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# DO DERIVATIVES INCREASE AMERICAN CORPORATE'S FINANCIAL PERFORMANCE?

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## ABSTRACT

*Hedging through derivatives contracts is a prominent tool under risk management system. This study examines association between derivatives usage and financial performance by analyzing three main categories of derivatives; commodity, interest rate, and foreign currency by considering altogether multiple type of instruments collectively, such as; futures, forward, swaps and options. The literature has mixed results about the association between hedging through derivatives usage and corporates financial performance and value. We revisit this link while applying a unique methodology called; Partial Least Square, Structural Equation Modeling (PLS-SEM), first time as per our knowledge. We considered a characteristically exclusive sample of top American non-financial corporates, listed on New York Stock Exchange, U.S 100 over period of 2009 to 2014; to exemplify and recommend the findings to corporates that belong to emerging, developing and underdeveloped countries. We confirm statistically and theoretically that hedging through derivatives has positive effect on corporates financial performance and add premium. The findings of study have theoretical and managerial contributions for emerging, developing and underdeveloped countries.*

**Key Words:** Derivatives, Risk Management, Hedging, Financial Performance, Structural Equation Modeling, Partial Least Square.

## INTRODUCTION

Corporate hedging is key component of risk management theories, and hedging through derivatives minimize risk and increase firm value (Bessembinder, 1991). The risk management system is significantly and actively available in multinationals (large) and national (small) corporates at different levels (Prevost, Rose, & Miller, 2000). The corporates are also spending huge resources on risk management due to international operations, currency, credit and commodity risks. The risk management includes utilization of off-balance sheet and on-balance sheet instruments (Smith & Stulz, 1985). Conventionally, the off-balance sheet instruments include use of futures, forward, options and swaps in three main categories of derivatives like commodity, interest rate and foreign currency.

The hedging through derivatives have increased after huge losses to non-financial corporates, such as; Metallgesellschaft , Procter & Gamble, and Aracruz during period of 1993-2008 (Dam, 2012). This concentration of corporates resulted as significant growth in notational amount of $57.5 to $544 trillion in global derivatives market from 1995 to 2016 as reported by International Swaps and Derivatives Association (2017). The growth of derivatives market caught the eye of academic researchers (Li, Visaltanachoti, & Luo, 2014; Donohoe, 2015; Ayturk, Gurbuz, & Yanik, 2016; Nguyen, Kim, & Papanastassiou, 2018) and policymakers (International Monetary Fund, 2011).

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Global 500 companies use financial derivatives to hedge their risk (Gilje & Taillard, 2017). Despite the reality that hedging through derivatives and its impact on the firm performance and value is limited. Gilje and Taillard (2017) reported that that it is a challenge to confirm casual effect of hedging through derivatives due to endogenous nature of hedging decision. In this study, we accept this challenge and aim to examine the casual effect between the derivatives usage and corporate performance and value by employing a prominent statistical technique Partial Least Square, Structural Equation Modeling (PLS-SEM). Partial Least Square, Structural Equation Modeling (PLS-SEM) technique is used in multiple disciplines, such as; psychology (Sette et al., 2016), medical science (Brett et al., 2018), economics (Shin, Jeong, & Park, 2018), sciences (Chen et al., 2018) and widely in finance to confirm the casual relationship among variables and constructs (Jamshidi & Hussin, 2018; Rasheed, Rafique, Zahid, & Akhtar, 2018; Fiksenbaum, Marjanovic, & Greenglass, 2017).

The casual relationship between the derivatives usage and corporate financial performance and value is examined by multiple researchers in several ways (Allayannis & Weston, 2001; Bartram, Brown, & Conrad, 2011; Erez-gonz, 2013; Gerrit & Posch, 2018; Jankensgård, 2014; Phan, Nguyen, & Faff, 2014).

Our study is different from previous research work in multiple ways, such as: first, we employed PLS-SEM to investigate this relationship, first time; second, we examined collectively three main categories of derivatives; commodity, interest rate, and foreign currency by considering altogether multiple type of instruments, such as; futures, forward, swaps and options; third, our sample of corporates is very unique as these are top 100 multinationals belong to United State of America and listed in U.S 100 index that covers 36% market capitalization of New York Stock Exchange (NYSE) (NYSE, 2018). These corporates are dealing around the world and provide a huge support to the economy of United State of America and large utilizer of derivatives contracts, to minimize the risk.

Forth, we are first to investigate this association; separately and only on these top 100 U.S national corporates, however, overall the 720 U.S corporates are studied by ). Fifth, the period of study is exclusive and selected thoughtfully from 2009 to 2014, to avoid the effect of economic and financial crises effect on causal association. Sixth, It is vital to examine the effect of derivatives on U.S corporates because derivatives market size has improved 18 to 30 times from $16.6 to $ 308 and $500, during two important periods of 1965 to 2012 (Abdel-khalik & Chen, 2015) and 1965 to 2016 (NEW York Fed, 2017), respectively.

