too much debt”, being permanently sick or disabled, being retired, older than 35 years of age, and being married.

Table 2. Adjusted Odds of Additional Work for Pay and Gig Work

		Financial and Health Measures			Financial, Health, and SES Measures		
		Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
		Additional Work for Pay	Technology-Additional Work (frequently)	Technology-Additional Work (sometimes)	Additional Work for Pay	Technology-Driven Additional Work (Frequently)	Technology-Driven Additional Work (Sometimes)
Unpaid Medical Loans	Yes	1.452 (1.262 - 1.670)	2.040 (1.594 - 2.611)	1.198 (0.981 - 1.463)	1.488 (1.287 - 1.719)	2.056 (1.585 - 2.668)	1.217 (0.989 - 1.497)
Not Going to the Doctor	Due to Cost	1.395 (1.216 - 1.601)	1.762 (1.380 - 2.248)	1.191 (0.978 - 1.452)	1.318 (1.147 - 1.516)	1.625 (1.264 - 2.090)	1.119 (0.915 - 1.370)
Not Filling a Prescription	Due to Cost	1.359 (1.170 - 1.578)	2.187 (1.703 - 2.807)	1.593 (1.290 - 1.966)	1.357 (1.166 - 1.580)	2.115 (1.627 - 2.749)	1.634 (1.318 - 2.026)
Health Insurance	No	1.010 (0.787 - 1.296)	2.087 (1.349 - 3.227)	1.595 (1.166 - 2.182)	0.904 (0.700 - 1.168)	1.692 (1.102 - 2.598)	1.306 (0.941 - 1.812)
“I have too much debt” Ref: 1 - Strongly Disagree	2	1.023 (0.872 - 1.200)	0.533 (0.331 - 0.860)	0.941 (0.725 - 1.222)	0.980 (0.832 - 1.156)	0.528 (0.320 - 0.870)	0.926 (0.706 - 1.215)
	3	1.013 (0.828 - 1.238)	0.888 (0.546 - 1.442)	1.100 (0.825 - 1.467)	0.945 (0.770 - 1.160)	0.828 (0.506 - 1.354)	1.007 (0.750 - 1.354)
	4 – Neutral	0.985 (0.838 - 1.158)	0.497 (0.322 - 0.768)	1.071 (0.837 - 1.371)	0.957 (0.812 - 1.129)	0.500 (0.317 - 0.790)	1.044 (0.810 - 1.346)
	5	1.088 (0.910 - 1.3010)	0.372 (0.214 - 0.647)	0.956 (0.729 - 1.254)	1.023 (0.851 - 1.231)	0.391 (0.223 - 0.685)	0.886 (0.673 - 1.167)
	6	1.008 (0.824 - 1.233)	0.523 (0.333 - 0.820)	1.187 (0.889 - 1.585)	0.946 (0.769 - 1.163)	0.523 (0.331 - 0.827)	1.137 (0.847 - 1.528)
	7 – Strongly Agree	1.330 (1.119 - 1.581)	0.981 (0.676 - 1.423)	0.896 (0.685 - 1.173)	1.270 (1.062 - 1.519)	0.943 (0.641 - 1.388)	0.864 (0.657 - 1.135)
Household Income Ref: <\$15,000	\$15,000-\$24,999	1.236 (0.799 - 1.910)	1.059 (0.485 - 2.314)	0.868 (0.496 - 1.520)	1.388 (0.892 - 2.160)	1.133 (0.527 - 2.432)	0.965 (0.537 - 1.732)
	\$25,000 - \$34,999	0.929 (0.612 - 1.410)	0.471 (0.223 - 0.997)	0.555 (0.327 - 0.942)	1.092 (0.717 - 1.666)	0.628 (0.295 - 1.338)	0.715 (0.411 - 1.243)
	\$35,000 - \$49,999	1.002 (0.672 - 1.490)	0.474 (0.234 - 0.960)	0.704 (0.430 - 1.154)	1.137 (0.763 - 1.695)	0.614 (0.303 - 1.245)	0.843 (0.504 - 1.412)
	\$50,000 - \$74,999	0.932 (0.630 - 1.379)	0.457 (0.234 - 0.892)	0.609 (0.376 - 0.988)	1.061 (0.714 - 1.577)	0.650 (0.332 - 1.272)	0.738 (0.444 - 1.228)
	\$75,000 - \$99,999	1.028 (0.695 - 1.520)	1.016 (0.531 - 1.941)	0.699 (0.431 - 1.132)	1.133 (0.761 - 1.686)	1.307 (0.676 - 2.523)	0.799 (0.478 - 1.335)
	\$100,000 - \$149,999	1.029 (0.695 - 1.524)	0.709 (0.364 - 1.379)	0.656 (0.404 - 1.066)	1.127 (0.754 - 1.685)	1.060 (0.537 - 2.095)	0.771 (0.458 - 1.299)
	\$150,000 +	1.012 (0.676 - 1.515)	1.061 (0.522 - 2.159)	0.852 (0.517 - 1.405)	1.084 (0.715 - 1.642)	1.780 (0.859 - 3.691)	0.975 (0.568 - 1.673)
Employment Ref: Full-time for employer	Self-employed	0.580 (0.495 - 0.681)	0.739 (0.529 - 1.034)	1.192 (0.912 - 1.557)	0.515 (0.435 - 0.609)	0.686 (0.468 - 1.006)	0.972 (0.731 - 1.294)
	Part time for employer	0.840 (0.677 - 1.044)	0.605 (0.369 - 0.990)	1.054 (0.749 - 1.482)	0.909 (0.722 - 1.145)	0.786 (0.453 - 1.366)	1.227 (0.850 - 1.769)
	Homemaker	0.530 (0.414 - 0.680)	0.494 (0.267 - 0.911)	0.642 (0.427 - 0.966)	0.615 (0.474 - 0.797)	0.872 (0.452 - 1.682)	0.731 (0.473 - 1.130)
	Full time student	2.927 (1.839 - 4.660)	1.342 (0.699 - 2.578)	1.962 (1.146 - 3.360)	1.821 (1.155 - 2.905)	0.835 (0.426 - 1.637)	1.181 (0.684 - 2.039)
	Permanently sick disabled	0.231 (0.143 - 0.374)	0.089 (0.026 - 0.308)	0.216 (0.086 - 0.544)	0.272 (0.167 - 0.443)	0.177 (0.046 - 0.672)	0.337 (0.128 - 0.886)
	Unemployed	2.153 (1.497 - 3.098)	0.381 (0.159 - 0.914)	0.605 (0.324 - 1.130)	2.568 (1.762 - 3.744)	0.574 (0.238 - 1.383)	0.745 (0.387 - 1.437)
	retired	0.461 (0.385 - 0.550)	0.120 (0.065 - 0.221)	0.193 (0.135 - 0.277)	0.714 (0.580 - 0.878)	0.392 (0.169 - 0.909)	0.467 (0.302 - 0.721)
Spending and	Spending > income	1.088 (0.951 - 1.246)	1.113 (0.849 - 1.459)	1.364 (1.111 - 1.673)	1.055 (0.920 - 1.211)	1.045 (0.791 - 1.382)	1.305 (1.061 - 1.606)

Income Ref: Spending < income	Spending = income	0.882 (0.795 - 0.978)	0.977 (0.759 - 1.257)	1.122 (0.953 - 1.321)	0.881 (0.792 - 0.979)	1.022 (0.788 - 1.326)	1.132 (0.956 - 1.340)
Income Drop (Ref: No)	Yes	1.000 (0.994 - 1.006)	1.003 (0.993 - 1.012)	1.006 (0.998 - 1.013)	1.000 (0.995 - 1.006)	1.001 (0.991 - 1.012)	1.004 (0.997 - 1.012)
Credit Card Balance (Ref: Yes)	Not carrying a CC balance	1.044 (0.934 - 1.167)	0.983 (0.765 - 1.262)	0.683 (0.575 - 0.813)	1.119 (0.998 - 1.255)	1.152 (0.891 - 1.490)	0.795 (0.665 - 0.950)
Auto Loan (Ref: No)	Yes	1.161 (1.054 - 1.279)	1.406 (1.112 - 1.779)	0.922 (0.794 - 1.072)	1.196 (1.081 - 1.322)	1.403 (1.094 - 1.800)	0.918 (0.785 - 1.074)
Student Loans	Yes	1.886 (1.659 - 2.143)	2.776 (2.209 - 3.490)	2.776 (2.209 - 3.490)	1.432 (1.246 - 1.646)	1.761 (1.372 - 2.261)	1.261 (1.042 - 1.526)
Predatory Loans	Yes	2.231 (1.943 - 2.561)	8.013 (6.401 - 10.031)	6.022 (5.079 - 7.142)	1.994 (1.723 - 2.307)	5.988 (4.680 - 7.661)	4.995 (4.188 - 5.958)
Sex	Male				1.299 (1.182 - 1.427)	2.270 (1.802 - 2.859)	1.785 (1.537 - 2.073)
Age Ref: 18-24)	25-34				0.582 (0.452 - 0.749)	1.036 (0.702 - 1.529)	0.831 (0.620 - 1.114)
	35-44				0.426 (0.330 - 0.550)	0.444 (0.293 - 0.673)	0.507 (0.375 - 0.686)
	45-54				0.346 (0.266 - 0.450)	0.225 (0.138 - 0.367)	0.315 (0.229 - 0.435)
	55-64				0.353 (0.272 - 0.460)	0.207 (0.123 - 0.349)	0.201 (0.142 - 0.285)
	65+				0.229 (0.171 - 0.307)	0.093 (0.037 - 0.238)	0.131 (0.083 - 0.209)
Ethnicity (Ref: White)	Non-White				1.055 (0.943 - 1.179)	1.488 (1.192 - 1.857)	1.574 (1.347 - 1.840)
Education	HS Grad – Regular				2.335 (1.065 - 5.117)	1.627 (0.523 - 5.069)	1.098 (0.439 - 2.744)
Ref: Did not complete HS)	HS Grad – GED				3.334 (1.494 - 7.438)	1.275 (0.385 - 4.218)	1.109 (0.424 - 2.900)
	Some College				3.252 (1.492 - 7.090)	1.659 (0.536 - 5.133)	1.117 (0.451 - 2.763)
	Associate's Degree				3.560 (1.623 - 7.807)	1.227 (0.380 - 3.969)	1.298 (0.519 - 3.246)
	Bachelor's Degree				3.477 (1.594 - 7.585)	1.685 (0.538 - 5.277)	1.564 (0.634 - 3.858)
	Post-Grad Degree				4.426 (2.024 - 9.681)	1.917 (0.607 - 6.054)	1.799 (0.723 - 4.474)
Marital Status Ref: Single	Married				0.875 (0.773 - 0.990)	0.696 (0.546 - 0.888)	1.186 (0.988 - 1.424)
	Separated				0.910 (0.511 - 1.619)	0.408 (0.108 - 1.545)	0.711 (0.319 - 1.588)
	Divorced				0.916 (0.759 - 1.106)	1.085 (0.660 - 1.784)	1.035 (0.750 - 1.430)
	Widowed				0.780 (0.575 - 1.057)	1.420 (0.490 - 4.118)	1.107 (0.560 - 2.187)

Table 3 represents a bivariate analysis of financial confidence and taking of additional work/technology-driven gig work. Significant differences were measured with Wald Chi Square statistics. Workers that took on additional work for pay were significantly more likely to report higher levels of being “somewhat” and “very” confident they would achieve a financial goal if they set one. Moreover, they were less likely to report that they were “not at all” or “not very” confident in their financial goal achievement. Similarly, respondents that did not use technology-driven methods for gig work reported lower financial confidence. Respondents that sometimes use technology-driven methods for gig work reported higher rates of “Somewhat”

confident, and respondents that frequently use technology-driven methods for gig work reported higher amounts of “Very” confident.

Table 3. Unadjusted Rates of Financial Confidence in Meeting a Goal Across Gig Work Status					
	Financial Goal Confidence				p-value
	Not at all	Not very	Somewhat	Very	
Add Work	5.01%	14.66%	42.86%	34.66%	<.0001
No Add Work	7.36%	15.36%	41.60%	30.52%	
Tech Gig Freq	5.24%	10.11%	26.84%	56.35%	<.0001
Tech Gig Sometimes	3.66%	12.61%	46.04%	35.46%	
No Tech Gig Work	7.18%	15.97%	42.60%	29.96%	

Table 4 represents adjusted odds ratios and their 95% confidence intervals of respondents that reported either being “somewhat” or “very” confident in achieving a financial goal. Significant independent variables that had a significant positive association with this outcome were: taking on additional work for pay, frequently using technology-driven methods for gig work, sometimes using technology-driven methods for gig work, earning more than \$35,000 income, having an auto loan, having a student loan, using predatory loans, being male, being of Non-White Ethnicity. Significant negative associations to being either “somewhat” or “very” financially confident include: having unpaid medical debt, not going to the doctor due to cost, self-reporting having moderate or high amounts of debt, being self-employed, being permanently sick or disabled, being unemployed, spending more than or equal to income, not carrying a credit card balance, and being either 45-54 or 65+ years of age.

Table 4. Adjusted Odds of Being Somewhat or Very Financially Confident			
			Somewhat or Very Confident
Gig Work	Additional Work	Yes	1.290 (1.097 - 1.517)
	Tech Gig Freq	Yes	4.532 (2.974 - 6.907)
	Tech Gig Sometimes	Yes	2.174 (1.637 - 2.888)
Health Factors	Unpaid Medical Loans	Yes	0.803 (0.664 - 0.971)
	Not Going to the Doctor	Due to Cost	0.557 (0.459 - 0.676)
	Not Filling a Prescription	Due to Cost	0.860 (0.696 - 1.061)
	Health Insurance	No	1.015 (0.740 - 1.393)
Financial Factors	“I have too much debt” Ref: 1 -Strongly Disagree	2	0.632 (0.475 - 0.839)
		3	0.393 (0.291 - 0.530)
		4 – Neutral	0.348 (0.272 - 0.445)
		5	0.436 (0.328 - 0.578)
		6	0.242 (0.182 - 0.321)
		7 – Strongly Agree	0.179 (0.137 - 0.234)
	Household Income Ref: <\$15,000	\$15,000-\$24,999	1.616 (0.942 - 2.773)
		\$25,000 - \$34,999	1.582 (0.952 - 2.629)
		\$35,000 - \$49,999	1.807 (1.104 - 2.958)
		\$50,000 - \$74,999	2.686 (1.645 - 4.386)
		\$75,000 - \$99,999	3.769 (2.291 - 6.199)
		\$100,000 - \$149,999	4.256 (2.554 - 7.094)
		\$150,000 +	4.627 (2.664 - 8.038)
	Employment Ref: Full-time for employer	Self employed	0.673 (0.509 - 0.890)
		Part time for employer	1.019 (0.710 - 1.464)
		Homemaker	0.733 (0.481 - 1.116)
		Full time student	0.752 (0.365 - 1.550)
		Permanently sick disabled	0.554 (0.330 - 0.929)
		Unemployed	0.344 (0.210 - 0.562)
		retired	1.207 (0.877 - 1.660)
	Spending and Income Ref: Spending < income	Spending > income	0.290 (0.240 - 0.349)
		Spending = income	0.482 (0.410 - 0.566)
	Income Drop (Ref: No)	Yes	0.597 (0.492 - 0.724)
	Credit Card Balance (Ref: Yes)	Not carrying a CC balance	0.760 (0.647 - 0.892)
	Auto Loan (Ref: No)	Yes	1.193 (1.031 - 1.380)
	Student Loans	Yes	1.240 (1.004 - 1.531)
	Predatory Loans	Yes	1.306 (1.019 - 1.674)
Individual-Level	Sex	Male	1.158 (1.009 - 1.330)
	Age (Ref: 18-24)	25-34	1.167 (0.788 - 1.729)
		35-44	0.837 (0.567 - 1.235)
		45-54	0.636 (0.428 - 0.946)
		55-64	0.694 (0.463 - 1.042)
		65+	0.463 (0.301 - 0.712)
	Ethnicity (Ref: White)	Non-White	1.236 (1.039 - 1.471)
	Education Ref: Did not complete HS)	HS Grad – Regular	1.553 (0.774 - 3.115)
		HS Grad – GED	1.804 (0.858 - 3.793)
		Some College	1.740 (0.873 - 3.469)
		Associate’s Degree	1.778 (0.880 - 3.595)
		Bachelor’s Degree	1.631 (0.815 - 3.263)
		Post-Grad Degree	1.759 (0.869 - 3.560)
	Marital Status Ref: Single	Married	0.889 (0.741 - 1.067)
		Separated	0.667 (0.341 - 1.306)
		Divorced	0.853 (0.664 - 1.096)
		Widowed	1.070 (0.739 - 1.548)

DISCUSSION

Gig work is a relatively unexplored research area. By casting a broad definition of gig work (frequently, sometimes, technology-driven, traditional additional work) the present study described the financial and personal characteristics of gig workers. This study also measured the relationship between gig work and financial confidence by adhering to the Serido et al (2013) model of financial capability development.

The results of this study corroborate previous studies and theories related to gig work and gig workers (Ranta and Salmela-Aro, 2017; Serido et al., 2013). The study also extends the work of these studies by measuring the financial characteristics of individuals who engage in gig work and additional work for pay. We found strong associations to participating in the gig economy across multiple health-related, financial, and personal characteristics and behaviors.

The results of this study are illuminating. Multiple healthcare-related variables were associated with participation in the gig economy, namely, having unpaid medical debt, not going to the doctor due to cost, not filling a prescription due to cost, and being uninsured. These relationships highlight some of the adverse consequences of lack of health insurance and not utilizing health services due to cost. Predatory loans, as defined as auto-title or payday loans in the present study, show a particularly strong positive association with additional work for pay and technology-driven gig work. These loans are characterized by triple-digit interest rates and inappropriate collection practices (Johnson, 2002; Martin & Adams, 2012). Users of these loan types have difficulty getting ahead of the large payment (due to interest) and often pay multiple times the value of the original balance.

Self-efficacy (or one's belief that one can achieve a goal) has been shown to be associated with behavior (Ajzen, 2002; Bandura, 1977). The present study used financial confidence in achieving a goal as a proxy for self-efficacy. Specifically, the study explored the relationship between a study respondent being somewhat or very confident in attaining a goal and their behavior in earning extra income via additional traditional work and technology-driven gig work, adjusting for other financial and personal characteristics and behaviors. We found that people who engage in the gig economy are more likely to respond that they are either somewhat or very financially confident, as opposed to not very or not at all confident in achieving a financial goal. Due to data limitations, we could not ascertain which direction this relationship flows, however, this could be a research question for future studies.

Applying the present study to the work of Serido et al (2013), we see that in Table 2, the financial characteristics of gig workers are less than ideal (high debt, spending more than income, predatory loan use, and healthcare-related financial trouble); however, in Table 4, these gig workers have a higher view of their confidence in achieving a financial goal. Therefore, the relationship between financial self-efficacy and financial behavior remains intact, even though the current financial status of the gig workers may not be financially strong.

One such factor affecting gig workers will be the spread of COVID-19: probably the biggest health crisis since the 1918-19 Flu pandemic in a world with many gig workers without health insurance or sick leave. Gig workers may work closely to clients with the virus prior to symptoms or with no symptoms. They may not quarantine to recover because their jobs are required more than ever and their lack of financial stability. In order to limit the spread of

COVID-19, the information we seek in this study may be critical in the long term for platform companies to understand the public health effects of their hiring policies and committing that economic uncertainty will not be deterrents to their workers following public health guidance.

LIMITATIONS

Our study had several limitations. First, while the 2018 NFCS surveyed over 27,000 people, the questions related to gig work were new to 2018 and the survey was limited to a cross-sectional research design. Therefore, no causal relationships should be inferred from this study. Moreover, while the sampling design attempts to reduce bias, it is possible that the sample may be biased in some unknown way. While causal relationships generally offer more and stronger insights, we believe that the association with this study offers significant preliminary steps to future research related to gig work.

A second limitation is the lack of data that describes why the individual is participating in gig work - necessity or desire? Motivations for gig work participation are varied and the 2018 NFCS does not provide individual-level gig worker motivation information. If a gig worker has fallen on hard times and gig work is the only option, they may have a lower financial confidence as opposed to the gig worker who works to earn extra income to pay off debt or invest.

CONCLUSION

The purpose of our research was to document the associated characteristics of gig workers and their financial confidence. We found even though the current financial status of gig workers may not be strong, their financial confidence in reaching a goal was significantly higher than non-gig workers. No matter how poor their financial condition becomes, the relationship between self-efficacy (financial confidence for goal attainment) and financial behavior (gig work) still remains true (as illustrated in the Serdido theoretical model). The characteristics of gig workers are fairly poor (high debt, spending more than income, predatory loan use, healthcare issues), BUT those same gig workers have a HIGHER view of their confidence in achieving a financial goal.

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WHEN WOMEN EARN MORE THAN MEN: THE GENDER WAGE GAP STORY OF COUNTY FINANCE DIRECTORS IN NORTH CAROLINA

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ABSTRACT

Prior literature has examined the salary differences among individuals employed in various industry and governmental roles. However, the question regarding the salary differential remains unanswered for those individuals employed as finance director at the local government level. This article addresses this question by examining whether there is significant pay difference between men and women who are employed as finance director for a county within the State of North Carolina in 2018. The data analyzed within this article was collected from public documents including the “Comprehensive Annual Financial Report (CAFR) that each county in the State of North Carolina is legally required to provide to the public. The findings from a univariate analysis suggest that women employed as finance directors by counties within the State of North Carolina earned less than their male counterparts in 2018. However, when this question is addressed via multivariate regression model that controls for tenure, qualification, along with the county’s economic variables, the results provide a different picture. Specifically, women employed as finance directors and who have earned the Certified Public Accountant designation before starting in their role of finance director are, on average, compensated significantly higher than men, all else equal.

INTRODUCTION:

Although wage inequality across genders has significantly declined in the twentieth century (Goldin, 2014; Blau & Kahn, 2008), Blau *et al.* (2017) suggests that the unexplained wage gap among men and women in United States has declined at a slower pace between 1980 and 1989. Furthermore, in 2012, the United States ranked 61 out of 135 in wage equality among men and women when performing similar work (Hausmann *et al.*, 2012). Empirical evidence from a longitude study conducted from 1986-2016 suggests that the wage gap among men and women has significantly declined but it has not been eliminated (Gharehgozli & Atal, 2020). Blau *et al.* (2017) suggest that the gender wage gap persists due to the following reasons: the interruptions that women endure while participating in the work force, shorter periods of participation, differences in occupations and/or industries, along with differences in gender roles regarding the division of labor. Findings from a survey of North Carolina residents conducted in 2018 suggest that women who worked year-round in a full-time position earned a median salary

of \$36,600, which was both economically and statistically less when compared to the \$45,000 salary earned by men (Anderson & Williams-Baron, 2018).

Prior research has attempted to assess whether women are paid less than their male counterparts in various industries. Horraccé *et al.* (2001) suggests wage difference among men and women were statistically insignificant except for those individuals working within the Finance, Insurance, and Real Estate sector when compared to other industries. The findings from the Institute of Management (IMA) 2019 Global Salary Survey, which consisted of 1,195 American accountants (514 women and 681 men), coincide with the results from Horraccé *et al.* (2001). In the IMA study, Charles (2019) provides empirical results that suggest that women working as accountants earn approximately 14% less than the median of total compensation as compared to men in United States.

According to the Labor Force Statistics from the Current Population Survey, which was updated in January 2021, there are approximately 1.48 million individuals working as either accountants and/or auditors in the United States, of which 60.01 percent (893 thousand) were women. Jones III *et al.* (2020) suggests women represent approximately 50 percent of individuals entering the labor force via private firms within the accounting profession; however, only 23 percent of equity partners are women. Historically, the public sector or government has provided far more equitable opportunities for women, thus women represent a significantly disproportionate share of employees within the public sector (Copper *et al.*, 2012). Women held the majority (57.7 percent) of full-time state and local government jobs in 2013 (Mayer, 2014). Thus, this article aims to add to the existing research regarding the wage gap among men and women employed by local municipalities to serve the community as finance directors by examining a multitude of factors that may explain why women outnumber men in this role.

Both state and local governments have been proactively enacting policies intended to address this type of wage discrimination within the various positions and/or roles within the government entities, agencies, and/or organizations. Furthermore, cities, counties, and states have chosen to implement salary history bans (SHBs). The enactment of SHBs are intended to reduce and/or minimize the gender wage gap between men and women (McNichols, 2019). In an effort to eliminate the gender wage gap within the State of North Carolina, Governor Roy Cooper signed Executive Order No. 93 on April 2, 2019. This executive order prohibits state agencies from requesting salary histories from job applicants along with directly removing the salary history fields from state employment applications.

Individuals employed within the public sector by a governmental entity, agency, and/or organization represent a significant number of individuals participating in a state's overall labor force. Per the 2019 Annual Survey of Public Employment & Payroll Survey, there are 647,478 individuals employed by a governmental entity in either full-time or part-time role within the State of North Carolina and earn approximately \$2,492,185,049 (2019 dollars) in March 2019. The wages earned by those government employees account for approximately 2.71 percent of the 1.031 trillion dollars of annual wages earned by residents of the State of North Carolina (Federal Reserve Bank of St. Louis and U.S. Bureau of Economic Analysis, 2020). It is undeniable that the wages earned by governmental employees contribute significantly to the overall economic activity and/or prosperity of city, county, region, or state in which he or she reside. Therefore, it is crucial to examine whether salary gaps and/or wage discrimination have been eliminated from these public-sector positions.

Prior research suggests that women employed as municipal managers earn significantly less than men (Fox & Schuhmann, 1999). The role of gender within the county finance director

position was briefly addressed in a survey of municipal employees conducted in 1979, approximately 40 years ago. Burns *et al.* (1980) conducted and analyzed the data in that study and reported that 96 of the 590 respondents were women employed as finance officers, while only 37 men were employed as the finance officers. Although that sample of municipal employees may not be nationally representative, however, the response rate implies that at that particular point in time the majority of finance officers or directors were women.

This paper adds to the literature by examining whether a gender wage gap currently exists among county finance directors across various counties within the State of North Carolina. The research question was addressed by examining publicly available data from the various Comprehensive Annual Financial Reports(CAFR) and merging that information with employee salary and tenure data provided by the University of North Carolina Institute of Government on its dashboard:2019 County Salaries in North Carolina. Univariate analysis suggests that males earned significantly more than females. However, the results from a multivariate model that accounts for the county directors' gender, qualifications, tenure, and various economic demographic factors suggest that qualified females earn significantly more than males but receive significantly less in cost of living adjustments.

This paper consists of the following sections a literature review of current and/or prior research regarding the wages of municipal government wages process of collecting the data and univariate analysis of demographics, three multivariable regression models, the results from the regression, and finally a discussion of the results as well as possible policy implications.

LITERATURE REVIEW

A woman's decision to enter the work force is influenced by her current family situation (Madden, 1973) and by her unique preferences towards participation in the labor force versus household production (Becker, 1965; Becker, 1973; Mincer, 1962). While not specifically addressed by those researchers, the same can be said for a man's choice. Those preferences influence the decisions a woman (or man) makes regarding the decision to enter the labor market. In an empirical examination of numerous levels of municipal administration (including assistant managers, finance directors, and departments heads) Burns (1980) found evidence that suggests men and women differ in various areas such professional ambition, definition of managerial roles, and support networks.

In an effort minimize any (or perceived) graft and corruption, council-manager have sought to depoliticize municipal administration. Therefore, municipal governments aim to abide by the standard in which elected officials establish public policy and nonelected experts are hired to facilitate in the policy's implementation (Nalbandian, 1991). Each local government may decide how it elects to hire and/or appoint the county's finance director (North Carolina General Statutes Chapter 159, 2019). Thus, some counties chose to make this decision based on the size and/or resources of the county determine whether a county's finance director is appointed by the County's Board of Commissioners or if the county's manager is burdened with the responsibilities typically delegated to the finance director. The nonelected experts are tasked with the responsibility of helping municipal managers, elected officials, and local residents to make informed and/or educated decisions regarding the financial position and/or condition of the county (Nalbandian, 1991). For example, the county's budget which is endorsed by manager and created by the finance director must provide the best possible solution and/or policy outcome without overspending and/or resulting in an increasing in revenue (Morgan *et al.*, 2014) .

Municipal budgets that exceed the pre-established parameters will most likely result in the county having to either reducing public service expenditures and/or the enactment of an increase in taxation. Neither of those options positively influence the county's residents. Furthermore, prior research suggests that female finance directors were more likely to strive to remain within the state's benchmarks during the formulation of a budget partly due to the association of having higher denial departmental requests than their male counterparts (Modlin & Goodman, 2018).

North Carolina General Statutes Chapter 159. Local Finance Section 159-29 outlines that finance directors may have the following duties and/or authority such as the disbursement of funds, preparation of financial statements, maintenance of records pertaining to issuance of bonds or other obligations, supervision of investments, and the continuance of education in area of municipal finance. Prior research conducted on gender difference among government employees has primarily focused on federal employees and suggest that women exhibited a higher preference towards policies that address increasing social welfare spending and a minimalization of military spending (Ahern *et al.*, 1997; Frankovic, 1982; Downs, 1967). Therefore, the opinions and/or analyses rendered by these non-elected professions can have a profound impact on how the municipality manages and/or pursues current and/or future public service projects. Modlin *et al.* (2018) suggests that a significant portion of a county finance director's duties include, but are not limited to, collecting budget requests for the varies representatives from each service department as well as some requests from the elected officials which must be compiled into initial budget that must formulated before the county manager can endorse it before its implementation.

The findings from a survey conducted in 1999 of 520 chief financial officers from 48 counties and 179 cities with 50,000 or more residents with an approximate response rate of 43.65 percent suggests that the average finance director had 22 years of accounting experience, 16 years of government accounting experience and have worked in their current position for an average of 8 years and earned approximately \$78,210 (Johnson & Brooks, 2001). Therefore, municipalities most prioritize hiring the right person for the job, as it is of the utmost importance.

The extant literature has also examined the career paths and demographics of men and women who are employed by governments to serve as finance directors. Prior research suggests that women employed by municipalities as finance officers and/or directors are more likely to be older, have fewer children, and to be divorced, separated, or single in comparison to their male colleague (Burns, Fong, & Fuhrman, 1980). Women were also more likely to be promoted to the position of Finance Director rather than hired from outside the organization. Due to the unique nature of the finance officer position which responsible with the duty of maintaining the county's bookkeeping, accounting and budgeting activities it is hypothesized that the majority of those respondents in the study entered the municipal management sector as an assistant and as time progressed their roles expanded to include major accounting and budgetary responsibilities. Interestingly, prior research on finance director's demographics concluded that municipalities with greater resources and those who have elected female mayors are more likely to employee women within the municipal government (Saltzstein, 1986)

This paper adds to the existing literature by investigating one of the incentives to enter the workforce, compensation. Government employee salaries are public record. However, the information that is publicly available should not be used to discriminate and/or influence an applicant's potential and/or excepted salary. The current literature fails to address whether a wage gap exists between women and men hired to serve the county as a finance director.

DATA

Under North Carolina statute², state agencies and/or governmental component units of the State are required to prepare annual financial disclosures regarding the funds administered by them no later than 60 days after the end of the State's fiscal year. That financial information must be collected and combined into a Comprehensive Annual Financial Report that shall be published as the official financial statement of that entity and made publicly available. To explore whether a difference in wage and/or salary exists between men and women employed as county finance directors, various public documents including the Comprehensive Annual Financial Reports (CAFR) of ninety counties were examined. Then the salary and tenure of each finance director was cross verified with the University of North Carolina Institute of Government's County Salaries in North Carolina: County Salaries in North Carolina, 2019. The data from these public documents was collected and compiled into a spreadsheet which was then analyzed via statistical software.

The study and application of finance theory and principles is based on accounting information; thus, a Certified Public Accountant (CPA) should be capable of making financial projections, developing and interpreting ratios, along with an understanding of all the cost associated with the production and/or management of capital (Roy, 1967). CPAs hold themselves to a higher standard as their Code of Professional Conduct is integral to their certification and are therefore more likely to be able to differentiate between ethical and unethical practices and/or behaviors (Ward, Ward, & Deck, 1993). In today's economic environment employers continue to see the value attached to the breadth of knowledge and skill obtained by those who have earned the right to use the CPA designation (Charles, 2019). The successful completion of all exams required along with mandatory hours of supervision by a CPA provide a metric to quantify the individual's aptitude and attitude of the tasks and responsibilities that embody the role of a county finance director. In this analysis, the CPA designation will therefore serve as a proxy for an individual's qualification.

Prior studies found evidence that suggests that women working as accountants had significantly less experience than men (12.8 vs 17.0 years), shorter tenure in that role (3.3 vs 4.5 years), and had been employed by the same firm for less time (6.2 vs 8.2 years); however, in 2001 when this survey was collected, there were more women than men respondents in entry-level positions (24% vs 11%) (Reichardt & Schroeder, 2002). Univariate results of this sample of municipal finance directors, of which most identified themselves as accountants, suggest that the tenure and/or experience of municipal finance directors is significantly different from those accountants who were employed in the private sector. However, due to the limitations in publicly available data, this study consists of only municipal employees; therefore, future research should examine whether wage gaps exist between public and private sector employees as one could argue there are several differences among the two sectors of employment.

² North Carolina General Statute Chapter 143B. Executive Organization Act of 1973 Section 143B-426. 40H. Annual Financial Information

Table 1: Demographics of Women and Men Finance Directors of North Carolina Counties

	Women (63)	Men (27)
Mean Finance Director Salary	95,316.22**	108,733.40*
Number of CPA	9	6
Mean Tenure	8.98	6.71
Mean of CPA and Tenure	8.86	12.43
Number of Urban	36	15
Number of Rural	27	12
Mean Median Income	48,556.16	50,475.22
Mean Total Government	135,5471,215.68	149,367,139.22

Difference of means test comparing female and male finance directors within the State of North Carolina in 2018, *** $p < 0.01$; ** $p < 0.05$; * $p < 0.10$.

Although, the univariate results of the difference between men and women in this sample are not statistically significant (except salary which implies that women earn less than men) one can infer that the majority (70 percent) of finance directors hired by counties in the State of North Carolina are women. In 2018, on average, women had been employed as county finance directors for a longer period of time (8.98 vs 6.71 years) and were more likely to have earned the CPA designation; however, men with the CPA designation have held the designation for a longer period of time (8.86 vs 12.43 years).

Table 2 (below) contains mean, standard deviation, minimum, and maximum statistics of the salary, gender, certified public accountant (CPA) designation and the tenure of the finance director along with the economic demographics of the county he or she serves. Due to limitations in the availability of certain public data at the time of this analysis, the final sample analyzed was constrained to ninety of the one hundred North Carolina counties and neither the birthday date and/or age of the county directors was not publicly available due to privacy concerns.

Table 2: Descriptive statistics

Description	Mean	St. Dev.	Min	Max
Finance Director	99,341.38	31,049.33	46,052	183,123.20
Gender	0.7000	0.4608		
CPA	0.1667	0.3747		
Tenure	8.30316	8.9366	0	42
Urban or Rural	0.4667	0.5016		
Median Income	49,131.88	9,761.28	35,433	80,428
Total Governmental Revenue	139,693,192.74	237,525,824.30	13,205,056.00	1,662,302,212.00

MODEL

In this analysis, our variable of interest is the salary that a county within the State of North Carolina pays its Finance Director. Three ordinary least square (ols) models were implemented to evaluate whether a difference in a salary a finance director's salary can be

explained the individual's gender, qualifications, and/or tenure. The first model (Model I) examines whether the salary that a county in North Carolina pays its Finance Director is explained by the individual's gender, qualification, or tenure.

Model I

$$\text{Finance Director Salary} = \beta_0 + \beta_1 \text{Gender} + \beta_2 \text{CPA} + \beta_3 \text{Tenure} + \varepsilon$$

The second model (Model II) includes the county's economic demographics in addition to the finance director's demography in an effort to determine whether salary difference exists.

Model II

$$\text{Finance Director Salary} = \beta_0 + \beta_1 \text{Gender} + \beta_2 \text{CPA} + \beta_3 \text{Tenure} + \beta_4 \text{Urban} + \beta_5 \text{Median Income} + \beta_6 \text{Total Governmental Revenue} + \varepsilon$$

Finally, the third model (Model III) introduces interaction terms which control for the finance director's unique characteristics, such as gender, qualification, and tenure along with the previously identified county's economic demographics.

Model III

$$\text{Finance Director Salary} = \beta_0 + \beta_1 \text{Gender} + \beta_2 \text{CPA} + \beta_3 (\text{Female} \times \text{CPA}) + \beta_4 \text{Tenure} + \beta_5 (\text{Tenure} \times \text{Female}) + \beta_6 (\text{Tenure} \times \text{CPA}) + \beta_7 (\text{Tenure} \times \text{Female} \times \text{CPA}) + \beta_8 \text{Urban} + \beta_9 \text{Median Income} + \beta_{10} \text{Total Governmental Revenue} + \varepsilon$$

Hence, each model builds on the prior model by including additional variables to serve as controls and help to mitigate the limitations of the prior model. The third equation is the most comprehensive of the models estimated as it is intended to address the possibility of omitting an economic variable from the analysis.

RESULTS

The results from the first model (I) suggest that a man with no tenure in this role and who has not earned the CPA designation on average earns approximately \$97,843.93 per year. Women are paid \$11,5575.64 less than men, all else equal. Highly qualified individuals (proxied by CPA license) earn on average \$35,770.91 more than those that do not hold the designation. In model (I) the tenure variable was not statistically significant. This model explains 25 percent of the variation among county finance director salaries ($R^2 = 0.2521$).

Once the counties economic variables are introduced, model (II) explains almost 68 percent of the variation in salary ($R^2 = 0.6762$). This indicates that model (II) is a better fit than model (I). The results from model (II) suggest that women are paid \$9,764.92 less per year than men, all else equal. However, the results also suggest that each additional year in the role of finance director is associated with an increase of \$742.54 per year. Finance directors hired in counties classified as urban setting by the United States Census Bureau earned \$14,625.66 more than those hired in rural counties. As in model (I), there is a significant premium earned by highly qualified individuals, \$17,010.85. The county's economic resources such as its total governmental revenue and its resident's median income also significantly impact the salary that its finance director earns per year.

After the interaction terms, which control for gender and qualification, are introduced in model (III) the results suggest that counties in North Carolina are willing to pay highly qualified women a premium. On average, a highly-qualified woman who was about to begin her role as finance director earned approximately \$108,369.72, which is \$23,869.71 more than a highly-qualified man who on average only earned \$84,500.00. Women without the CPA designation earned on average the least; \$79,582.49. Note that this is \$28,869.71 less than the salary women with the CPA designation earned. Finally, men without the CPA designation on average earned \$99,733.39. Counter intuitively, this result suggests that counties pay men without the CPA designation more than men with the CPA designation. Additional analysis was conducted to examine the interactional difference between women working in rural versus urban counties however the results were statistically insignificant.

The estimated coefficients regarding the relationship of salary and qualification (where the CPA designation served as a proxy) from the three multivariate models suggest that counties in North Carolina are willing to pay a premium to attract and retain highly qualified individuals, especially highly qualified women. This result is consistent with the findings from Charles's (2019) analysis of the 2019 Institute of Management (IMA) Global Salary Survey data in which CPAs earned 29% more than the median of total compensation earned by those working as accountants.

Table 3 reports the results from the three OLS models exhibiting the difference in county finance salaries between men and women. All else being equal, the results from all three model suggest that women earn significantly less than men in the role of the county's finance director. Specially, the results from the second model suggest that women working as finance directors on average earn \$ 9,764.92 less than men in the State of North Carolina. However, women with the CPA designation make significantly more than women without the designation and men with or without the CPA designation. Subsequently, the results suggest that qualified women start at higher salaries. Noteworthy is that the interaction variable that controls for gender, qualification, and tenure suggests that highly-qualified women get less in cost of living increase and/or raises in pay.

Table 3: Results for an ordinary least squares analysis

Variable	Model I Coefficient	Model II Coefficient	Model III Coefficient
Intercept	97,843.93***	46,731.36***	62,286.97***
Gender (Female)	-11,575.64*	-9,764.929**	-20,150.90***
CPA	35,770.91***	17,010.85***	-15,233.39
Female & CPA			44,020.61***
Tenure	438.29	742.54***	-1,188.62
Female & Tenure			1,957.38**
CPA & Tenure			3,742.75***
Female & CPA & Tenure			-4,940.13***
Urban		14,625.66***	14,836.89***
Median Income		0.74***	0.62**
Total Governmental Revenue		0.00005***	0.00005***
R ²	0.2521	0.6762	0.7234

*** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$

CONCLUSION

Prior research suggests that women earn significantly less than men when employed to perform the same task. The results from a univariate analysis suggest that finding is still true within a sample of 90 individuals who were hired to serve as the county finance directors throughout various counties within the State of North Carolina. However, when the interaction variables that control for qualification, tenure, and gender a significantly different answer appears which suggests that qualified women earn significantly more than their male counterparts. The results also suggest that cost of living adjustments and/or raises awarded to women are significantly less than those awarded to men.

The findings from this analysis suggest that municipal governments have addressed the gap in wages among gender by compensating the individuals not by their gender but rather the degree of qualifications he or she possesses when hired to serve as county finance director. A county decision to compensate an individual by his or her qualifications rather than by their gender ensure that the county hires the most qualified individual for the role. However, due to availability of salary data from private accounting firms its impossible for this analysis determine and/or estimate the fair market wage for individuals entering the accounting profession via the private sector which could help explain why this wage premium exists within local governments. The absence of this data prevents this analysis from determining whether men choose to forgo accounting careers within local government.

Like all research, this research has limitations. Specifically, our research has only focused on county finance directors in North Carolina. Future research should therefore investigate whether similar results can be found for other states and different government entities like states, municipalities, or school districts. Perhaps, future researchers could conduct a longitude analysis to determine whether there is a wage gap among the salary increases received by county finance directors and whether this contributes to a shrinking or expanding wage gap.

Future research could also try to explain the role race and/or ethnicity has on the wages and/or salary that an individual earns as finance director. Perhaps, future research should also examine a longitudinal dataset to evaluate how cost of living adjustments and/or wage increases are distributed and/or assigned differently not among genders but across the private and public sector. Due to public data limitations, we were not able to address these questions for our sample. However, the U.S. Census Bureau does publish the county demographics and it could be used a control variable to determine whether county demographics influence the salary that paid to municipal government employees.

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THE ASSOCIATION BETWEEN MEDICAL HARDSHIPS AND EARLY RETIREMENT ACCOUNT WITHDRAWALS

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ABSTRACT

Medical hardships are common in the United States due to rising medical expenditures and patient-financial responsibilities. Meanwhile, every year, billions of dollars are lost to penalties from early withdrawals from retirement accounts to pay for these medical bills. Prior research has been devoted to the interrelation between the medical hardships and medical affordability. Separately, attention has been paid to the leakage impact of the early withdrawals from retirement withdrawals. This study explores the linkage between medical hardships and early withdrawals from retirement accounts. We ask whether the medical hardships, such as unpaid medical debt, unfilled prescriptions due to cost, and medical-care avoidance due to cost, are associated with early withdrawals from retirement accounts. We then discuss the negative financial impact of early withdrawals from retirement accounts on retirement readiness. Lastly, we explore the potential impact of the vicious circle among the low-income, uninsured, medical hardship sufferers coupling to their early withdrawals from retirement accounts and retirement readiness.

INTRODUCTION

With ever-growing medical expenditures, medical hardships due to cost have become a pressing problem (Cohen, Cohen & Banthin, 2009; Yabroff, Zhao, Han & Zheng, 2019) and the medical expenses from the current COVID-19 pandemic have led many Americans to fall deeply in debt (Wapner, 2020). For decades, researchers have discussed the associations between the medical expenditures and retirement savings or retirement readiness (Fronstin, 2008; Qiu, 2016; VanDerhei, 2012). Goldman, Zissimopoulos & Lu (2011) suggested that medical expenditure was an important factor for understanding retirement decisions, financial preparation for retirement, and healthcare outcome prediction. Zheng, Jemal, Han, Guy, Li, Davidoff, Banegas, Ekwueme & Yabroff (2019) defined medical hardship, or medical financial hardship, in three domains: 1) material, such as inability to pay medical bills, 2) psychological, such as anxiety about paying medical bills, and 3) behavioral, such as medical care delay or avoidance.

Dwyer and Mitchell (1999) reported that the main concern for retirement savings readiness came from medical problems. Early withdrawal from retirement savings has been one method for relieving medical hardship (Salter & Evensky, 2008). Early withdrawals of

retirement savings impact participants' retirement savings readiness in the short term and long term. In the short term, apart from the income taxes on the taxable portion of the amount, IRA owners and participants in 401(k) plans generally need to pay a 10-percent penalty with withdrawals before age 59½ (IRS, 2021). In the long term, early withdrawals permanently remove assets from retirement savings, thereby losing the compounded interest and other potential earning (Jeszeck, Lehrer, McMurray, Fernandez, Miskell, Tessin & Wendel, 2019). IRA owners and 401(k) participants paid \$6.2 billion for the 10-percent penalty in 2013 alone (Jeszeck et al., 2019).

People who lack health insurance were more likely to have less medical care access and have more medical hardships (Asplin, Rhodes, Levy, Lurie, Crain, Carlin & Kellermann, 2005; Kennedy & Morgan, 2006). Uninsured people were more financially fragile when having unexpected medical expenses (Lusardi, Mitchell & Oggero, 2018; Wolman & Miller, 2004). Hence, they faced higher risks of having unpaid medical debt, unfilled prescription, and higher rates of medical-care avoidance due to cost (Doty, Edwards & Holmgren, 2005; Kirking, Lee, Ellis, Briesacher & Mckercher, 2006, p.39; Kraft, Quimbo, Solon, Shimkhada, Florentino & Peabody, 2009; Sood, Long, Terp, Joyce & Arora, 2014). In the United States, young adults 19 to 24 years old were the most likely (31 percent) to be uninsured (Peterson & Grady, 2008). They had higher barriers to obtain medical care and were more likely to have medical hardship (Callahan & Cooper, 2005). Uninsured people also faced higher financial risk because of having fewer assets and little ability to borrow (Wolman & Miller, 2004).

This study examined the relationship between medical hardships due to cost and early withdrawals from retirement savings plans. Previous studies of early withdrawals have considered either only the leakage impact for the retirement security/readiness or compared the degree of medical hardship on insured or uninsured. It is important to investigate the financial characteristics of the individuals who took early withdrawals from their retirement savings, which may then guide policymakers and financial professionals to better understand the financial and socioeconomic status of these individuals, along with the ripple effects on the current retirement and social security system. We believe it is a vicious circle: low-income people cannot afford healthcare insurance, which may make them more likely to have medical hardship and take early withdrawals, thereby making them stuck in perpetual financial plight.

LITERATURE REVIEW

Medical hardship is increasingly a primary contributor to household and individual financial distress as medical care costs have risen relentlessly and continuously for decades - above the inflation rate, income increases, and the GDP growth rate. The Centers for Medicare & Medicaid Services projected that the medical spending share of GDP would rise from 17.9 percent in 2017 to 19.4 percent by 2027 (Centers for Medicare & Medicaid Services, 2019). The COVID-19 crisis may make this projection worse. Bartsch, Ferguson, McKinnell, O'Shea, Wedlock, Siegmund & Lee (2020) estimated that if 20 percent of Americans are infected with COVID-19, an average of \$163.4 billion indirect costs would be generated. Personal bankruptcy resulting from medical hardship is common despite the Affordable Care Act (Himmelstein,

Lawless, Thorne, Foohey & Woolhandler, 2019). In 2007, 62 percent of personal bankruptcy filings resulted from medical hardship (Himmelstein, Thorne, Warren & Woolhandler, 2009).

Retirement and Health Savings

According to a report from the US Pension Rights Center, less than 1/3 of American workers possessed an employer-sponsored retirement plan (Pension Rights Center, 2019). It is estimated that half of American adults will have insufficient funds with which to sustain their retirement (Warshawsky & Ameriks, 2000); this can largely be explained by low savings rates and inadequate financial risk tolerance (Hallahan, Faff & McKenzie, 2004; Martin & Davari, 2018; VanDerhei, 2015).

Behavior Life Cycle theory holds that individuals tend to place financial assets into different accounts, each of which is mentally assigned to a different purpose or function, a process known as mental accounting. The most common mental accounts used by consumers are current income, current assets, and future income, the latter of which include assets used to produce future income (Shefrin & Thaler, 1988). These accounts appear to exist in a hierarchy whereby current income is the most basal to consumers, followed by current assets, and lastly, future income (Kitces, 2017). This supposition may also help explain why Millennials seem to be far more conservative with their investment choices and appear to have fewer current assets available to them than other age groups (Kirkham, 2015). It may also indicate why people have much more financial fragility (Nicolini, 2016) than they may realize and why, when exposed to unaffordability risks, they move beyond current income, current assets and move into assets held to produce future income to recover.

Uninsured

In 2018, 9.2 percent of the US population remained medically uninsured (Freund & Choi, 2018). Uninsured nonelderly individuals increased from 27.7 million in 2016 to 28.9 million in 2019 (Tolbert, Orgera & Damico, 2020). Most uninsured people were low-income families and have at least one worker in the family. Working-age adults (19 to 64 years old) were the largest uninsured population segment (84.6 percent) (Berchick, 2018). Even with the ACA, the high cost of insurance is still the main driver for coverage inaccessibility (Bosworth, Finegold & Ruhter, 2021).

Unpaid Medical Debt

Although the proportion of families that face medical bill problems remained stable, the proportion of nonelderly people with medical bill problems has increased considerably since 2003 (Sommers & Cunningham, 2011). There were 137.1 million Americans facing financial hardship in 2019 because of medical costs (Yabroff et al., 2019). The Commonwealth Fund Biennial Health Insurance Survey revealed that 25 percent of working-age adults with adequate coverage for the full year struggled to pay their medical bills or debts, while 50 percent adults without adequate coverage for the full year had trouble paying their medical bills in 2019 (Commonwealth Fund, 2020). Shen & McFeeters (2006) claimed that people who had no private group coverage had a high out-of-pocket burden, regardless of income level and that low-income adults who had employer-sponsored insurance had heavier out-of-pocket burden than the uninsured. Nevertheless, Dranove and Millenson (2006) argued that medical debt was a causal

contributor for most bankruptcy filings. Dobkin, Finkelstein, Kluender & Notowidigdo (2018) found that the uninsured non-elderly individuals were more likely to have increases in unpaid medical bills and bankruptcy rates after hospital admission compared to the insured non-elderly. Medically uninsured individuals had the highest rates of medical debt, and there were significantly higher rates of medical debt in working-age adults than 65-year-old and older (Doty et al., 2005).

Unfilled Prescriptions

Patients with unfilled prescriptions are an important public health consideration (Belletti, 2011; Goldsmith, Kolhatkar, Popowich, Holbrook, Morgan & Law, 2017; Zheng, Poulouse, Fulford & Holbrook, 2012). Approximately 30 percent of Americans failed to fill prescriptions because of high medicine price barriers (Gadkari & McHorney, 2010; Kirzinger, Lopes, Wu, & Brodie, 2019; Tamblyn, Egualé, Huang, Winslade & Doran, 2014). One report showed that U.S. prescription sales in the calendar year 2018 totaled \$476.2 billion and were expected to rise by 4.0-6.0 percent in 2019 (Schumock, Stubbings, Hoffman, Wiest, Suda, Rim, Tadrous, Tichy, Cuellar, Clark, Matusiak, Hunkler & Vermeulen, 2019). Moreover, research has suggested that the uninsured were more likely to delay care and have unfilled prescriptions (Schoen & DesRoches, 2000). Sood et al. (2014) argued that cost variation was a barrier for uninsured patients for filling prescriptions. Moreover, the unfilled rate was higher among working-age disabled beneficiaries than those aged 65 years or older (Kennedy, Tuleu & Mackay, 2008).

Medical Care Avoidance

Another main concern for medical care is the delay or avoidance in care. High cost is the core driver for medical care delay or avoidance (Rahimi, Spertus, Reid, Bernheim & Krumholz, 2007; Tipirneni, Politi, Kullgren, Kieffer, Goold & Scherer, 2018; Weinick, Byron & Bierman, 2005). Federman, Vladeck & Siu (2005) stated that in the Qualified Medicare Beneficiary (QMB) program, part of the Medicare Savings Program, the enrollees were half as likely as non-enrollees in avoiding physician visits because of cost. The anxiety caused by the high cost of medical care also contributed to the avoidance of medical preventive and non-preventive care (Tipirneni et al., 2018). Moreover, Weissman, Stern, Fielding & Epstein (1991) stated that the odds of delays in care from black, poor, uninsured, or without a regular physician were 40 percent to 80 percent greater than others. Further research has shown that those who had low confidence in health insurance affordability were likely to have higher medical care and medication avoidance (Tipirneni, Solway, Malani, Luster, Kullgren, Kirch, Singer & Scherer, 2020).

Early Withdrawals

Studies have pointed out that a retirement crisis is coming in the U.S. (Ellis, Munnell & Eschtruth, 2014; Miller, 2020; Oakley & Kenneally, 2015; Rhee & Boivie, 2015) due to inadequate retirement funding for many people. The U.S. Government Accountability Office (Jeszeck et al., 2019) found that individuals in their prime working years (ages 25 to 55) executed early withdrawals of \$69 billion from their retirement savings in 2013. The amount of IRA early withdrawals was \$39.5 billion, which was the largest source of early withdrawals.

\$29.2 billion has been depleted from 401(k) plans. There was nearly a 1.5 percent leakage occurring from the 401(k)/ IRA system each year (Munnell & Webb, 2015).

Leakages occur in three ways: in-service withdrawals, cashouts, and loans (IRAs do not allow loans). Hardship withdrawals and withdrawals after age 59½ are both in-service withdrawals. In general, hardship withdrawals are subjected to income tax, the 10-percent penalty tax, and a 20-percent withholding for income tax (withdrawals after age 59½ can eliminate the 10-percent penalty tax) (Tacchino, 2020).

A hardship withdrawal consists of the employee's elective contributions and employer matching contribution. Hence, hardship withdrawals are very costly since they are not repayable and will permanently reduce the retirement savings from both individual and employer and deprive any compound interest accrued (Brown, Medeiros & Bruce, 2015; Butrica, Zedlewski & Issa, 2010). As an example, if an adult takes a withdrawal of \$1,000 when he is age 25, he will lose \$10,285 in his retirement savings by age 65 if his return on revenue is 6 percent per year. He will lose \$45,259 if his return on revenue is 10 percent per year (Tacchino, 2019).

Cashouts are subjected to the 10-percent early withdrawal penalty (if under age 59½), and a 20-percent withholding tax which is credited against the federal and state tax liability on the distribution. The U.S. Government Accountability Office estimated that about 2.7 percent of assets were lost each year through cashouts (Jeszeck et al., 2019).

Although the leakage from 401(k) plan loans has not been the main contributor to the retirement savings imbalance; the amount of unpaid plan loans was significant (Jeszeck et al., 2019). Not every 401(k) plan allows for loans (Beshears, Choi, Laibson & Madrian, 2012), loans are limited to the lesser of \$50,000 or 50 percent of the vested account balance, and the common minimum loan amount is \$1,000. When participants borrow money from 401(k) plans, no immediate tax is involved. However, when participants pay off the loan, usually in 5 years, the loan payments are after-tax, and are typically made through payroll deductions.

Pre-retirement liquidity

Moore and Turner (2021) suggested that retirement savings may be impacted by pre-retirement liquidity needs, and that the U.S. retirement public policy should be improved because pre-retirement liquidity can be shown to directly lead to the leakage from the pension system. Pre-retirement liquidity is a double-edged sword issue. First, inadequate liquidity or indebtedness would contribute to the insufficiency of the retirement savings balance, particularly when meeting an economic shock (Cavanagh & Sharpe, 2002; Moore & Turner, 2021; Ofili, 2017). People would have to take money either from their current accounts, or long-terms savings, such as retirement savings of 401(k) or IRA to ride out the economic shock. Theoretically, the higher the degree of illiquidity, the higher is the probability for stripping from the retirement saving. On the other hand, excessive liquidity also impacts retirement savings since people were more likely to overconsume and make irrational or over-optimistic decisions for their savings and retirement savings (Wertenbroch, Soman & Nunes, 2001; World Bank Group, 2019). Argento, Bryant & Sabelhaus (2015) identified that low-income families were more inclined to have an illiquidity issue and more likely to be led to early withdrawals for retirement savings when they experience economic shocks.

THEORETICAL ASSUMPTIONS

Understanding the relative importance of the underlying mechanisms responsible for the relationships studied here is hampered by the lack of a sufficient comprehensive theory. Case and Deaton (2005) argue that it was extremely difficult to understand the relationships between health, education, income, wealth, and labor-force status without some guiding theoretical framework. Consequently, our variable selection was guided by a number of theories.

Behavioral Life-Cycle Theory

Behavioral Life-Cycle Theory (Bernheim, Skinner & Weinberg, 2001; Biggs, 2017; Graham & Isaac, 2002; Shefrin & Thaler, 1988; Statman, 2017) is centered on the hypothesis that even people who want smooth spending during their entire life cycle find it difficult to balance needs for spending now and wants for saving for tomorrow. Behavioral life-cycle theory says that individuals reconcile these conflicts via personal devices and are helped by policies of government and employers. Personal devices include framing, mental accounting, and self-control rules that prohibit dips into other-than-designated accounts. Yet, these do not always work. Shefrin & Thaler (1988) found that faculty deciding whether to receive their salary in 9 versus 12 month payments fell into two distinct groups: 30 percent make the wealth-maximizing choice of pay cycle and 70 percent make the sub-optimal choice (in terms of wealth maximization), and give no weight to the economically relevant cost of their decision.

Public policies include such things as automatic enrollment into retirement plans, penalties for withdrawal from such plans, and mandatory Social Security, etc. Turner, Zhang, Hughes & Rajnes (2019) studied attitudes toward Social Security in Canada, Ireland, and the United States. In all three countries, with differing systems of financing and differing politics concerning the programs, surveys found a surprising degree of pessimism and lack of trust in social security programs. Although rhetoric in the United States about Social Security being “broken” may be part of the explanation there, that rhetoric was not present in Canada and Ireland. Employer policies include limits on retirement account withdrawal, loans, and required and shared contributions to retirement accounts.

Behavior Life Cycle Theory is designed to predict how consumers address their more complicated lifetime financial planning problems but makes no specific allowance for medical hardship which can disrupt all plans to smooth spending patterns regardless of personal self-control or government and employer constraints on retirement accounts.

Galama & Van Kippersluis (2019) developed an economic model to explain the observed disparities in health by social economic status (SES). In their model, lifestyle factors (preventive care, healthy and unhealthy consumption), working conditions (physical and psychosocial health stresses), living conditions (housing, neighborhood social environment), curative care and the constraining effect of health on work are mechanisms through which SES (endowed wealth, lifetime earnings and education) and health are related. The main mechanism through which lower SES translates into health is by increasing the marginal cost of and the demand for curative care. Further, as health declines with age, the demand for curative care increases. They suggest that

the effect of deteriorating health on investment in curative care shows that young individuals invest little in curative care, the middle-aged more, and the elderly the most. They did not measure medical hardship directly and did not explicitly include racial and gender disparities in health. Differences in SES between racial groups may account for most of the observed racial disparities in health. Just 12 percent of the working Americans reported that they took potential healthcare costs into their retirement planning (Harlow, 2015). Harlow and Brown (2017) opined that the health status of an individual was a pivotal factor when doing retirement-saving planning.

Financial Fragility

Financial fragility refers to a financial status in which an individual is exposed to unaffordability risks, which differentiate with financial troubles and financial difficulties (Nicolini, 2016). Hasler, Lusardi & Oggero (2018) found that 36 percent of Americans were financially fragile, and they cannot cope with a \$2,000 unexpected need. Among this financially fragile population, 35 percent are Millennials, aged 18 to 35. Some middle-income households also faced the financial fragility issue; additionally, even those having full-time employment or solid income cannot be exempt from financial fragility (Hasler & Lusardi, 2019; Lin, Bumcrot, Ulicny, Mottola, Walsh, Ganem, Kieffer & Lusardi, 2019; Lusardi, 2019). We expect the extent of financial fragility to be an ever-increasing phenomenon in the near future.

Researchers have discussed the reasons that cause financial fragility, including a) inadequate assets (Fasianos, Godin, Kinsella & Wu, 2014; Hasler et al., 2018; Yilmazer & DeVaney, 2005); b) illiquidity (Allen & Gale, 2004; Aspachs, Goodhart, Tsomocos & Zicchino, 2007; Brunetti, Giarda & Torricelli, 2016; Jappelli, Pagano & Di Maggio, 2013), for example, households or individuals do not have sufficient savings to pay an unexpected expense, such as medical treatment or car repair; and c) indebtedness (Christelis, Jappelli, Paccagnella & Weber, 2009; Faruqui, 2008; Jappelli et al., 2013; Skiba & Tobacman, 2019). Indebtedness can come from a series of financial loans that people were struggling to repay such as escalating student loan debt (Domma & Giordano, 2012). These reasons were robust determinants of financial stress on households (Anderloni & Vandone, 2008; Del-Río & Young, 2005; Fasianos et al., 2014). People can feel psychological stress and anxiety even if they can still afford their bills because they are aware of potentially unforeseeable financial or medical crises (Lusardi et al., 2018; Nicolini, 2016). Moreover, when people become financially fragile, especially when having too much debt, they were more likely to carry their debt into retirement, thereby negatively impacting their retirement well-being (Lusardi, et al., 2018).

Financial fragility can be measured by the capability to cope with unexpected expenses or income shock (Lusardi, Schneider & Tufano, 2011). Some scholars used negative net worth to measure the probability of household financial fragility, namely, if the total debt outweighs financial assets that would be the threshold of financial fragility (Brown & Taylor, 2008). Jappelli et al. (2013) measured the sensitivity of household financial fragility to indebtedness and found there was a positive association between the two. Ghilarducci, Radpour & Webb (2019) estimated that 20 percent of the early withdrawals from retirement accounts is caused by unexpected expenses or income shock.

Morrison, Gupta, Olson, Cook & Keenan (2013) emphasized that risk heterogeneity was a determinant for financial fragility and claimed that an individual's pre-shock financial status significantly associated with his health shock possibility. Automobile accidents were one of the common health shocks; many scholars have discussed this impact (Doyle, 2005; Lenhart, 2019; Morrison et al., 2013). In 2010, more than 30,000 people died, and nearly 4 million people were injured from vehicular accidents in the United States. The economic cost totaled \$242 billion which included lost productivity, medical cost, litigation cost, and property cost (Blincoe, Miller, Zaloshnja & Lawrence, 2015). Dobkin et al. (2018) also found that health shock was the main contributor to adults' financial risk in the U.S. Interestingly, other scholars remarked that there was no correlation between self-reported health issues and the possibility of financial fragility (bankruptcy filing) when debt levels were controlled (Fay, Hurst & White, 2002).

RESEARCH QUESTIONS

The literature supports the potential linkage between medical hardship and early withdrawals from retirement accounts. As outlined above, we have provided several theoretical rationales for why this may be present. Medical hardships include unpaid medical debt, unfilled prescription, and medical-care avoidance. While previous studies of early withdrawals usually consider only the leakage impact for the retirement security/readiness or compare the degree of medical hardship on insured or uninsured, the present study seeks to quantitatively describe the population that uses early retirement account withdrawals – specifically to determine any association with individuals suffering from a medical hardship. Building on the literature review we hypothesize that early retirement account withdrawals are associated with medical hardships and other socio-economic characteristics that traditionally are associated with lower healthcare access.

METHOD

Data Source

Analyses were conducted using data from the 2018 FINRA National Financial Capability Study (FINRA Investor Education Foundation, n.d.). The study was funded by the FINRA Investor Education Foundation and conducted by Applied Research and Consulting. The objectives of the study were to benchmark key indicators of financial capability and how they vary with demographic, behavioral, attitudinal, and financial literacy factors. The survey was conducted online from June through October 2018, among a national sample of 27,091 American Adults. Prior to 2018, the National Financial Capability Study was conducted in 2009, 2012, and 2015. Weights were calculated by Census distributions according to the American Community Survey. The entries were weighted to be representative of each state by age, gender, ethnicity, and education, and Census Division.

Study Variables

All study variables used in this analysis came from questions from the 2018 FINRA National Financial Capability Study related to medical hardship, uninsured status, and early

hardship withdrawals from retirement accounts. We constructed three models: starting with healthcare independent variables only, then building to other individual-characteristics, then finally a complete model with the inclusion of personal finance variables. The initial model used Unpaid Medical Loans, Not Going to the Doctor, Not Filling a Prescription, and Health Insurance beneficial as independent variables driving the dependent variable of Retirement Account Early Withdrawal. All dependent and independent study variables were coded as [1: Yes; 2: No; 98: Don't Know; and 99: Prefer not to say]. Missing main independent and dependent variables (respondents that replied that they either "Don't Know" or "Prefer not to say" were counted at 846 for "Not going to the doctor due to cost", 820 for "Not filling a Prescription due to cost", 857 for "Having unpaid medical debt", and 109 for "Early Hardship Withdrawal from retirement account". This was out of a total respondent count of 27,091.

Statistical Analyses

Initial analysis described the study sample across certain personal finance variables (as mentioned above). Bivariate differences were tested using Wald Chi Square Tests. Multivariate logistic regression analyses (PROC SURVEYLOGISTIC) were performed to determine individual and financial characteristics of retirement hardship withdrawals.

All analyses were conducted with SAS (SAS Institute Inc., Cary, North Carolina). Weights were provided by the National Financial Capability Study and were applied based on the probabilistic factors affecting the selection of the survey. PROC SURVEYLOGISTIC allows for the use of weights to account for the data's complex survey design. The weights incorporated: gender, age, ethnicity, and education.

RESULTS

Table 1 presents the description of this study sample that reported medical hardships. Within group significant differences were measured using Wald-Chi Square Tests. The total number of respondents were 27,091. Among them, (a) those with unpaid medical debt account for 22.77%, (b) those that reported not going to the doctor due to cost account for 21.28%, and (c) those that reported not filling a prescription due to cost account for 16.86%.

Table 1. Percentage of Respondents that Reported Medical Hardships				
		Unpaid Medical Debt	Did not go to doctor due to cost	Did not fill a prescription due to cost
Overall (n=27,091)		22.77%	21.28%	16.86%
Sex	Male (n=13,253)	20.38%**	19.04%*	14.87%*
	Female (n=13,837)	25.07%**	23.42%*	18.77%*
Age	18-24 (n=3086)	22.86%*	30.60%*	20.89%*
	25-34 (n=5037)	33.54%*	32.30%*	24.72%*
	35-44 (n=4337)	30.99%*	27.07%*	21.01%*
	45-54 (n=4460)	25.49%*	22.22%*	17.54%*
	55-64 (n=4852)	17.86%*	15.15%*	12.15%*
	65+ (n=5315)	8.03%*	5.50%*	7.42%*
Ethnicity	White (n=19,281)	20.93%*	20.09%*	15.60%*
	Non-White (n=7809)	27.34%*	24.21%*	19.99%*
Education	No HS (n=747)	32.39%*	27.52%*	24.76%*
	HS Grad – Regular (n=5,277)	24.63%*	20.26%*	16.34%*
	HS Grad – GED (n=2073)	28.73%*	24.01%*	19.98%*
	Some College (n=7947)	28.38%*	25.17%*	20.26%*
	Associate's Degree (n=3137)	23.19%*	22.54%*	17.72%*
	Bachelor's Degree (n=4,947)	14.49%*	17.39%*	12.61%*
	Post-Grad Degree (n=2,960)	11.21%*	14.32%*	10.68%*
Marital Status	Married (n=14,100)	21.55%	18.81%	15.31%
	Single (n=8,443)	23.90%	26.22%	19.14%
	Separated (n=401)	39.03%	28.71%	27.26%
	Divorced (n=2,975)	24.50%	20.93%	17.32%
	Widowed (n=1,170)	19.47%	13.66%	14.35%
Income	< \$15,000 (n=3,248)	27.47%*	26.14%*	21.78%*
	\$15k-\$25k (n=2,901)	31.74%*	26.89%*	22.52%*
	\$25k-\$35k (n=3,006)	28.61%*	26.82%*	21.42%*
	\$35k-\$50k (n=3,983)	25.38%*	24.40%*	18.71%*
	\$50k-\$75k (n=5,256)	21.16%*	19.50%*	14.42%*
	\$75k-\$100k (n=3,783)	23.18%*	20.56%*	16.90%*
	\$100k-\$150k (n=3,255)	12.20%*	13.25%*	9.50%*
	>\$150k (n=1,656)	6.00%*	7.42%*	6.76%*
Employment	Self-Employed (n=2,024)	26.10%**	27.24%*	20.72%*
	Full-time for employer (n=10,825)	25.10%**	23.87%*	17.43%*
	Part Time for employer (n=2,406)	24.73%**	25.29%*	18.04%*
	Homemaker (n=2,037)	30.97%**	26.32%*	21.56%*
	Full time student (n=1,020)	17.28%**	27.73%*	16.39%*
	Sick, disabled, unable (n=1,486)	39.59%**	26.50%*	28.82%*
	Unemployed (n=1,332)	28.64%**	29.16%*	22.95%*
	Retired (n=5,957)	9.26%**	7.03%*	8.18%*
*= $p < .0001$				
**= $p < .05$				

We found the common individual characteristics of respondents who were burdened with unpaid medical bills, did not go to the doctor due to income, or did not fill a prescription due to cost that was above the average rate, were: female, age between 25 and 54, ethnicity non-white, education level associate degree or below, income level below \$100,000, employment status all types except full-time students and retirees.

Table 2 presents the description of this study sample that reported spending more than their income or having various debt. Among these variables were (a) those spent more than their income account for 18.83%, (b) those who routinely carry a credit card balance account for 46.48%, (c) those have auto loans account for 33.82%, (d) those who carried student loans account for 18.45%, and (e) those expressing that they had “too much debt” (with a score of 6 or 7 in a Likert scale of 1-7) account for 27.37%.

Table 2. Percentage of Respondents that Spend More than Income and have Various Types of Debt						
		Spending More than Income	Credit Card Balance	Auto Loan	Student Loan	Too much debt (6&7 on Likert Scale)
Overall (n=27,091)		18.83%	46.48%	33.82%	18.45%	27.37%
Sex	Male (n=13,253)	18.50%*	43.79%	34.77%**	17.70%**	25.83%**
	Female (n=13,837)	19.15%*	49.26%	32.91%**	19.17%**	28.83%**
Age	18-24 (n=3086)	22.21%*	36.07%*	20.58%*	35.19%*	22.75%*
	25-34 (n=5037)	26.70%*	54.27%*	41.51%*	37.74%*	40.87%*
	35-44 (n=4337)	22.28%*	56.59%*	41.82%*	27.09%*	36.76%*
	45-54 (n=4460)	17.82%*	56.30%*	38.06%*	11.90%*	30.80%*
	55-64 (n=4852)	13.89%*	44.14%*	32.13%*	4.67%*	20.51%*
	65+ (n=5315)	11.94%*	32.25%*	25.66%*	1.48%*	12.96%*
Ethnicity	White (n=19,281)	17.05%**	44.81%*	34.41%*	15.07%*	26.12%*
	Non-White (n=7809)	23.23%**	50.97%*	32.35%*	26.81%*	30.47%*
Education	No HS (n=747)	25.09%*	48.28%*	15.84%*	3.89%*	27.43%*
	HS Grad – Regular (n=5,277)	17.43%*	45.86%*	30.32%*	7.00%*	24.24%*
	HS Grad – GED (n=2073)	19.69%*	48.33%*	28.52%*	7.94%*	28.05%*
	Some College (n=7947)	21.05%*	54.32%*	35.98%*	23.60%*	32.40%*
	Associate’s Degree (n=3137)	19.43%*	52.99%*	37.47%*	23.30%*	28.85%*
	Bachelor’s Degree (n=4,947)	16.92%*	40.41%*	35.52%*	23.01%*	23.68%*
	Post-Grad Degree (n=2,960)	15.71%*	32.84%*	35.81%*	23.34%*	23.51%*
Marital Status	Married (n=14,100)	16.79%**	44.49%**	43.27%**	13.46%	25.23%
	Single (n=8,443)	22.54%**	47.18%**	23.10%**	30.50%	30.67%
	Separated (n=401)	25.33%**	60.62%**	28.07%**	19.37%	38.64%
	Divorced (n=2,975)	18.10%**	55.41%**	25.36%**	13.09%	29.54%
	Widowed (n=1,170)	16.21%**	43.58%**	20.74%**	4.97%	19.95%

Income	< \$15,000 (n=3,248)	23.75%*	45.25%*	9.92%*	22.79%*	30.23%*
	\$15k-\$25k (n=2,901)	24.68%*	55.31%*	17.29%*	19.24%*	33.12%*
	\$25k-\$35k (n=3,006)	22.75%*	51.80%*	27.40%*	20.11%*	30.94%*
	\$35k-\$50k (n=3,983)	19.82%*	49.50%*	34.58%*	18.76%*	29.43%*
	\$50k-\$75k (n=5,256)	16.87%*	48.19%*	39.37%*	17.66%*	25.99%*
	\$75k-\$100k (n=3,783)	17.99%*	47.98%*	48.27%*	20.22%*	28.82%*
	\$100k-\$150k (n=3,255)	13.16%*	39.49%*	47.53%*	14.97%*	21.10%*
	>\$150k (n=1,656)	8.69%*	29.68%*	41.88%*	10.10%*	13.61%*
Employment	Self-Employed (n=2,024)	19.62%*	48.46%*	30.85%*	19.51%*	30.62%*
	Full-time for employer (n=10,825)	19.61%*	52.79%**	46.08%*	25.13%*	32.57%*
	Part Time for employer (n=2,406)	22.60%*	45.24%**	29.66%*	20.60%*	28.08%*
	Homemaker (n=2,037)	19.88%*	51.31%**	35.19%*	15.71%*	29.97%*
	Full time student (n=1,020)	21.82%*	34.38%**	15.92%*	49.20%*	20.94%*
	Sick, disabled, unable (n=1,486)	25.77%*	67.51%**	19.76%*	12.44%*	40.30%*
	Unemployed (n=1,332)	22.80%*	51.30%**	13.41%*	20.70%*	31.50%*
	Retired (n=5,957)	12.12%*	31.71%**	24.90%*	1.76%*	12.57%*
*= $p < .0001$						
**= $p < .05$						

We found the common characteristics of the respondents who overspent their income were: gender female, age younger than 45, ethnicity non-white, education level neither high school nor high school GED, married status either single or separated, income level \$50,000 or below, employment status non-retired.

The common characteristics of the respondents who had a credit card balance that was above the average rate were: age between 25 and 54, ethnicity non-white, education level below high school, high school GED, some college and associate degree, married status either single, separated, or divorced, income level between \$15,000 and \$75,000, employment status self-employed, full-time employed, homemaker, sick, disabled, unable to work, or jobless.

The common individual characteristics of the respondents who took on an auto loan that was above the average rate were: age between 25 and 54, ethnicity white, education level some college or better, married status married, income level \$35,000 or above, employment status full-time employment and homemaker.

The common individual characteristics of the respondents who incurred a student loan that was above the average rate were: gender female, age between 18 and 44, ethnicity non-white, education level some college or better, income level in two ranges: between \$15,000 and \$50,000, and between \$75,000 and \$100,000, employment status including self-employed, full-time or part-time employment, full-time students, or jobless.

The common individual characteristics of the respondents who had heavy debts that were above the average rate were: female, age between 25 and 54, ethnicity non-white, education level

high school GED, some college, or associate degree, income level below \$50,000, employment status including all types except full-time students and retirees.

Table 3. Percentage of Respondents that Experienced a Drop in Income over the past 12 Months		
Overall (n=27,091)		19.88%
Sex	Male (n=13,253)	19.11%
	Female (n=13,837)	20.62%
Age	18-24 (n=3086)	25.99%*
	25-34 (n=5037)	30.44%*
	35-44 (n=4337)	24.66%*
	45-54 (n=4460)	19.70%*
	55-64 (n=4852)	14.82%*
	65+ (n=5315)	7.19%*
Ethnicity	White (n=19,281)	17.26%*
	Non-White (n=7809)	26.34%*
Education	No HS (n=747)	29.12%*
	HS Grad – Regular (n=5,277)	20.46%*
	HS Grad – GED (n=2073)	23.27%*
	Some College (n=7947)	23.76%*
	Associate's Degree (n=3137)	19.05%*
	Bachelor's Degree (n=4,947)	14.61%*
	Post-Grad Degree (n=2,960)	13.39%*
Marital Status	Married (n=14,100)	17.18%
	Single (n=8,443)	25.02%
	Separated (n=401)	30.95%
	Divorced (n=2,975)	18.41%
	Widowed (n=1,170)	15.23%
Income	< \$15,000 (n=3,248)	29.38%*
	\$15k-\$25k (n=2,901)	28.12%*
	\$25k-\$35k (n=3,006)	22.25%*
	\$35k-\$50k (n=3,983)	20.85%*
	\$50k-\$75k (n=5,256)	16.01%*
	\$75k-\$100k (n=3,783)	19.23%*
	\$100k-\$150k (n=3,255)	12.55%*
	>\$150k (n=1,656)	8.33%*
Employment	Self-Employed (n=2,024)	30.02%
	Full-time for employer (n=10,825)	19.57%
	Part Time for employer (n=2,406)	26.89%
	Homemaker (n=2,037)	22.68%
	Full time student (n=1,020)	23.50%
	Sick, disabled, unable (n=1,486)	21.95%
	Unemployed (n=1,332)	38.83%
	Retired (n=5,957)	7.84%
*= $p < .0001$		
**= $p < .05$		

Table 3 presents the description of this study sample that experienced a drop in income over the past 12 months; those with an income drop in the last year accounted for 19.88%.

The common individual characteristics of the respondents who had their salaries reduced during the last year with above average rates were: age 44 or younger, ethnicity non-white, education level some college or below, income level below \$50,000.

Adjusted odds ratios and their 95% confidence intervals for taking a Hardship Retirement Withdrawal are represented in Table 4-6. Odds ratios greater than 1 (with corresponding confidence intervals also greater than 1) are interpreted as significantly more likely to take an early retirement hardship withdrawal. Similarly, odds ratios less than 1 (with corresponding confidence intervals also less than 1) are interpreted as significantly less likely to take an early retirement hardship withdrawal. Any variable with a confidence interval that crosses over “1” (above AND below) does not have a significant association. Tables 4-6 show three models: starting with healthcare independent variables only, then building to other individual-characteristics, then finally a complete model with the inclusion of personal finance variables.

Table 4. Adjusted Odds of Retirement Early Hardship Withdrawal by Medical Factors Only			
Factor Group	Variable	Label	Retirement Hardship Withdrawal
	Unpaid Medical Loans	Yes	8.838 (7.483 - 10.438)
	Not Going to the Doctor	Due to Cost	2.557 (2.102 - 3.110)
	Not Filling a Prescription	Due to Cost	3.435 (2.816 - 4.188)
	Health Insurance	No	0.821 (0.534 - 1.263)

Across all three models (Tables 4-6), starting with Model 1 (Table 4), having unpaid medical debt, not going to the doctor due to cost, not filling a prescription due to cost had higher odds of making retirement hardship withdrawals as opposed to their counterparts.

Table 5. Adjusted Odds of Retirement Early Hardship Withdrawal by Medical and Socio-Economic Factors			
Factor Group	Variable	Label	
	Unpaid Medical Loans	Yes	7.086 (5.903 - 8.504)
	Not Going to the Doctor	Due to Cost	2.114 (1.727 - 2.588)
	Not Filling a Prescription	Due to Cost	3.074 (2.504 - 3.773)
	Health Insurance	No	0.751 (0.504 - 1.118)
Individual-Level	Sex	Male	2.399 (2.013 - 2.858)
	Age	25-34	1.745 (1.232 - 2.472)
		35-44	0.813 (0.566-1.168)
		45-54	0.467 (0.312 - 0.700)
		55-64	0.482 (0.318 - 0.730)
		65+	0.485 (0.312 - 0.752)
	Ethnicity	Non-White	1.513 (1.265 - 1.810)
	Education	HS Grad – Regular	0.998 (0.446 - 2.230)
		HS Grad – GED	0.975 (0.415 - 2.291)
		Some College	1.018 (0.461 - 2.248)
		Associate's Degree	0.646 (0.283 - 1.477)
		Bachelor's Degree	0.817 (0.368 - 1.817)
		Post-Grad Degree	1.041 (0.466 - 2.326)
	Marital Status	Married	0.836 (0.693 - 1.008)
		Separated	1.848 (0.845 - 4.043)
		Divorced	0.960 (0.652 - 1.413)
		Widowed	0.933 (0.412 - 2.115)

In Model 2 (Table 5), while adjusted for individual-characteristics only, being male, being 25-34 years of age, and being of Non-White Ethnicity had higher odds of retirement hardship withdrawals as compared to their referent group counterparts. Conversely, being 45 years of age or older had lower odds of retirement hardship withdrawals as compared to their referent group counterparts.

Table 6. Adjusted Odds of Retirement Early Hardship Withdrawal by all Study Variables			
Factor Group	Variable	Label	
	Unpaid Medical Loans	Yes	3.119 (2.525 - 3.853)
	Not Going to the Doctor	Due to Cost	1.546 (1.235 - 1.936)
	Not Filling a Prescription	Due to Cost	2.126 (1.696 - 2.666)
	Health Insurance	No	0.638 (0.418 - 0.974)
Individual-Level	Sex	Male	1.846 (1.515 - 2.250)
	Age	25-34	1.368 (0.912 - 2.051)
		35-44	0.792 (0.522 - 1.203)
		45-54	0.633 (0.396 - 1.012)
		55-64	0.943 (0.582 - 1.528)
		65+	1.166 (0.660 - 2.058)
	Ethnicity	Non-White	1.257 (1.027 - 1.540)
	Education	HS Grad – Regular	1.655 (0.708 - 3.870)
		HS Grad – GED	1.497 (0.586 - 3.825)
		Some College	1.374 (0.590 - 3.201)
		Associate’s Degree	1.069 (0.447 - 2.560)
		Bachelor’s Degree	1.395 (0.597 - 3.260)
		Post-Grad Degree	1.501 (0.635 - 3.546)
	Marital Status	Married	0.912 (0.733 - 1.135)
		Separated	1.934 (0.796 - 4.699)
		Divorced	0.976 (0.647 - 1.473)
		Widowed	1.173 (0.569 - 2.416)
Financial Factors	“I have too much debt”	2	1.527 (0.984 - 2.370)
		3	1.757 (1.079 - 2.863)
		4 – Neutral	1.814 (1.200 - 2.741)

		5	2.064 (1.356 - 3.140)
		6	2.979 (1.984 - 4.472)
		7 – Strongly Agree	3.735 (2.610 - 5.344)
	Household Income	\$15,000-\$24,999	1.067 (0.556 - 2.047)
		\$25,000 - \$34,999	0.830 (0.434 - 1.586)
		\$35,000 - \$49,999	0.580 (0.315 - 1.067)
		\$50,000 - \$74,999	0.783 (0.436 - 1.405)
		\$75,000 - \$99,999	1.211 (0.680 - 2.158)
		\$100,000 - \$149,999	0.945 (0.521 - 1.713)
		\$150,000 +	0.871 (0.453 - 1.675)
	Employment	Self employed	0.590 (0.434 - 0.801)
		Part time for employer	0.729 (0.463 - 1.150)
		Homemaker	0.557 (0.309 - 1.004)
		Full time student	0.863 (0.454 - 1.643)
		Permanently sick disabled	0.761 (0.366 - 1.581)
		Unemployed	0.989 (0.456 - 2.147)
		retired	0.509 (0.318 - 0.817)
	Spending and Income	Spending > income	1.521 (1.209 - 1.913)
		Spending = income	1.036 (0.830 - 1.294)
	Income Drop	Yes	0.995 (0.986 - 1.005)
	Credit Card Balance	Not carrying a CC balance	1.156 (0.929 - 1.438)
	Auto Loan	Yes	1.589 (1.291 - 1.955)
	Student Loans	Yes	1.621 (1.312 - 2.002)
	Predatory Loans	Yes	4.727 (3.869 - 5.777)

Model 3 (Table 6) incorporated healthcare, individual, and personal finance-related characteristics in measuring retirement hardship withdrawals. As was the case in Models 1 and 2,

having unpaid medical debt, not going to the doctor due to cost, not filling a prescription due to cost, being male, and being of Non-White Ethnicity all had higher odds of retirement hardship withdrawals as compared to their referent groups. Adding to these variables, Model 3 resulted in higher debt loads, spending more than income, having an auto loan, having a student loan, and using predatory loans all were associated with higher odds of retirement hardship withdrawals.

DISCUSSION

More than 50 percent of states are dedicating to establishing programs to address the deficiency of retirement saving in the US (Biggs, 2019). Retirement savings are important because they provide more freedom and control over our lifestyle and life quality (Mayer, Zick & Marsden 2011; Schnaubelt, 2018). With the decreasing level of pre-retirement liquidity in recent years (Moore & Turner, 2021), especially with the current COVID-19 crisis, the leakage from retirement savings has substantially worsened.

The relationship between medical hardship and retirement hardship withdrawals is a relatively unexplored research area. The importance of this association goes beyond current healthcare-financial troubles into longer-term retirement readiness issues. We demonstrate that people who are financially fragile and unable to cope with unexpected expenses caused by medical hardship become weaker towards retirement readiness. Financial fragility, especially indebtedness, is a driver for retirement hardship withdrawals and also impact retirement readiness eventually.

Behavioral life cycle theory assumes that people make current financial decisions, such as work, consumption, and savings, in terms of their predication or assumptions about their individual future financial status (Statman, 2017). Life cycle theory suggests that people should be more rational and realistic in moderating their financial decisions when they experience economic shocks (Carroll, 1997). However, the general income growth often experienced in the earlier time span of one's life would inevitably incite the misconception that income can only go up monotonically as a function of time, but in reality, real earning reaches a peak followed by earning decline for a decade before retirement. The variation of one's real earning across the life cycle can be detrimental for retirement readiness (Tharp & Kitces, 2018), but such a variation from misplaced expectation also can influence retirement readiness. Therefore, current medical hardship coupling to this misplaced expectation (misprediction for the future) may lead people to "borrow" future assets to sacrifice their future living standard to address their current financial plight. To address this issue, we support the idea of encouraging people to start contributing to retirement saving as earlier as possible (Dahlheim-Englund, Carlsson, Nyström, Gillsjö, Eriksson & Palmér, 2019). We also agree with the argument of rethinking the pros and cons of the current pre-retirement liquidity policy (Moore & Turner, 2021). A recent study found that if people begin and then uninterruptedly contribute to their retirement saving starting at age 25, their retirement saving account would be quarter of million dollars higher than the current average retirement saving account balance (Biggs, 2019). This highlights the importance of not only starting to save early for retirement, but also to not take early withdrawals.

The present study also may have implications in public policy. By allowing individuals to fall into financial hardship from healthcare needs, and to address those healthcare needs by either borrowing against or withdrawing from their own retirement savings, they suffer in the long term by lower retirement readiness. Compounding this issue is the 10-percent early withdrawal penalty (before age 59½). Applying this to the current COVID-19 pandemic, many people who have been laid off (due to COVID-19) may have a need to withdraw their retirement funds early to meet medical needs due to lack of employer-sponsored health insurance. This 10-percent penalty for early withdrawals is waived for coronavirus-related distributions. Medicaid and other safety net systems may be put under more strain due to increased expectation and demand. Future studies should focus in these areas.

While the cause of the healthcare-related financial independent variables (unpaid medical debt, not going to the doctor due to cost, and not filling a prescription due to cost) cannot fully be attained with this data, their significant positive association with retirement hardship withdrawals is worrisome. By being more likely to take an early retirement hardship withdrawal, these individuals not only suffer from lack of health services at present, but also will have a lower likelihood to be retirement-ready due to lack of retirement savings. It is yet to be seen how the COVID-19 crisis will affect these relationships, but we expect to see both situations worsen in the future.

LIMITATIONS

The present study had several limitations. First, while the 2018 NFCS data surveyed over 27,000 people, the survey was a cross-sectional research design. Therefore, no causal relationships should be inferred from this study. Moreover, while the sampling design attempts to reduce bias, it is possible that the sample may be biased in some unknown way. While causal relationships generally offer more and stronger insights, we believe that the association with this study offers significant preliminary steps to future research related to the linkage between the medical hardship and retirement readiness.

A second limitation to this study is the lack of information regarding why individuals have unpaid medical debt. Due to data limitations (cross-sectional design and limited health-related survey questions), we cannot attain the reason why the survey respondent replied affirmatively towards medical debt, not going to the doctor due to cost, and not filling a prescription due to cost. We also do not know (due to data limitations) the medical debt balance or how long a person has neglected medical care due to cost. Further inquiry is warranted to investigate effects of these longitudinal issues.

CONCLUSION

The purpose of the present study was to document the associated characteristics of people who take early hardship withdrawals from their retirement accounts. We were particularly interested in the association between early hardship withdrawals and medical hardships (unpaid medical debt, not going to a doctor due to cost, and not filling a prescription due to cost). We

found that having unpaid medical debt, not going to the doctor due to cost, not filling a prescription due to cost had higher odds of making retirement hardship withdrawals as opposed to their counterparts, even while controlling across multiple personal finance and socio-related variables.

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INNOVATION CAPACITY: A FIRM LEVEL RESPONSE TO SUBSIDY ACTIVITY IN A NATIONAL SETTING

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ABSTRACT

The purpose of this paper is to investigate the effect subsidies have on firm-level innovation across Eastern European and Central Asian countries and to assess if these effects move to increase firm-level capability. Specifically, we investigate the extent subsidy programs act to shape and guide firm-level innovative capabilities and how the presence of such capabilities affect operational performance. We employ a Probit model to investigate firm-level innovation and OLS regression to assess how subsidies, in association with the decision to adopt foreign technology and in-house research and development (R&D) affect firm productive capacity. Results suggest subsidies promote innovation and that when these subsidies are contemporaneously considered in the face of the decision to adopt foreign technologies and employ in-house R&D, firm-level capacity increases.

INTRODUCTION

The main purpose of this paper is to link the effect of state subsidies on firm-level innovation across Eastern European and Central Asian countries. Further, we investigate if these effects move to increase firm-level capability. Similar to Chinese firms, a distinguishing feature of these firms from Western firms is their access to state sponsored financial subsidies (Lee, Walker, & Zeng, 2014). As the economies in this region move from a state centrally planned market to a market-oriented economy, the various states in this region have provided subsidies to promote innovation and firm-level capability. Part of the tension surrounding this query concerns the role subsidies and related control systems play in providing information to guide firm-level innovation activities. Otley (2003) suggests control systems and their content may inhibit innovation, while others suggest it is not the content but rather, how the ensuing information is used that determines the extent a control system benefits firm-level operations (Simmons, 1995). O'Connor, Vera-Muñoz, & Chan (2011) tend to agree and find this relation is more acute for emerging-economy firms that seek a different type of information in order to grow, especially in relation to technology. Jugend, Fiorini, Armellini, & Ferrari (2020) reach the same conclusion.

Finally, Otley (2003) observes an under-explored perspective is to assess how control system information relates to local firm-level performance when the effects of national culture are included. O'Connor et al. (2011) move further and suggest gaining information about a

national culture/firm-level link via the use of a control system actually helps emerging-economy firms address the technology/innovation gap they have with more well developed firms. Martin & Scott (2000) agree and envision technological advance as the consequence of commercial innovative applications by firms. However, as innovation is an institutional process, more information is needed about how innovation is supported and what its inclusion creates. Kubeczko, Rametsteiner, & Weiss (2006) suggest this information is better obtained via a system that captures these effects.

This, however, may be an elusive task. Becheikh, Landry, & Amara (2006), for example, indicate that the growing importance contemporary companies place on innovation is hampered by a lack of prescriptive identification and analysis of data elements related to it. Through an analysis of the literature, we identify a series of variables that have been associated with innovative development. While our results are comprehensive, we advocate further work needs to be conducted to advance knowledge about innovative performance measurement. One of the specific options we propose is to link relationships between variables to gain an understanding of the management and use of the information provided. Collectively, this speaks to the need of a management control system which can be used to ensure a firm's actions are consistent with its objectives and strategies (Merchant & Van der Stede, 2007, p. 5). Such an effort, accordingly, begins with identifying, capturing, and interpreting information useful in guiding such objectives and strategies (Malmi & Brown, 2008).

Many research articles indicate that management control systems can play a beneficial role in innovation for firms. For example, Haustein, Luther, & Schuster (2014) prove this claim by dividing management control systems into two types and further divide each type into two categories (Direct control and indirect control). Direct control is divided into "Results control" and "Action control", while indirect control is divided into "Personnel control and Cultural control". They find that there is a greater positive connection between innovation and indirect control, while there is a negative connection between innovation and direct control. They conclude that firms should keep focusing on the indirect control because it has more potential to generate innovation in order to maintain, and support, flexibility and creativity.

Simons (1990) shows the use of management control systems encourages successful product innovation. Even though other researchers tried to test Simons (1990) methodology, their data shows no evidence to support Simons claim (Bisbe & Otley, 2004). On the other hand, Davila & Wouters (2004) predict that there are many factors that drive the use of various methods of cost management in product innovation to be more productive. Also, there are other factors than product cost and it is not an easy task to model the cost behavior. Therefore, firms can benefit from management control systems to be able to innovate in the future. Similarly, Davila (2000) reach a similar conclusion that one cannot ignore variables in the management control systems that may lead firms to be more innovative.

Constructing a reaction to these queries provides contributions on many levels. Our study reacts to these observations and focuses on the development of a framework of information thought valuable when assessing the capacity to innovate when national cultures and resource allocations are considered. In doing so, we respond to calls to develop control systems that focus

on the objectives, strategies, and informational flows that take place in a firm's internal and external environment (Berry, Coad, Harris, Otley, & Stringer, 2009).

Procedurally, we investigate how extent subsidy programs act to shape and guide firm-level innovative capabilities and how the presence of such capabilities affect operational performance. To do so, we draw on the theory of the firm which assumes firms represent a collective set of resources used by management to develop and sustain competitive advantage. We supplement these observations with tenets from the theory of absorptive capacity, which suggests a strategic combination of internal R&D and the use of technology obtained from sources external to the firm is most effective in creating and maintaining long-term competitive advantage (Cohen & Leventhal, 1989 and 1990; Atallah, 2019). Using this combined theoretical base, we provide traction to investigate the extent firm-level capabilities are heightened by an ability to exploit internal and external technology.

Operationally, we measure how the extent subsidies aid firms to innovate new products or improve existing technologies given their production functions and operating environments. Then, we assess the degree to which innovative capabilities *spurred on or promoted by subsidies* affect the ability of a firm to be more efficient as evidenced by an increase in excess resource capacity, in terms of capacity utilization. As our focus is to evaluate firm-level performance within an operating context that includes the presence of subsidies *and* their impacts, we provide insight about subsidy efficacy and its ability to improve firm-level productivity capacity. In addition, given our international setting, where we assess firm capability in emerging economies, we provide additional commentary to the observation that the development of firm-level competitive advantages can act to stimulate growth in modern economies (Hart, 1989), especially when such growth relies on the creation of new knowledge (Liebeskind, 1996). While Dai & Li (2020) suggest firm subsidies are controversial and vague.

We also respond to the query about the role innovation plays in promoting business growth development formerly hampered by social, political, and economic environments highly resistant to change (Lee & Peterson, 2000). In doing so, we offer insight about factors related to the global competitiveness of nations, and provide a rejoinder to the challenge noted to identify how emerging economies can overcome external and internal impediments to design and implement successful market-based strategies (Hoskisson, Eden, Lau, & Wright, 2000).

Data from the 2012 Business Environment and Enterprise Performance Survey (BEEPS) database were employed. Our study was constructed in two parts. First, we assess the impact of subsidies on firm innovation, where our variable of interest is the *subsidy*. Second, we determine the extent subsidies promote learning within a firm and hence, positively impact outcomes associated with innovation. We do so by isolating firms who have received subsidies *and* have also invested in internal (in-house) R&D, external (foreign) technologies, or both. This calibration isolates the effect that the *combination* of internal investment of R&D and the adoption of foreign technology has on firm-level capability.

Results obtained suggest subsidies promote innovation and that when these subsidies are contemporaneously considered in the face of the decision to adopt foreign technologies and employ in-house R&D, firm level capacity increases (see Greco, Grimald, & Cricelli, 2017). Collectively, our results provide insight into the types of information that would be included in a

control system to guide innovation and the ensuing firm-level operating performance in emerging economies.

LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

The theory of the firm observes firms exist to make decisions about a feasible set of production resources in order to create profit (Hart, 1995). Operationally, this occurs when firms strategically allocate resources that produce optimal outcomes (Penrose, 1959, p. 11). Strategic resource allocations should also consider internal and external operating environments. For example, moves to adopt allocations should assess how firm behavior is likely to react to change as well as how any change might affect the relationship the firm has with others (Holmstrom & Tirole, 1989, p. 63). Studying firm reactions in this manner provides an understanding of the central role firm's play, individually, in the growth of an economy (Holmstrom & Tirole 1989, p. 63-65).

Rubin (1973) extends this perspective to include insight about how firm reactions to strategic resource allocations affect growth capacity and suggests overall economic growth is related to how *particular* resources available to firms are employed to create change. As he further suggests, over time, as outputs from these resources grow because of both effectiveness and efficiency, the firm has more time and additional resources. Grant (1996) agrees and indicates an analysis of organizational capability and capacity brought on by the strategic view of firm resources allocation will create a competitive advantage.

Taipaleenmäki (2014) indicates that there is an absence in accounting systems to include innovative product and R&D in the accounting output. Taipaleenmäki's empirical findings show that management accounting (MA) drives innovation of new products. He also shows that there is a negative absence between management accounting and new product development and suggested that could be explained by a multitude of factors. Liebeskind (1996) suggests it is new knowledge, via innovations, that plays a critical role in moving both firms and the economies in which they operate forward. Pennings & Harianto (1992a) surmise that specific skills need to be present for an organization to implement innovation and that a firm will enjoy a major advantage if it can manage the flow of ideas that enter its boundaries.

Collectively, innovation is viewed as a significant force that drives the sustainable growth, competitiveness, and productivity of firms (Czarnitzki & Lopes-Bento, 2014). Moreover, innovation represents the adoption of a new idea, process, product or service developed internally or acquired from the external environment (Pennings & Harianto 1992b). As such, innovations can be thought of as concerned with the creation of new businesses or the renewal of ongoing businesses through developing new products, new manufacturing methods, or the discovery of new approaches to managing resources or operating activity (Slater, 1997). Technological innovations evolve from a firm's past accomplishments and in turn, furnish a new assortment of skills, including the ability to identify, absorb, and assimilate know-how generated from the outside (Nieto & Quevedo 2005). From this perspective, a key determinant of economic growth is technological progress developed through innovative activities (Cheng & Tao 1999). Ditillo (2012) suggested it is important to study exchanging new technology knowledge between

firms and even projects across countries, thus leading to an increased understanding of management controls as a “knowledge management mechanism.” The role of government in moving from centrally planned markets to market-based economies is widely debated in the economic literature (Lee et al., 2014). Eastern European/Central Asian countries have followed an approach that reforms should be quickly carried out through mass privatization to exploit opportunity (see Balcerowicz & Gelb, 1995; Lipton & Sachs, 1990; Shleifer & Treisman, 2000). According to Hellman, Jones, Kaufmann, & Schankerman (2000), most such economies experience an initial drop in output, followed by a recovery at varying levels. This led to an expansion of accounting, management, information system, new products, and profitability that in turn caused an increase in consulting over financial reporting (Järvenpää, 2007). Järvenpää added that most of the accounting research concentrated on the accounting system operation and less attention has been paid to other factors, such as, accounting culture environment.

In this study, subsidies are defined as state sponsored monetary or non-monetary financial aid/incentives freely obtained to support an enterprise from the government. For firms in these transitional economies, access to resources is critical. Subsidies from state agencies are an important resource for many firms. In addition, states may also provide subsidies to help firms overcome financial distress or capital constraints (Claro, 2006).

Firm-level innovation is a multi-faceted tool shaped and influenced by the intricate financial and uncertainty hurdles that characterize innovation projects. Individual firms are not always in a financial or operating position to pursue innovation and consequently, firm innovation is often financed by subsidies. Various studies have explored the influence of innovation subsidies on firm growth (Lee, et al., 2014; Guoqing, Zhou, & Chunyu, 2014). To date, results are mixed as some studies observe innovation subsidies enhance firm innovative ability (Kinoshita, 2000) where others suggest subsidies actually work to undermine firm growth (Haley & Haley, 2013). Relative to the positive effects of subsidies, Söderblom & Samuelsson (2013) note subsidies can act as triggers to motivate private research and support the development of new technologies. Subsidies also are thought to stimulate inter-organizational collaboration, promote team work, and enhance a sharing of knowledge (Keese, Philipp, & Rüffer, 2012). In this case, innovation subsidy policies stimulate collective learning that increases aggregate innovation performances.

Innovation subsidy policies are also thought to stimulate the access, adaption and application of skills and knowledge that are held by organizations external to the firm. The key is that innovation promotes an awareness of all types of technology, be it internal or external. Holmström & Mathiassen (2014) suggest as much and conclude the impacts of innovation subsidies on in-house R&D, in part, are captured in evidence of enhanced employment and collaboration that work to stimulate further innovation. The authors go on to note that this can occur with both the development of internal and use of external innovations.

Klette & Møen (2012) focus on the influence subsidies have on innovation efficiency via assessing the relationship between innovation output and innovation inputs. Results obtained observe innovation subsidies stimulate and even increase innovation efficiency. Given these results, it is apparent that firms must have *the capacity* to innovate when subsidies are put in place. At an initial pass, then, one has to consider the internal characteristics of the firm and how

those characteristics might affect innovative capacity. This analysis controls for how the production function and processes affect firm performance. In addition, one has to also account for external environmental factors. Sievers, Mokwa, & Keinenburg (2002) indicate that non-financial information could be very helpful in accounting information system as to increase the understanding of financial information. Collectively, then, one of the issues that surfaces is the extent to which a firm has the *capability* to innovate. Cohen & Levinthal (1989, 1990) indicate that capacity to innovate relies on capability or ability to learn. As the authors suggest, the ability to learn is manifested by working to develop and create in-house capabilities. This is usually in the form of in-house R&D. However, on a broader focus, the authors also observe in-house ability fosters the capacity to not only create new information, but to also enhance an ability to assimilate and exploit existing information. Thus, they contend one of the main reasons to invest in R&D is to be able to identify, assimilate, and exploit knowledge from the external environment. This skill, referred to as absorptive capacity, provides a dual role related to firm innovation; i.e., the ability to *learn* and ability to *exploit what is learned*.

Indeed, Zahra & George (2002) indicate that absorptive capacity pertains to knowledge creation and works to enhance a firm's ability to gain and sustain a competitive advantage via the strategic use of that knowledge. They expand the premise of absorptive capacity as a set of organizational routines and processes by which firms acquire, assimilate, transform, and exploit knowledge to produce a dynamic organizational capability. They suggest absorptive capacity is a multi-dimensional construct and that to improve the outcomes of its use, several dimensions of a firm's actions and abilities need to be considered relative to how they, together, improve firm performance via a heightened ability to learn. Interpretively, they suggest one way to evaluate the presence of absorptive capacity is to assess its impact on firm-level performances metrics associated with the creation of a competitive advantage.

Griffith, Redding, & Van Reenen (2003) agree and suggest that R&D related absorptive capacity impounds in firm profit. Jaffe (1986) provides additional support in that he observes that the use of a firm's own R&D, as well as the use of R&D related to others, could allow an adopting firm to achieve greater measurable results; it is this measurable outcome that provides evidence of the benefits of absorptive capacity. Thus, it may be that the key to assessing resource allocations in the face of R&D and subsidies may be how they are evaluated relative to their use in creating a competitive advantage. Indeed, Griffith, et al. (2004) agree and suggest absorptive capacity can be a potential source of productivity growth when all of these factors are considered.

Based on the above literature we hypothesize the following:

H1: Governmental subsidies promote firm innovation.

H2a: Investment in R&D leads to greater firm productivity.

H2b: Investment in foreign technology leads to greater firm productivity.

H2c: Investment in both R&D and foreign technology will lead to greater firm productivity.

RESEARCH DESIGN AND MODEL DEVELOPMENT

The purpose of this paper is to assess the effect subsidies have on firm-level innovation across Eastern European and Central Asian countries and to determine if these effects impound in firm-level capabilities given the subsidies. Specifically, we investigate the extent subsidy programs act to shape and guide firm-level innovative capabilities and how the presence of such capabilities affect performance meaningful to organizational prosperity and sustainability. In doing so, our focus is to add additional commentary of the roles innovation and subsidies play in enhancing firm performance. We also look to provide insight about how the development of a management control system framework that is designed to capture information may prove useful to firm operations. This latter observation is particularly important for firms in emerging markets who often have little insight about operating activities that add value.

Our study is constructed at two levels. The first (Level 1) is where we assess the impact of subsidies on innovation where our variable of interest is the *subsidy*. To evaluate the impact of subsidies on firm-level innovation we include country, computation, tax rate, tax administrations, political instability, regulations, education and work force, labor, ownership, and firm size as control variables. Our second level (Level 2) seeks to determine the extent subsidies promote learning and hence positively impact the outcomes associated with innovation. This approach adopts a two-step methodology. First, we identify those firms who have received subsidies and include them in our sample. Second, within our sample, we identify those firms who have invested in internal research development, external (foreign) technologies, or both. Our objective is to isolate the effect that the combination (interaction) of investments in R&D and foreign technology have on a performance measure (excess production capacity) associated with the presence of innovation. Accordingly, our variable of interest is the *interaction* of the presence of firm level research development and the use of external technology.

Level 1 Approach

Level 1 seeks to assess the impact of *subsidies* on innovation where our variable of interest is subsidies. To do so, we follow the framework developed by Ljiljana & Valerija (2011) using the data from 2012 Business Environment and Enterprise Performance Survey (BEEPS). BEEPS is a survey collected by the European Bank for Reconstruction and Development (EBRD) and the World Bank.³ The 2012 survey covered enterprises in 30 countries.

The dependent variable for the Level 1 analysis is a dichotomous variable equal to 1 if during the last three years an establishment introduced a new or significantly improved product or service and 0 otherwise. Since the dependent variable is binary, we make use of a binary probit model, where the dependent variable reflects a dichotomous scenario of an event or condition either occurring or not occurring; in essence, the dependent variable is not continuous

³ All of the data were obtained from the 2012 BEEP survey series. The 2012 survey is the first to include countries from Eastern Europe and Central Asia, and was the first to include an Innovation module that covered various aspects of firm-level innovation. As such, the 2012 BEEP is uniquely qualified for use relative to assessing the role of innovation in emerging economies.

but rather is associated with two qualitative choices. The probit model is appropriate because of the ordinal nature of the dependent variable (Maher, 1987). The objectives of this kind of model are usually to identify factors that significantly influence choice and to predict the likelihood that an event will occur for given values of the explanatory (independent) variables (Herring & Roy, 2007).

Our model specification for Level 1 is as follows:

$$\text{INNO}_i = \alpha + \beta_1 \text{SUB}_i + \beta_2 \text{LOGE}_i + \beta_3 \text{PART}_i + \beta_4 \text{OWNERF}_i + \beta_5 \text{OWNERG}_i + \beta_6 \text{COMP}_i + \beta_7 \text{INTERNET}_i + \beta_8 \text{AccF}_i + \beta_9 \text{TAXR}_i + \beta_{10} \text{TAXA}_i + \beta_{11} \text{PINS}_i + \beta_{12} \text{CORR}_i + \beta_{13} \text{LABR}_i + \beta_{14} \text{LICENS}_i + \beta_{15} \text{CUST}_i + \beta_{16} \text{INWORK}_i + \varepsilon_i > 0; 0 \text{ otherwise} \quad (1)$$

Where:

INNO _i	=	Dichotomous variable equal to 1 if during the last three years establishment introduced a new or significantly improved product or service and 0 otherwise.
SUB _i	=	SUB _i being a dichotomous variable equal to 1 if during the last three years the establishment received any subsidies from national, regional or local government or European Union sources (i.e., products or services) and 0 otherwise.
LOGE _i	=	Represents a continuous variable for the number of employment available for each of the establishments over time.
PART _i	=	Represents is a dichotomous variable equal to 1 if establishment is part of a large firm and 0 otherwise.
OWNERF _i	=	Represents the % ownership of Private Foreign types available for the establishments over time.
OWNERG _i	=	Represents the % ownership of Government types available for the establishments over time.
COMP _i	=	Represents a continuous variable for the main market in which this establishment sold its main product, how many competitors did this establishment's main product face.
INTERNET _i	=	Represents a dichotomous variable equal to 1 if establishment has a high speed internet connection on its premises and 0 otherwise.
AccF _i	=	Represents a dichotomous variable equal to 1 if establishment faces access to finance which form an obstacle to current operations and 0 otherwise.
TAXR _i	=	Represents a dichotomous variable equal to 1 if establishment faces tax rates which form an obstacle to current operations and 0 otherwise.
TAXA _i	=	Represents a dichotomous variable equal to 1 if establishment faces tax administration which form an obstacle to current operations and 0 otherwise.

PINS _i	=	Represents a dichotomous variable equal to 1 if establishment faces political instability which form an obstacle to current operations and 0 otherwise.
CORR _i	=	Represents a dichotomous variable equal to 1 if establishment faces corruption which form an obstacle to current operations and 0 otherwise.
LABR _i	=	Represents a dichotomous variable equal to 1 if establishment faces labor regulation which form an obstacle to current operations and 0 otherwise.
LICENS _i	=	Represents a dichotomous variable equal to 1 if establishment faces a business licensing and permits which forms an obstacle to current operations and 0 otherwise.
CUST _i	=	Represents a dichotomous variable equal to 1 if establishment faces a customs and trade regulations which forms an obstacle to current operations and 0 otherwise.
INWORK _i	=	Represents a dichotomous variable equal to 1 if establishment faces an inadequately educated force labor which forms an obstacle to current operations and 0 otherwise.

Level 1 is conducted for three groups.⁴ The first group is composed of all countries (All Countries). The second group is for the fourteen former Soviet Union countries (FUSSR). The final group is for the seven former Socialist Federal Republic of Yugoslavia countries (FSFRY). Table 1 one provides a list of the countries included in the study.

An important observation needs to be made relative to how we proxy for subsidies. Specifically, we allow the receipt from national, regional or local government or European Union sources to be defined as a subsidy. Evidence in the literature provides support for such an approach. For instance, as noted by Lach (2002), a wide variety of instruments are used by governments to foster technological change within firms; for example, such instruments as tax cuts, and the formation of consortia and laboratories are routinely adopted. Indeed, there is considerable evidence that all types of instruments are being used to support firm innovative capacity (Bérubé & Mohnen, 2009). However, according to Schwartz & Clements (1999, p.120),

⁴ An emerging economy can be thought of as a country that faces a rapid pace of economic development in the presence of government policies that favor economic liberalization (Hoskisson et al., 2000). With the collapse of communism in 1989, newly emerging economies formerly associated with this political structure sought to encourage and stabilize private enterprise but the size of economic growth across these emerging markets was not uniform (Hoskisson et al., 2000). Lee & Peterson (2000) suggest entrepreneurial orientation is critical to the economic growth of companies and that innovation is at the center of this orientation. Further, as noted by Hoskisson et al. (2000), while all former communist-based or affected economies face pressure to improve their transitioning business activities, Lee & Peterson (2000) observe the former Soviet economies are those most likely to encourage a de-emphasis of independent thinking, initiative and innovation by firms. Former Yugoslavian country firms while also under a communist regime, are likely to vary from former Soviets country firms. In an attempt to capture the differing effects with our sample, we segregate and conduct analysis across three sets; all firms; former Soviet firms; and former Yugoslavian firms.

the concept of a subsidy is elusive and as such, they noted subsidies should be thought of in more general terms as *any government assistance* that (1) allows consumers to purchase goods and services at prices lower than those offered by a perfectly competitive sector, or (2) raises producers' incomes beyond those that would be earned without this intervention.

Table 1 List of Countries Included in the Study N=30		
FUSSR Countries N=14	FRFRY Countries N=7	Other Countries N=9
Armenia	Bosnia and Herzegovina	Albania
Azerbaijan	Croatia	Bulgaria
Belarus	Macedonia	Czech Republic
Estonia	Kosovo	Hungary
Georgia	Montenegro	Mongolia
Kazakhstan	Serbia	Poland
Kyrgyz Republic	Slovenia	Romania
Latvia		Slovak Republic
Lithuania		Turkey
Moldova		
Russia		
Tajikistan		
Ukraine		
Uzbekistan		
This table presents the 30 Eastern European and Central Asia countries included in the study grouped by FUSSR (i.e., former Soviet Union); FSFRY (i.e., former Socialist Federal Republic of Yugoslavia); and Other (i.e., all other countries) that were included in the 2012 BEEPS survey		

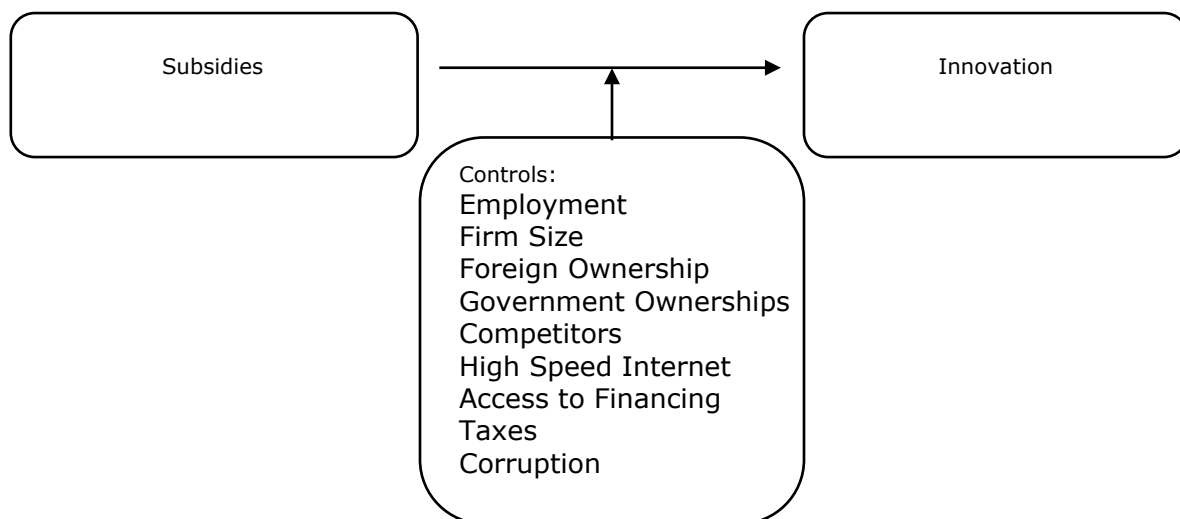
The authors go on to note this definition extends beyond the traditional narrow subsidy concepts and leaves room for a wide range of government activities to be defined as subsidies. For example, it recognizes that strict definitions of subsidies into specific categories may not reflect that the categories are not homogenous and that subsidies can take on different forms and can thus belong to different categories at the same time. In addition, they assert that a more general view of subsidies leaves ample room for measurement issues that are hard to overcome or eliminate. The authors indicate their general definition necessarily captures both the explicit and implicit subsidy elements that are contained in different forms of government intervention. Levén, Holmstrom, & Mathiassen (2014) agree and indicate observations noted by Schwartz & Clements (1999) allow one to focus on assessing the differential impact of the presence or receipt of *any* government assistance.

Bérubé and Mohnen (2009) seem to support this view and indicate that, in terms of research, assessing the incremental contribution or isolating the benefit of selecting one type of policy measure over another depends on factual situations and industry context. As such, based on a review of the literature, they observe it is really not possible to conclude in favor of one instrument over another, at least, not in any obvious way.

Evidence does exist that adopting a holistic approach to developing an overall proxy for a subsidy has merit. For example, Almus & Czarntitzki (2003) sought to assess the extent to which any subsidies received by public authorities affect firm-level innovation capacity. In doing so, they assert that adopting a collective measure of subsidy activity in order to control for any possible effects of all publicly funded research is of value. In addition, while they note that part of the decision to do so was because they were not able to track or assign specific types of support, the presence of the receipt of resources is evidence of a treatment that can be used to assess a difference.

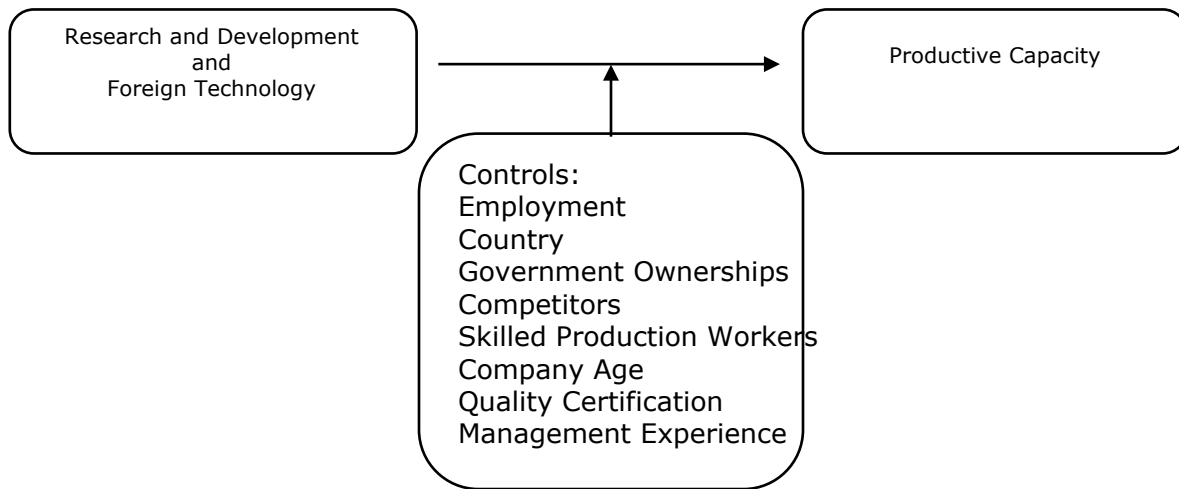
Finally, the use of a composite or single nature proxy for subsidies appears to have traction. For example, Zhang, Li, Zhou, & Zhou (2014) examine the use of subsidies in China based on the sum all subsidiary activity together, rather than classifying activities individually. González, Jaumandreu, & Pazó (2005) follow suit in that they explore the effects of subsidies based on the total amount of support received. Finally, Giardino-Karlinger (2010), via the use of a dichotomous variable, assign a value of 1 to capture whether a firm received a subsidy from any sources, or 0 otherwise⁵. Given this collective evidence, we deem our subsidiary proxy appropriate.

Figure 1
Model Diagram – Level 1 Approach



⁵ It is interesting to note that, similar to our study, Giardino-Karlinger (2010) make use of BEEP data.

Figure 2
Model Diagram – Level 2 Approach



Level 2 Approach

Level 2 of our analysis seeks to determine the extent subsidies promote learning⁶ and hence positively impact outcomes associated with innovation. As such, in this component of our study, only firms receiving subsidies will be included. This approach adopts a two-step methodology.

First, we identify firms who have received subsidies and include them in our sample. Second, within this sample, we identify those firms who have invested in internal R&D, external (foreign) technologies, or both. Our objective is to isolate the effect that the *combination* or interaction of a firm's own investments in R&D and the adoption of foreign technology have on a firm-level performance measure associated with the presence of innovation. Accordingly, our variable of interest is the *interaction* of firm-level research development and the use of external technology.

The approach of the second component of our study makes use of a theory constructed by Cohen & Leventhal (1989; 1990) that suggests the combination of internal R&D and the use of technology external to the firm will promote long term competitive advantage. This theory assumes that this combination, known as absorptive capacity, will be impounded in firm-level performance measures. Estimating the effects of resource allocation decisions and associating those decisions with R&D and external technology opportunities has been investigated from a multi-faceted perspective.

Indeed, Hagedoorn & Cloudt (2003) suggest there is a long history of struggling with the measurement of innovative performance and the outcomes it produces in firms. Moreover,

⁶ Under this rubric, learning refers to both the ability to learn as well as to exploit or use that which has been learned to create advantage.

Griffith et al. (2003), in a review of the effects of absorptive capacity, find that an assessment of productivity growth and productivity convergence varies across economic foundations and suggest that a wide range of different economic specifications in the face of stable control variables is likely to provide value adding insight about the role one's own as well as others R&D activities have on productivity.

Finally, Jaffe (1986) assesses that the effects of internal R&D and external technological opportunities may be affected by the characteristics of the technology or the state of exogenous scientific knowledge present at the time. In addition, Jaffe (1986) notes that observing the actual effects may be difficult, and that the economic manifestations of a firm's decision to employ a full set of R&D activities (i.e., the construction of one's own R&D and the adoption of others) may be obscured. As such, the author opts to use multiple firm-level performance indicators (i.e., patents, profit, and the market value) to assess firm-level productivity in the face of an adoption of a firm's own R&D and external technological opportunities on firm productivity. Our dependent variable is the level of excess productive capacity of a firm in the presence of this interaction.⁷ We make use of ordinary least squares to investigate the Level 2 query.

Our Level 2 model specification is as follows:

$$\begin{aligned} \text{PROD}_i &= \alpha + \beta_1 \text{LOGE}_i + \beta_2 \text{COUNTRY}_i + \beta_3 \text{OWNER}_i + \beta_4 \text{COMP}_i + \beta_5 \text{LOGS}_i + \beta_6 \text{AGE}_i + \\ &\beta_7 \text{CERT}_i + \beta_8 \text{AccF}_i + \beta_9 \text{MANEX}_i + \beta_{10} \text{FT}_i + \beta_{11} \text{R\&D}_i + \beta_{12} \text{FT} * \text{R\&D}_i + \varepsilon_{ij} \end{aligned} \quad (2)$$

Where:

PROD _i	=	Represents firm level excess productive capacity as (1- Capacity Utilization).
LOGE _i	=	Represents the number of employment available for each of the establishments over time.
COUNTRY _i	=	Represents country dummy variables.
OWNER _i	=	Represents the % ownership of <i>Government</i> types available for the establishments over time.
COMP _i	=	Number of competitor establishment faces.
LOGS _i	=	Number of Skilled production workers.
AGE	=	Age of enterprise
CERT _i	=	Represents a dichotomous variable equal to 1 if the establishment has an internationally-recognized quality certification and 0 otherwise
AccF _i	=	Represents a dichotomous variable equal to 1 if establishment faces access to finance which form an obstacle to current operations and 0 otherwise.

⁷ As denoted on the model below, mathematically excess capacity for a firm (PROD_i) is computed as 1- the reported capacity utilization of a firm. According the BEEPS data, and as supported by Ayyagari, Demirgüç-Kunt, & Maksimovic (2011), Capacity utilization is defined as the amount of output actually produced relative to the maximum amount that could be produced with the firm's existing machinery, equipment, and regular shifts.

MANEX _i	=	Number of years top managers have experiences.
FT _i	=	Represents a dichotomous variable equal to 1 if the firm uses technology licensed from a foreign-owned company, excluding office software and 0 otherwise.
R&D _i	=	Represents a dichotomous variable equal to 1 if the firm has invested in R&D activities, either in-house or contracted with other companies or 0 otherwise
FT*R&D	=	Represents a dichotomous variable equal to 1 if the firm uses technology licensed from a foreign-owned company, excluding office software AND the firm has invested in R&D activities, either in-house or contracted with other companies or 0 otherwise.

RESULTS

Level 1 Analysis and Discussion

Our results of the Probit regression are presented in Table 2 for the three groups (i.e., all countries, FUSSR countries and FSFRY countries). Collectively, our results show that across two groups, subsidies promote innovation in transition economies, thereby supporting H1. Specifically, Table 2 shows that in the all country sample, which includes 6,921 firms, the SUB coefficient (0.298) is significant at the $p < 0.01$ level. In addition, the coefficients of variables of LOGE (0.109), OWNERF (0.002), INTERNET (0.398), AccF (0.138), CORR (0.179), CUST (0.254) and INWORK (0.124) are also all significant at the $p < 0.01$ level of significance. Finally, the coefficient of PINS (0.08) is significant at the $p < 0.10$ level of significance.

Table 2						
Probit Regression Analysis: Impact of Subsidies on Innovation						
Dependent Variable: INNO_i						
<u>Variable</u>	Est. Coeff. (Std. Error)	Marginal Effect	Est. Coeff. (Std. Error)	Marginal Effect	Est. Coeff. (Std. Error)	Marginal Effect
SUB	0.298*** (0.057)	0.092	0.052 (0.099)	0.015	0.320*** (0.103)	0.112
LOGE	0.109*** (0.014)	0.034	0.164*** (0.019)	0.048	0.030 (0.032)	0.010
PART	0.002 (0.061)	0.001	0.038 (0.078)	0.011	(0.166)	-0.027
OWNERF	0.002*** (0.001)	0.001	0.004*** (0.001)	0.001	0.001 (0.002)	0.000
OWNERG	-0.002 (0.002)	-0.001	0.000 (0.003)	0.000	-0.011 (0.011)	-0.003
COMP	-0.002 (0.001)	-0.001	-0.000 (0.002)	-0.000	-0.003 (0.002)	-0.001
INTERNET	0.398*** (0.054)	0.123	0.327*** (0.071)	0.096	0.628*** (0.142)	0.219
AccF	0.138*** (0.045)	0.043	0.232*** (0.060)	0.068	0.011 (0.092)	0.003
TAXR	0.065 (0.042)	0.020	0.011 (0.054)	0.003	-0.019 (0.098)	-0.006
TAXA	-0.054 (0.054)	-0.016	-0.114 (0.076)	-0.033	0.110 (0.114)	0.038
PINS	0.082* (0.044)	0.025	0.116* (0.059)	0.033	-0.021 (0.090)	-0.007
CORR	0.179*** (0.046)	0.055	0.148** (0.061)	0.043	0.208** (0.100)	0.072
LABR	-0.061 (0.073)	-0.018	-0.024 (0.116)	-0.006	-0.055 (0.138)	-0.019
LICENS	0.031 (0.062)	0.009	0.077 (0.077)	0.022	-0.018 (0.159)	-0.006
CUST	0.254*** (0.057)	0.078	0.320*** (0.072)	0.094	0.278** (0.129)	0.097
INWORK	0.124*** (0.047)	0.038	0.100* (0.060)	0.029	0.248* (0.127)	0.086
Intercept	-1.407*** (0.074)		-1.521*** (0.095)		-1.048*** (0.177)	
Observations	6,921		3,883		1,360	
Pseudo R ²	0.088		0.094		0.062	
***, **, * Denote statistical significance at the 0.01, 0.05, and 0.01 levels respectively, based on two-tailed test. This table presents the results of subsidy affected innovation using probit estimation. Marginal effects are also presented. Variables are defined at Model [1] description.						

For the 14 FUSSR countries, which includes 3,883 firms, the SUB coefficient (0.052) is not significant. However, LOGE (0.164), OWNERF (0.004), INTERNET (0.327), AccF

(0.232), and CUST (0.320) are all significant at the $p < 0.01$ level. The CORR coefficient (0.148) is significant at the $p < 0.05$ level, while the coefficients for both PINS (0.116) and INWORK (0.100) are significant at the $p < 0.1$ level. For the 7 FSNRY countries, which includes 1,360 firms, the SUB coefficient (0.320), our variable of interest, is significant at the $p < 0.01$ level, as is INTERNET (0.628). The CORR coefficient (0.208) and CUST coefficient (0.278) are significant at the $p < 0.05$ level. Finally, the INWORK coefficient (0.248) is significant at the $p < 0.10$ level.

Table 2 provides insight into the effects that various variables have on the capacity to innovate. Based in a review of those variables that were significant, we find that INTERNET; CORP; CUST; INWORK, are significant across all three groups. The positive significance of the internet may be an indication that a broad sense or need for communication is required to both understand, adopt, and make use of innovation. In general, we surmise these results indicate that as long as firms have the ability to access knowledge and skills from the internet, they will improve their capacity to innovate (Pagani, 2005). The level of corruption is also found to have a positive effect on the capacity to innovate. Research indicates that the presence of corruption spurs the ability to think of new ways to produce (Vieites & Calvo, 2011). Respectively, then, a high level of corruption might imbue higher thinking capacity within a country as it spurs one to think outside the box. It could also make it easier for firms to think about how to overcome traditional thoughts related to production and the use of resources.

Tilman (1968) refer to corruption as being like two sides of a coin, where there are both negative and positive outcomes. He argues that it can be adding another dimension that he refers to as “patrimonial-bureaucratic systems”. And suggests that rational bureaucracy can hurt the growth of groups or firms in an area. Seyf (2001) discusses that under some conditions corruption may enhance efficiency, especially if kept within limits. He also refers to corruption as the oil that lubricates the wheels of the bureaucratic administrations, it will enhance the decision making process which will lead to substantial savings for firms. Other researcher argues that corruption improves the productive efficiency of bureaucratic decisions. (Alam, 1990). Leff (1964) argues that the concerns of corruption for developing countries are not as serious as is generally assumed. He argues that it may perhaps have important positive effects that are often ignored.

In our study, custom, trade and regulation represents the presence of custom and trade regulations which forms an obstacle to current operations. These regulations are important because they form the environment in which the firm operates. Our findings are in line with others who suggest that strict regulations can spur management to think about how to work within the confines of an operating environment to produce viable, innovative, and more production outputs and outcomes (Hitt, Hoskisson, & Ireland, 1994)

Finally, we find that the lack of adequate workers has a positive relation with respect to creating the capacity to innovate within a firm. This may be representative of the view that educated workers try to move to more advanced and technological astute economies in order to receive higher pay and/or better opportunities (Horvat, 2004). Moreover, it could be that the shortage of educated labor can affect innovation as countries in these conditions are forced to pay more attention on how to innovate and how innovation can be used to improve both the

incidence and use of human capital. Indeed, as denoted by Ljiljana & Valerija (2011), the brain drain of educated individuals out of a country may spur firms to seek ways to innovate.

There were other variables that were significant across at least two groups. The size variables, LOGE, has positive and significant relation with innovation in the all countries and FUSSR countries groups, but no relation with the third group (FSFRY). This may be interpreted to mean that bigger firms have the ability to innovate as they have more resources, most of the countries in the FSFRY were relatively small and an incidence or more internal conflict. As such, as denoted by Collier (2003), this effect could remain over time, especially in relation to emerging or transitioning economies.

OWNERF is significant for all countries and the FUSSR groups, but like LOGE, is not significant for the FSFRY group. Our analysis of this outcome is that, in general, firms with foreign ownership are more apt to innovate as external ownership is likely to bring an appreciation of the search for and use of new ideas or technology to use in the firm. This association is true for the all countries and the FUSSR groups as further analysis reveals those groups are likely to be more stable and thus, more apt to attract and use foreign investments (Meyer & Pind, 1999).

Access to the finance have significant affect in the all countries and FUSSR countries, but have no effect in the FSFRY countries. From this perspective it may be that financial institutions are more likely to lend to firms that are able to pay back their loan (Bellucci, Borisov, & Zazzaro, 2010). Our previous evidence suggests that as FSFRY countries are small and less stable, both of which affect their capacity to obtain financing.

PINS it has significant results at the all countries and FUSSR countries, but has no effect on the FSFRY countries. Thus, it may be that political instability creates the move to innovate. This may be due to the fact that political instability creates incentives to in improve (Zahra & Hansen, 2000). As such, creating new product or services may be the outcome of such a condition. Upon reflection, political instability works to produce an incentive to create inventive product or services (Michael & David, 1986), in part, because firms are forced to take a broad view of firm operations.

Finally, PART, OWNERG, COMP, TAXR, TAXA, LABOR, and LICENS have no effect on the innovation activity in all the three groups. Thus, being part of a larger firm appears to have no impact on innovation activity. The same holds true when a firm is owned by government. It is our view, upon reflections of the literature, that governmental ownership is less likely to promote innovation because the focus of governmental entities is to produce but not always in effective manner and, as such, innovations in these types of firms may not be encouraged (Baldridge & Burnham, 1975; Qian, Liu, & Wang, 2018).

Likewise, the level of competitors has no significantly effect on innovations. This may be the case because competitive markets have not truly emerged in transition economies (Masso & Vahter, 2008). Tax rate and tax administration have no effect on innovation activity in all three groups, which may indicate a viable tax system is absent (Gentry and Hubbard, 2004). Labor Regulation and business licensing and permits do are not significant for any groups. This lack of significance could be caused by the fact that these groups may not have infrastructures in

place to attend to these activities (South Sudan Country Profile, 2014). Ultimately, we surmise that subsidies do appear to promote innovation.

Level 2 Analysis and Discussion

Our analysis seeks to determine the extent subsidies promote learning and hence positively impact outcomes associated with innovation. As such, in this component of our study, only firms receiving subsidies will be included. This approach adopts a two-step methodology. First, we identify firms who have received subsidies and include them in our sample. Second, within this sample, we identify those firms who have invested in internal research development, external (foreign) technologies, or both. Our objective is to isolate the effect that the *combination* or interaction of a firm's own investments in R&D and the adoption of foreign technology have on a measure firm-level performance measures associated with the presence of innovation. Accordingly, our variable of interest, then, is the *interaction* of firm-level R&D and the use of foreign technology.

Our study makes use of ordinary least squares regression to investigate our query. Our productivity measure is PROD which is 1 minus the current capacity utilization of the firm; in essence, it reflects the level of excess resources available to a firm once its current operating activities, including the adoption of R&D and foreign technologies, have been taken into consideration. In the literature, capacity utilization has been used as a proxy to assess the effects of innovation on firm-level performance and can be thought of as a predictor of outcomes when both innovation and an assessment of learning is considered (Gorodnichenko & Schnitzer, 2013; Ayyagari, Demirgüç-Kunt, & Maksimovic, 2011; and Ghosal & Loungani, 1996). As such, it appears reasonable to adopt this proxy for our study.

Table 3 and 4 reflect two estimation techniques based on Model 2. The first, as reflected in Table 3, is our original estimation depicted in Model 2 that captures the activity of the subsidized firms. Estimation 2, as captured in Table 4, reflects the application of Model 2 for those firms that received no subsidy. Approaching our analysis in this manner provides additional insight about the impact of subsidies.

As reflected in Table 3, based on the full model that included FT, R&D, and FT*R&D, we find that the coefficients of our variables of interest are positive and significant. Specifically, the FT coefficient (16.52) finds significance at the $p < 0.10$ level, while both R&D (19.86) and FT*R&D (11.07) are significant at the $p < 0.05$ level. H2a, H2b and H2c are supported, in that foreign technology and R&D lead to greater productivity. Additionally, we find the coefficients of the control variables LOGS (4.07) and OWNERG (-0.191) are significant at the $p < 0.10$ level.

Table 3
OLS Regression Analysis: Impact Foreign Technology and
Research and Development on Capacity
Subsidized Firms
Dependent Variable: $PROD_i$

	Control	Full
	Mode	Model
	Est. Coeff.	Est. Coeff.
<u>Variable</u>	<u>(Std. Error)</u>	<u>(Std. Error)</u>
LOGE	4.591* (2.483)	4.074* (2.498)
COUNTRY	0.095 (0.151)	0.111 (0.152)
OWNERG	-0.184* (0.101)	-0.191* (0.102)
COMP	0.103 (0.071)	0.086 (0.072)
LOGS	-5.902*** (2.241)	-5.372** (2.259)
AGE	0.015 (0.066)	0.012 (0.066)
CERT	-3.008 (2.509)	-2.593 (2.606)
AccF	3.471 (3.178)	3.207 (3.189)
MANEX	0.062 (0.105)	0.054 (0.105)
FT		16.952* (9.465)
R&D		19.861** (9.526)
FT*R&D		11.071** (5.529)
Intercept	-76.846*** (4.740)	-119.935*** (21.970)
Observations	324	324
Adj R ²	0.03	0.04
***, **, * Denote statistical significance at the 0.01, 0.05, and 0.01 levels respectively, based on two-tailed test. This table presents the results of foreign technology and R&D affected firm capacity for subsidized firms using OLS regression. Variables are defined at Model [2] description.		

Table 4 captures the results of analyzing the effects of FT and R&D on non-subsidized firms.⁸ At the outset, we see that the coefficients of our three variables of interest, namely FT

⁸ We are conducting this robust test in order to add additional evidence that the presence of a subsidy affects the productivity when foreign technology and research and development are present.

(3.87), R&D (6.76), and FT*R&D (2.18) are not significant. We do find, however, that the coefficient of LOGS (-3.51), like that of subsidized firms is significant (at the $p < 0.01$ level). Moreover, relative to non-subsidized firms, we find that the coefficients of Country (0.174), AGE (0.101), CERT (-2.532), and AccF (7.589) are significant at $p < 0.01$, $p < 0.01$, $p < 0.05$, $p < 0.05$, and $p < 0.01$, respectively.

Table 4 OLS Regression Analysis: Impact Foreign Technology and Research and Development on Capacity Non-Subsidized Firms Dependent Variable: $PROD_i$		
Variable	Control Model Est. Coeff. (Std. Error)	Full Model Est. Coeff. (Std. Error)
LOGE	1.123 (0.992)	1.020 (0.994)
COUNTRY	0.175*** (0.062)	0.174*** (0.062)
OWNERG	0.060 (0.072)	0.068 (0.072)
COMP	0.087** (0.037)	0.086** (0.037)
LOGS	-3.533*** (0.911)	-3.519*** (0.911)
AGE	0.099** (0.044)	0.101** (0.044)
CERT	-2.180* (1.189)	-2.532** (1.218)
AccF	7.739*** (1.230)	7.589*** (1.231)
MANEX	-0.020 (0.049)	-0.024 (0.049)
FT		3.878 (5.819)
R&D		6.762 (5.819)
FT*R&D		2.183 (3.198)
Intercept	-70.378*** (2.124)	-79.031*** (12.887)
Observations	2,276	2,276
Adj R^2	0.04	0.04
***, **, * Denote statistical significance at the 0.01, 0.05, and 0.01 levels respectively, based on two-tailed test. This table presents the results of foreign technology and R&D affected firm capacity for non-subsidized firms using OLS regression. Variables are defined at Model [2] description.		

In general, our variables of interest are positively significant in the presence of a subsidy. In essence, we find that foreign technology, R&D and, more importantly, their interactions, positively affect the ability of the firm to produce excess capacity. Thus, in line with the theory of absorptive capacity, we find R&D, either created internally or obtained from external sources, allow a firm to operate more efficiently and, consequently, provide additional resources available for firm use. We find that when firms are involved in R&D that it will lead to an increase in excess capacity of the firm in the near future. Such an outcome is viewed as value adding because under general cost accounting theory, released capacity can be used for other profitable purposes (Horngren et al., 2010, p. 401; He, Gan, & Xiao, 2021)

LIMITATIONS OF THE STUDY

We construct the initial phase of our study to assess the extent the presence of subsidies promote firm level innovation. The basis of our observation of the presence of a subsidy is whether, in the last three years, firms received subsidies from local, national or European Union governmental entities. The presence of a subsidy is also a seminal component of the second phase of our study.

Admittedly, in constructing a link between subsidies and innovation, many researchers have specified the *type* of subsidy granted. Our efforts have taken a more generalized approach in that we merely rely on the presence of a subsidy to assess innovative capacity. Our decision to do so is partly related to the limitation of our data; specifically, the BEEPS database only reveals that a subsidy is received. This data limitation is also present in the literature (see Branstetter & Sakakibara, 1998), where they concentrated their analysis of the effects of subsidies to the presence of the subsidy.

Our review of the literature provides additional evidence that our approach has traction. For example, Levén et al. (2014) indicate that a subsidy in the broadest sense, can be *any* government assistance. Dai & Cheng (2015), in their analysis of the role of subsidies on R&D, opt to not focus on type of subsidy. Instead, they look at the magnitude of the subsidy to evaluate subsidy effectiveness. Finally, Schwartz & Clements (1999) indicate that when assessing the role of subsidies in a firm, a broad definition of subsidies may be necessary to capture both the explicit and implicit elements associated with government interventions. They take this view given the observation that subsidy classifications may be too narrow and can overlap. Notwithstanding the above, we do acknowledge the inherent limitation of our proxy. Hence, it is important to take the likely endogeneity concern of the subsidy variables into account. Since some firms who receive a subsidy may fail to innovate and others who did not receive a subsidy successfully innovate.

SUMMARY AND CONCLUSIONS

This paper has two levels of analysis. The first investigates the effect subsidies have on firm level innovation and the extent subsidies promote learning and hence positively impact outcomes associated with innovation. The second measures firm productivity when the adoption

of foreign technology and in-house R&D is considered. Our results suggest subsidies promote innovation and that when these subsidies are contemporaneously considered in the face of the decision to adopt foreign technologies and employ R&D, firm-level capacity increases.

Our work also identifies components found to be important determinants of innovation and improved firm performance when a strategic decision to employ R&D activities and external technology with subsidies are considered. Our results, capture the interactive effects of a decision to manage both resources and environments when adopting a strategy. This offers insight into the development of management control systems that include both management and strategic control. According to Merchant & Van der Stede (2007, p. 7), this consideration creates a management control system that is cybernetic and proactive, rather than merely reactive. It is this type of design that Abernethy & Lillis (1995) allude to as most likely to create the type of flexibility needed to improve performance. It does so because it links manufacturing strategy with control system design.

Our results also provide insight into the relation between management control and organizational capacity. Specifically, as articulated by Henri (2006), understanding the source of competitive advantage is an influential ingredient to creating firm-level value. By identifying these sources in the face of both internal and external environments, Henri suggests a management control system is developed that makes managers aware of the drivers of value in organizations and the causal relationships critical to drive that value. Our results capture such relationships.

An implication of our research is the suggestion that if a developing country wants to improve productivity, then they should provide subsidies that encourage companies to invest in R&D and foreign technology. We believe this conjecture leads to an additional question that must be addressed in future research: If government agencies keep increasing subsidies, will this lead to new products or will that destroy the competitive market? As well as our paper finds a strong connection between innovation and subsidies in most developing nations, will this lead to developed nations using the same model? Also, we believe there is a need for more research to compare developed nations and developing nations on the module that we use to see if subsidies can prompt innovations.

Finally, our results also contribute to the on-going debate as to whether the collection and use of data via a management control system is relevant for top management regarding its ability to implement successful product innovation. Specifically, through our analysis of contextual environments, we offer that information will emerge about innovation, especially when subsidies and access to technology are considered. In doing so, we provide support of the considerable importance of formal management control systems in the pursuit of innovations that will successfully translate into improved long-term performance.

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INVESTIGATING THE ROLES OF LEVERAGE AND SIZE ON FIRM'S VULNERABILITY: TURKEY EVIDENCE

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ABSTRACT

This paper aims to examine the roles of leverage and size on a firm's vulnerability. Some studies defend the larger firms are more financially fragile. Considering that there are opposite views in the literature, this study tested which one is valid for Turkish manufacturing firms.

We applied panel data analysis, including Altman's Emerging Market Z Score and Merton's Distance to Default Score. We examined 116 Borsa Istanbul (BIST) firms in the manufacturing sector using their last ten-year data. We found that leverage is positively, and size is negatively correlated to the firms' vulnerability. These findings have been reached using both accounting-based and market-based measures. Unlike the studies championing larger firms are more vulnerable, our results support the vice versa. The firms with less leverage and larger are more resilient and less vulnerable.

This study's originality is the first one that uses both accounting-based and market-based measures together in Turkey. Although both measures identify firm vulnerability, each one uses different kinds of information about a firm and thus reflects different perspectives. We don't investigate which model is running best. Instead, we search if the effects of size and leverage on firm vulnerability are similar for each measure.

Whether larger firms are more vulnerable or not is an essential question for managers and regulatory agencies. The findings of the study can be used for regulatory and managerial purposes.

INTRODUCTION

Detecting the determinants of firms' failures is one of the core issues investigated widely in finance. Following early warning systems enable the firms to take necessary actions before any failure. Firms may encounter financial distress during their lives for various reasons. If these situations cannot be eliminated, many stakeholders such as shareholders, managers, financing institutions, the firms within the supply chain, state agencies may face negative results. Sometimes such results could be vital for firms. As a result, it is important to closely monitor firms' financial conditions and take necessary steps to prevent possible failures.

Generally, as firms grow, the cash inflows increase and stabilize. Firms' leverage levels are getting rise and the capital structure change in favor of debt over equity. At the maturity stages, firms have debts at their highest level (Damodaran, 2014). Since the earnings are so small

or negative in the start-up or growth stages, the effects of the tax shield would be limited. However, as the debt levels get higher for mature firms, the tax shield effects start to rise, and expected bankruptcy costs begin to decrease. The benefits of borrowing are more than its costs up to an optimum point. Exceeding that certain point exposes the firms to more bankruptcy costs. So, there would be a trade-off between the benefits and costs of debt.

Leverage is one of the variables frequently handled in the studies investigating the reasons for firms' financial distress. According to some of those studies, most firms face financial trouble when they are at their all-time peak market leverage (DeAngelo et al., 2016); high leverage is the primary cause of financial distress (Andrade & Kaplan, 1997); leverage and past excess stock returns are short-term signals of financial distress rather than long-term (Hilscher & Szilagyi, 2005); equity ratio is evaluated as an effective predictor of bankruptcy for a very long period considering its relation to the retained earnings and long-term profitability which presents especially in SMEs using little financing other than debt (Altman, 2016); the probability of bankruptcy is a decreasing function of return on assets and an increasing function of financial leverage (Zmijewski, 1984); leverage is positively related to the probability of bankruptcy (Charalambakis & Garrett, 2019); a firm's debt structure affects the way financially distressed firms restructure (Asquith et al., 1994); the level of debt is a crucial variable that effects the costs of financial distress and the composition of debt is another important determinant of the outcome of financial distress (Asquith et al., 1994); as the debt level of firms increases, the financial distress level of those firms increases (Abdioğlu, 2019); there is a positive and significant relationship between debt and financial distress (Turaboğlu et al., 2017); the use of debt by nonfinancial firms increases their level of financial distress (Muigai & Mutiso, 2018); leverage has significant positive effect to financial distress (Giarto & Fachrurruzie, 2020).

There is a tendency for firms to get larger as they mature. The assets grow, the market share and earnings increase as benefiting from economies of scale, efficiencies, know-how experiences, established distribution channels, and professionalism. Then, is there any significant difference between the larger and smaller firms in terms of vulnerability? Are the larger firms more vulnerable or more resilient?

Size is one of the most investigated variables in the studies on firms' failures. A firm's size is evaluated as strongly related to bankruptcy probability with other factors such as past stock returns and the idiosyncratic standard deviation of stock returns. Firm size is a significant predicting variable since the market equity of firms that are close to bankruptcy is typically discounted by traders (Shumway, 2001). According to the other studies, default risk is related to the size and book to market characteristics of a firm (Vassalou & Xing, 2004); up to four years horizon, bankruptcy risk has a local minimum as a function of the size, which is taken into account as logarithmic total assets (Altman et al., 2016); larger firms which have more mature business lines, higher profitability and lower volatility of profit have significantly lower firm risk (Bartram et al., 2015). Firms with higher leverage, lower profitability, lower market capitalization, lower past stock returns, lower cash holdings, higher market-book ratios, and lower prices per share are more likely to financial failure; at longer horizons, the most persistent firm characteristics, market capitalization, the market-book ratio, and equity volatility become relatively more significant (Campbell et al., 2005).

Larger firms can access finance more cheaply and diversify financing sources easier. Also, they are more stable than smaller firms (Kurshev & Strebulaev, 2006). There is a positive relationship between firm size and profitability (Rahman & Yilun, 2021). Firms with low profitability, low liquidity, and small size will have a higher probability of financial distress (Thim et al., 2011); large firms can reduce financial distress risk by using more debt (Muigai & Mutiso, 2018). According to this literature, as the firm gets larger, it becomes more resilient. In other words, there is a negative relationship between size and firm fragility.

On the other hand, there are some mixed results regarding the size effect. For example, Alfaro et al. (2019) have evaluated the size effect on a firm's fragility as time-invariant and in a negative way. They have found the larger firms are more vulnerable in their studies. In addition to that, Vassalou and Xing (2004) have concluded that the size effect is a matter only within the quintile with the highest default risk. Akpınar and Akpınar (2017) have found that leverage, size, and dividend payment increase the risk of financial distress.

In a recent study investigating the relationships of size and leverage with the fragilities of the firms in emerging markets, it was found that there is a strong relationship between firm size and firm fragility independent of time (Alfaro et al., 2019). According to this study, larger firms are more vulnerable for a given level of leverage. Additionally, it was mentioned that there is a negative relationship between leverage and firm fragility; however, this power of association changes depending on time. The firms operating in Turkey were also in the scope of that study. The finding that the relationship between size and fragility is positive and larger firms are more financially fragile, is surprising.

In this framework, we wonder if this relationship is valid, and if so, what the direction of this relationship is, from a narrower perspective. Considering that mentioned studies either focus on the firms operating in developed economies or bulk (public and private) of firms in Turkey from a cross-country perspective, this study concentrates solely on BIST firms in the manufacturing sector in Turkey. To do this, we examine the roles of both leverage and size on firms' fragility for these firms using their ten-year data and considering both accounting-based and market-based measures.

METHODOLOGY AND DATA COLLECTION

We seek to find the relationships of leverage and size with the firm fragility. To determine a firm's vulnerability, we use two different measures. One is Altman's Emerging Market Z-Score (EM Z-Score) which is an accounting-based measure. The other is Merton's Distance to Default Score (DD Score), a market-based measure. The reason why we use two different kinds of measures to evaluate a firm's vulnerability is to determine if the questioned relationships are valid for each measurement. Since the EM Z-Score depends on several ratios from financial tables, the information they reflect is generally backward-looking about a firm (Xu & Zhang, 2009).

On the other hand, the DD Score evaluates the situation of a firm based on market values. So, it uses more daily information about a firm. Although both measures are related to firm vulnerability, each one uses different kinds of information about a firm and thus reflects different

perspectives for the firm situations. Here, we don't investigate which model is running best. We want to test if the relationships of size and leverage between a firm's vulnerability are the same or different based on each measure.

For the leverage variable, we use the ratio of total liabilities to total assets for each firm. For the size variable, we use two different measures. First is the log of total assets. The other is the log of the ratio of the market value of equity to the total BIST market capitalization. So, we get two alternative results regarding with size of each regression model. Thus, we can compare the results in terms of alternative measures, which enable us to reach more comprehensive conclusions.

In this paper, we focus on BIST firms in the manufacturing sector. We gather related data from Eikon. We collect ten-year data of firms between the years 2010-2019. There are 116 manufacturing firms of which we can reach ten-year data. Thus, we have used 1160 firm-year observations in the study.

Emerging Market Z-Score

The Altman Z-score, which was firstly developed for manufacturing firms in the USA, was modified several times to address more specifically non-manufacturing firms and private firms. Altman has proposed a new version of the original Z-score, Emerging Market Z-score (EM Z-score), to capture emerging market firms' characteristics (Altman, 2005).

EM Z-score consists of four different ratios and one constant value as below:

$$\text{EM Z-Score} = 6.56X_1 + 3.26X_2 + 6.72X_3 + 1.05X_4 + 3.25$$

where;

X_1 = Working Capital / Total Assets

X_2 = Retained Earnings / Total Assets

X_3 = Operating Income / Total Assets

X_4 = Book Value of Equity / Total Assets

There are two threshold values to classify the firms as safe, vulnerable, and distressful.

The firms are evaluated as *safe* if the EM Z-score is over 5.85.

The firms are evaluated as *vulnerable* if the EM Z-score is between 3.75 and 5.85.

The firms are evaluated as *distressful* if the EM Z-score is below 3.75.

The formula mentioned above is initially only one part of the calculation of the EM Z-score. There are other additional steps to reach the final score, such as adjusting bond ratings for foreign currency devaluation vulnerability, adjusting for industry, adjusting for competitive position, taking into account the special debt issue features, and comparing the sovereign spread. The formula represents the basis of the calculation, and the others represent some adjustments. Altman mentioned that anyone not having information or time for the other steps could apply the

initial first step and infer useful information (Altman, 2005). So, we have adopted this approach when calculating EM Z-score.

Since being a component of the EM Z-score, using leverage as an independent variable is potentially a multicollinearity problem. So, Alfaro et al. have offered another EM Z-score named Modified EM Z-score (MEM Z-score) (Alfaro et al., 2019). We also adopt that approach. Thus, to calculate MEM Z-score, we drop the leverage term and keep the others. In addition to that, we also use the volatility of equity's market value as another independent variable in the models.

We use the following models regarding with MEM Z-score:

$$\text{Model 1: MEMZ}_{i,t} = \alpha_i + \beta_1(\text{Leverage}_{i,t}) + \beta_2(\text{Size1}_{i,t}) + \beta_3(\text{Volatility}_{i,t}) + \beta_4(\text{CFO}_{i,t}) + \beta_5(\text{MB}_{i,t}) + \varepsilon_{i,t} \quad (1)$$

$$\text{Model 2: MEMZ}_{i,t} = \alpha_i + \beta_1(\text{Leverage}_{i,t}) + \beta_2(\text{Size2}_{i,t}) + \beta_3(\text{Volatility}_{i,t}) + \beta_4(\text{CFO}_{i,t}) + \beta_5(\text{MB}_{i,t}) + \varepsilon_{i,t} \quad (2)$$

where $\text{MEMZ}_{i,t}$ is the modified emerging market Z-score for firm i , for year t ; $\text{Leverage}_{i,t}$ is the ratio of total liabilities to total assets for firm i , for year t ; $\text{Size1}_{i,t}$ is the log of the total assets for firm i , for year t ; $\text{Size2}_{i,t}$ is the log of the ratio of the market value of equity to total BIST cap for firm i , for year t ; $\text{Volatility}_{i,t}$ is annualized standard deviation of the daily market value of firm i , for year t . Net cash flow from operations is able to indicate the financial distress of a firm (Fitzpatrick & Ogden, 2011; Koh et al., 2015), so we control for a firm's cash flow. $\text{CFO}_{i,t}$ is the ratio of net cash flow from operations divided by total assets of firm i for year t . Market to book ratio contributes explanatory power and is essential to predict failures at long horizons. Also, it captures the relative value placed on the firm's equity by stockholders and accountants (Campbell et al., 2005). So, we also use market to book ratio as control variable in the model. $\text{MB}_{i,t}$ is the ratio of market value to book value of firm i , for year t . The standard errors are clustered at the firm and year level.

Distance to Default Score

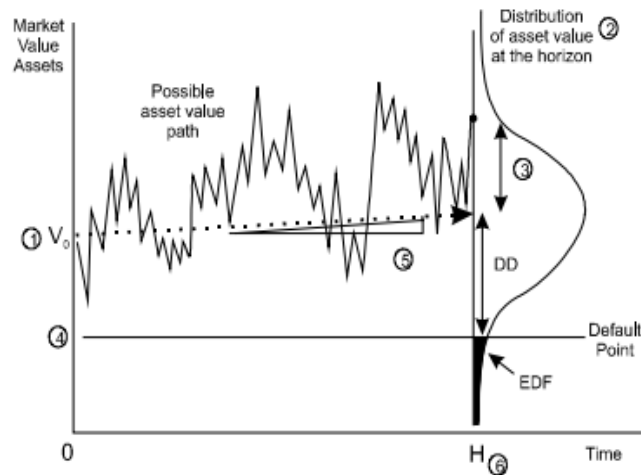
Distance to default (DD) measure stands on a solid theoretical background. According to the DD, a firm's equity is evaluated as a call option on the firm's assets (Merton, 1974). The equity holders are residuals claimants on the firm's assets after all other obligations have been met. According to the Black Scholes (1973) formula below, V_E is the market value of equity, V_A is the firm's asset value, the strike price of the call option is the book value of the firm's liabilities.

$$V_E = V_A N(d_1) - X e^{-rT} N(d_2), \quad (3)$$

$$d_1 = (\ln(V_A / X) + (r + 0.5\sigma_A^2)T) / (\sigma_A \sqrt{T}), \quad (4)$$

$$d_2 = d_1 - \sigma_A \sqrt{T}, \quad (5)$$

where r is the risk-free rate, N is the cumulative density function of the standard normal distribution.

Figure 1 Distance to Default

The numbers in Figure 1 (Crosbie & Bohn, 2003) corresponds to the meanings below:

- 1- The current asset value
- 2- The distribution of the asset value at time H
- 3- The volatility of the value of the future assets at time H
- 4- The level of the default point, the book value of the liabilities
- 5- The expected rate of growth in the asset value over the horizon
- 6- The length of the horizon, H (Crosbie & Bohn, 2003).

DD measures the distance between the current value of assets and the debt amount in terms of volatility which is the standard deviation of the growth rate of the assets. However, the market value of the assets and their volatility are not directly observed. So, an iterative procedure is applied to obtain them. We have used Löffler and Posch's (2007) approach to estimate those values.

First, we obtain the daily price of firms' stocks. Then we calculate the standard deviations of these. After that, we annualize daily standard deviations and thus reach volatility of equity. We also get the market value of equity by multiplying the number of outstanding shares with the price of shares per year. We take the time horizon as one year. We include all short-term liabilities and half of the long-term liabilities for the book value of liabilities per year. Servicing long-term debt and its interest payments consist of a part of the one-year-horizon debt. So, there is a convention of including half of the long-term debt in the literature (Crosbie & Bohn, 2003; Vassalou & Xing, 2004). We use the interest rates of bonds that mature up to one year and take the average of these rates for a specific year for the risk-free rates. We get these rates from the Central Bank of the Republic of Turkey (CBRT) website.

We calculate the asset value by summing up the market value of the equity and the book value of the liabilities as mentioned above. We calculate asset volatility by proportionate the volatility of equity volatility. Then we get another asset value and asset volatility by using the

Black-Scholes formula. In this way, we get equity value and equity volatility. Finally, we minimize the square roots of the errors by converging asset values and asset volatilities. At the end of this iteration process, the calculated d2 term in the formula above gives the distance to default for each firm.

We use the following models regarding with DD score:

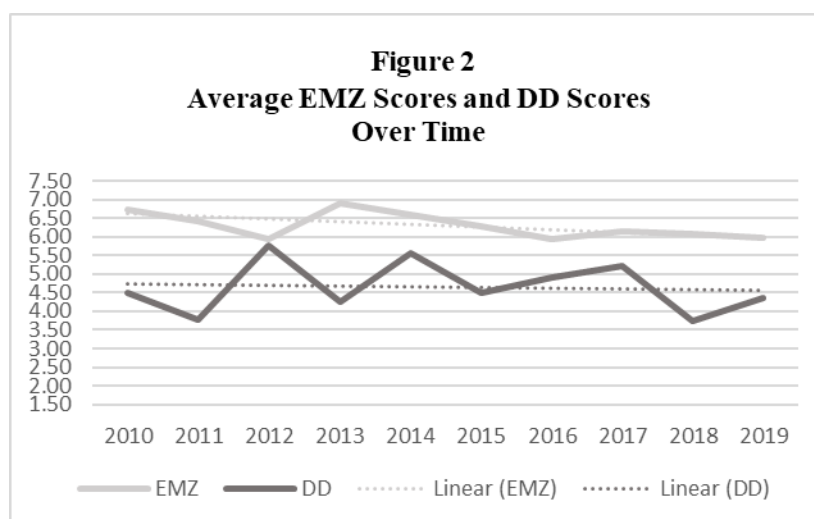
$$\text{Model 3: } DD_{i,t} = \alpha_i + \beta_1(\text{Leverage}_{i,t}) + \beta_2(\text{Size1}_{i,t}) + \beta_3(\text{Volatility}_{i,t}) + \beta_4(\text{CFO}_{i,t}) + \beta_5(\text{MB}_{i,t}) + \varepsilon_{i,t} \quad (6)$$

$$\text{Model 4: } DD_{i,t} = \alpha_i + \beta_1(\text{Leverage}_{i,t}) + \beta_2(\text{Size2}_{i,t}) + \beta_3(\text{Volatility}_{i,t}) + \beta_4(\text{CFO}_{i,t}) + \beta_5(\text{MB}_{i,t}) + \varepsilon_{i,t} \quad (7)$$

where, $DD_{i,t}$ is the distance to default score for firm i , for year t ; $\text{Leverage}_{i,t}$ is the ratio of total liabilities to total assets for firm i , for year t ; $\text{Size1}_{i,t}$ is the log of the total assets for firm i , for year t ; $\text{Size2}_{i,t}$ is the log of the ratio of the market value of equity to total BIST cap for firm i , for year t ; $\text{Volatility}_{i,t}$ is annualized standard deviation of daily market value for firm i , for year t . Net cash flow from operations and market to book ratio are also included as control variables in the models. The standard errors are clustered at the firm and year level.

Snapshot of the Sector

We calculate the Z-scores and DD-scores of the firms in the scope of the study. The figure below depicts the development of the average scores over the years. Both the average of EM Z-scores and the average of DD scores show a decreasing trend. We observe that firms' average fragility has slightly risen in the last decade.

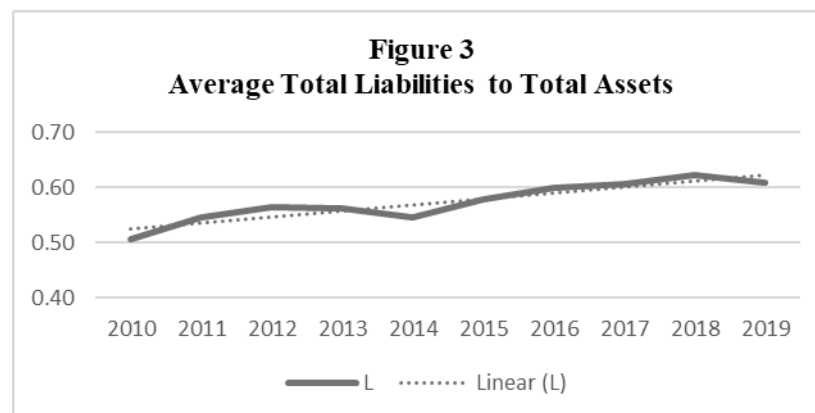


The table below presents the change in the numbers of firms according to the zones they involve. While the number of firms in the safe zone is 70 in 2010, it decreases to 57 in 2019. For

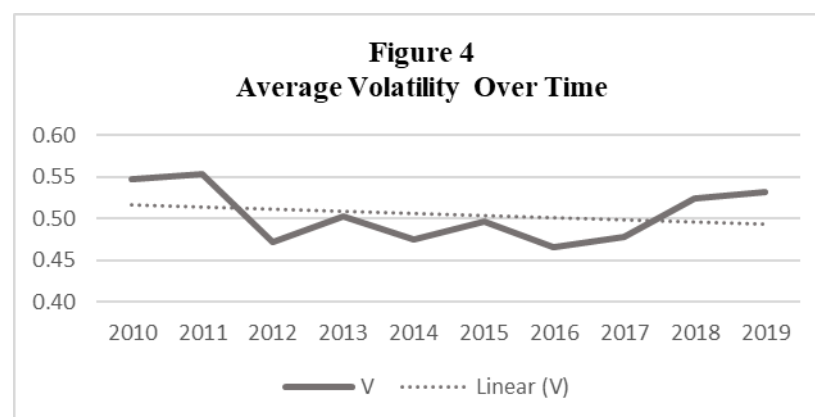
the same period, the number of firms in the distress zone has increased from 19 to 27. We observe that more firms are having financial difficulties in 2019 compared to 2010.

Table 1 The Numbers of Firms According to Their Vulnerability Scores (EMZ Score)										
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Safe Zone	70	67	67	63	61	59	53	59	64	57
Grey Zone	27	28	31	37	31	35	38	39	29	32
Distress Zone	19	21	18	16	24	22	25	18	23	27
Total Firms	116	116	116	116	116	116	116	116	116	116
Safe Zone: $EMZ > 5.85$, Grey Zone: $3.75 < EMZ < 5.85$, Distress Zone: $EMZ < 3.75$										

There is an upward trend of the averages of the firms' leverages. While it was about 50% in 2010, it passed slightly over 60% in 2019.



On the other hand, although there are some upside and downside movements in the volatility of these firms, average volatility keeps going around 50%.



RESULTS

We calculate the Leverage, Size 1, Size 2, Volatility, CFO, MB, EM Z-scores, MEM Z-scores, DD scores for the firms in question. Table 2 puts the summary statistics.

Table 2 Summary Statistics						
	Obs.	Min	Median	Mean	Max	St. Dev.
EM Z-Score	1160	-77.738	6.042	6.293	32.973	5.847
MEM Z-Score	1160	-76.809	5.128	4.710	23.251	4.721
DD Score	1160	0.113	4.080	4.653	20.075	2.431
Leverage	1160	0.036	0.549	0.574	8.665	0.478
Size 1	1160	15.837	19.676	19.878	24.740	1.613
Size 2	1160	-12.893	-7.711	-7.709	-3.223	1.731
Volatility	1160	0.113	0.384	0.505	7.050	0.669
CFO	1160	-0.970	0.050	0.063	7.516	0.247
MB	1160	0.049	0.643	0.955	10.981	1.137
Leverage: Total Liabilities / Total Assets Size 1: Ln (Total Assets) Size 2: Ln (Market Equity / Total BIST Market Cap) Volatility: (St. Dev of Daily Values of Equity)*250 ^{0.5} EM Z-Score (Emerging Market Z Score): $6.56 * (\text{Working Capital} / \text{Total Assets}) + 3.26 * (\text{Retained Earnings} / \text{Total Assets}) + 6.72 * (\text{Operating Income} / \text{Total Assets}) + 1.05 * (\text{Book Value of Equity} / \text{Total Liabilities}) + 3.25$ MEM Z-Score (Modified Emerging Market Z Score): The same formula of EMZ Score above, only eliminating the fourth component CFO: Cash Flow from Operations / Total Assets MB: Ratio of Market Value / Book Value						

As mentioned in the methodology section, we use four models. The first two models are designed for the dependent variable of the MEM Z-scores, and the remaining models are designed for the dependent variable of the DD scores. Both these scores show the current positions of firms in terms of financial distress. The higher the scores, the better the situations of firms.

We seek the signs of coefficients regarding dependent variables and any heterogeneity across firms over a ten-year period. We investigate the fixed effect estimates of the relationship between size, leverage, and financial distress. Firm fixed effects and year dummies are specified in the regression. So, their estimates are constant at the firm level and year level. The control variables (volatility, cash flow from operations, market value to book value ratio) are measured at firm-year level. The regression coefficients on control variables remain constant in the sample.

We run balanced panel data regressions using fixed-effects model for each designated model. The results of the regressions are showed in Table 3. In the table, MEMZ denotes the modified emerging market Z-score; DD denotes the distance to default score. Leverage is the ratio of total liabilities to total assets. S1 is the log of total assets. S2 is the log of the ratio of the market value of equity to the total BIST market cap. V is the annualized volatility of equity's market value. CFO is cash flow from operations. MB is the ratio of market value to book value.

The coefficients of both S1 and S2 variables are positive and significant in model 1 and model 2. It suggests that the larger firms have a higher MEMZ score. According to this positive relationship between size and MEMZ score, the larger firms are more resilient. The coefficient of leverage is negative and significant for both model 1 and model 2. It shows that as the leverage of a firm gets higher, the firm becomes more financially vulnerable. Volatility is found negatively and significantly correlated with the MEMZ score for model 2. CFO has a positive and significant relationship with the MEMZ score for both models, as expected. All else equal, a higher CFO indicates that the firm is more financially resilient. While the coefficient of market value to book value ratio is significant for both models, the signs differ.

For model 3 and model 4, the relationships of S1 and S2 with DD scores are different. S2 has a positive and significant relation with financial vulnerability; the coefficient of S1 is not significant. While the sign of S2 is positive as predicted, we see that the relationship between size and financial vulnerability is sounder for MEMZ score than DD score. Leverage and volatility show a negative and significant relationship with the DD score. According to this, the firms with higher leverage and higher volatility are more financially vulnerable. The CFO and MB variables have a positive and significant relationship with the DD score, as expected. All else equal, the higher CFO and higher MB, the higher the DD score.

Table 3				
Regression Results				
	Model 1	Model 2	Model 3	Model 4
L	-10.722734***	-10.2550848***	-1.360100***	-1.379000***
S1	1.013433***		-0.112338	
S2		0.5495142***		0.188723.
V	0.035484	-0.0093132	-1.977827***	-1.983195***
CFO	6.953449***	6.9271261***	0.316805.	0.328405.
MB	0.140022.	-0.2107763*	0.250072**	0.189742*
F Statistic (p value)	876.641 (< 2.2e-16)	769.79 (p< 2.2e-16)	30.023 (p< 2.2e-16)	30.3652 (p< 2.2e-16)
Year Dummy	Yes	Yes	Yes	Yes
Firm Fixed Effect	Yes	Yes	Yes	Yes
Adj. R-squared	0.78625	0.76289	0.025326	0.026726
Observations	1160	1160	1160	1160
Number of Firms	116	116	116	116

DISCUSSION

Whether there is any relationship of leverage and size with fragility is an essential question for the firms. If so, the direction of the relationship is also significant for managers to follow the right way. Although there is a consensus on the presence of the relationship, different findings are on the table in terms of the direction of this relationship. To contribute to this issue, we examine 116 manufacturing firms in BIST. The originality of our study is using either accounting-based measure and market-based measure together.

Both accounting-based measure and market-based measure appoint a financial stability score to firms. However, each measure uses different kinds of information about firm. When calculating accounting-based measure, various firm characteristics such as liquidity, profitability, productivity, solvency, and sales-generating ability are included. All these data cover different aspects of a firm. So, the use of abundant information is an advantage of accounting-based measure. On the other hand, this measure tends to look backward. Contrary, market-based measure adopts a forward-looking approach. The disadvantage of this measure is oversimplified and restrictive assumptions about capital structure and the stochastic process of asset value (Xu & Zhang, 2009).

We find that leverage and volatility are negatively; size is positively related to the firm's financial resilience. We reach these results both using accounting-based measurement and market-based measurement. According to our findings, the larger firms are more resilient. Also, the firms with more debt are more vulnerable. Our results present a different picture from the studies advocating that the larger firms are more fragile.

On the other hand, the results of our study show some differences between these two measures. As size variable, total assets (S1) and the ratio of market equity to total BIST market cap (S2) are positively related with MEMZ (accounting-based measure). On the other hand, while the ratio of market equity to total BIST market cap is positively and significantly associated with DD (market-based measure), the variable of total assets is negatively related to DD, and this relation is not significant.

Although there are many similarities between firms, larger firms differ from smaller firms in some respects. As firms get larger, they can use economies of scale and minimize their costs. This maintains efficiency. Larger firms can also benefit from well-established supply chains and distribution channels. Additionally, larger firms have bigger market share, more opportunities to make a profit and abundant resources. This phenomenon is also regarded with the mature of these firms. As the firms get older, their know-how experiences and professionalism increase. So, it is expected that larger firms have more strengths to difficult conditions compared with smaller ones.

The signs of leverage variable are negative and significant for all models. On the other hand, the relation of leverage with MEMZ is sounder than DD. In terms of leverage, firms can be on one of two opposite sides, benefiting from a tax shield or exposing heavy debt costs. Firms have a tax shield when using debt. By borrowing, they can decrease the cost of capital. However, this phenomenon is valid until a certain point. The level of this threshold is different for each firm. On the other hand, it is open that firms expose severe costs if they pass beyond that level. Thus, it is not surprising that leverage has a negative effect on a firm's financial fragility.

The variable of CFO has apparent explanatory power on financial strength. This relation is positive and significant for both measures. It can be said that net cash flow from operations is able to indicate the financial distress of a firm. While the explaining power of volatility is more substantial in DD scores, there is no significant relationship between volatility and MEMZ. The signs of market value to book value are positive and significant in DD scores. However, there are mixed results in MEMZ scores.

The focus of the study is to find the relation of size and leverage with financial distress. According to the results, the larger firms are more resilient. Also, the firms with more debt are more vulnerable. These findings can be useful for managers and supervisory authorities. The vulnerability of a firm should be evaluated individually. Although the larger firms have several advantages and resources to overcome financial difficulties, they also expose to more risks because of their position in the whole economy. So, they should be supervised closely by supervisory authorities. The vulnerability stemming from leverage is another concern for the firms. The factors related with leverage such as debt ratio, maturity mismatches, interest rate risk should be closely monitored, and necessary actions should be taken proactively by the managers.

CONCLUSION

In this study, we investigate the roles of leverage and size on firms' fragility. To this purpose, we use two different measures for determining the firms' conditions. One is MEM Z-Score which is an accounting-based measure. The other is DD Score which is a market-based measure. For the right-hand side variables, we use leverage, size, and volatility. We use two alternatives for the size variable. According to our findings, the larger firms are more resilient. Leverage and volatility have a negative impact on firms' resilience.

For further studies, the scope of this study can be enlarged either by extending the time dimension and by including the other firms in different sectors or different countries.

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