Our paper provides several key findings. First, we confirm that overall causal relationship between the derivatives usage and financial performance of American corporates exist during period of 2009 to 2014, specifically. Second, during years 2009 and 2010 the relationship exists (β value is acceptable as per criteria of Chin (1998), however remain insignificant.

Third, our conclusion that the rejection of the H1 during 2009 and 2010 is due to effect of financial crises of 2008 is consistent with finding of Aebi et al. (2012). This finding also supports our critical approach to limit the period of study between 2009 to 2014 to avoid effect of financial crises. The pre-2009, there was huge financial crises in 2008 (Marshall, 2009) and post-2014 there were financial and economic crises at small level and performance of the American economy was low in 2015 & 2016 (Oliver Wyman Group, 2016), and in 2017 (Albert Edwards, 2017) the economic condition of American economy was same as it was in 2008.

Forth, we draw a conclusion from our results that the causal relationship between derivatives usage and financial performance of corporates is highly sensitive to sample, period of study, econometric technique, financial, and economic conditions, such crises or boom and this finding is consistent with the result of Bartram, Brown, and Conrad (2011). Fifth, we also conclude from our critical review and analysis of portfolio of top 100 American caproates; that they are consistent user of derivatives contracts and derivatives are key players in their risk management system to hedge against multiple type of risks, such as commodity, interest rate and currency.

Our study has multiple theoretical and managerial contributions. The theoretical contribution of our study is related to literature, First, we investigated this relationship by applying Partial Least Square, Structural Equation Modeling (PLS-SEM), first time as per our knowledge. Second, we confirmed the finding of Bartram, Brown, and Conrad (2011) that this causal relationship between derivatives and financial performance of corporates is sensitive to sample of study and we present that financial and economic conditions such as crises or boom effect this association.

The managerial contribution of study is useful for developed, emerging, and developing countries. First, for developed and emerging countries the findings and analysis of the top 100 American corporates is useful that how they are managing their risk across the world and doing business successfully and supporting American economy. There is debate on the cost of derivatives, but we found that the size of derivatives contracts for these top corporates is increasing from 2009 to 2014 to minimize the risk and do successful business.

On the other side, for developing countries, such as Pakistan, Bangladesh, Portugal and Africa the findings are more useful because developing countries are more inclined towards the commodity, interest rate and foreign currency risk due to unstable economic conditions. The corporates which are best among the worst in developing countries have to follow the model of American top corporates to perform well and safe their positions from the above defined risks because these corporates are at more financial threat in international financial system. The limitation and future research directions are presented in concluding remarks.

The rest of the paper is strutted as section 2. literature review, section 3. methodology, section 4. Results and discussion and section 5. conclusion

## LITERATURE REVIEW

Krause and Tse (2016) conduct a detail literature review of 65 research articles which examine the relationship, association and effect of risk management on the firm value, while considering recent theories and evidences. They conclude that risk management has positive effect on the firm value and reducing firm risk, but it depends on sample characteristics, economic condition of country, region, economic and financial crises. Contrary, Abdullah, Janor, Hamid, and Yatim (2017) found that implementation of the enterprise risk management has negative effect on firm value in case of Malaysian firms.

Overall, the association between derivatives usage and corporate's performance and value is investigated by multiple academic researchers and policymakers. Several studies show that there is positive relationship between derivatives and their effect of financial performance ( G Allayannis & Weston, 2001; Jin & Jorion, 2006; Kapitsinas, 2008, Erez-gonz, 2013; Donohoe, 2015; Dan et al., 2005; Kim, Papanastassiou, & Nguyen, 2017; Bae, Kim, & Kwon, 2018). However, there are some researcher who found that there is no or negative relationship (Fok, Carroll, and Chiou, 1997;

Li et al., 2014; Ayturk et al., 2016; Nguyen, Kim, Papanastassiou, 2017).

Guay (1999) examined the impact of derivatives usage on firm risk of 335 corporates, which were new user of derivatives and concluded that derivatives improve firm value by minimize risk. In American context, Allayannis & Weston (2001) investigated this relationship on 720 U.S firms and found that derivatives increase firm value. Similarly, Jin and Jorion (2006) analyzed the hedging activities through derivatives on 119 firms from oil and gas sector and found same results which support Allayannis and Weston (2001) findings. In another study, the sample of 203 American corporates are examined in prospective of derivatives usage and demonstrated that derivatives have real positive consequence on firm outcome and performance (Erez-gonz, 2013).

Further, Kapitsinas (2008) demonstrate that specifically foreign currency and interest rate derivatives add approximately 4.6% in firm value through hedging risk, instead of general derivatives which include all types. Donohoe (2015) also studied the sample of 375 new derivatives users' firms and found that derivatives result in economic benefit of corporates by tax savings. He recommended that the use of derivatives as tax avoidance also add in firm value. Moreover, the interest rate and commodity derivatives also add premium in financial performance by minimizing risk (Dan et al., 2005). Meanwhile, Lau (2016) examines the role of derivatives as risk mitigators and effect on firm value. He concludes that the derivatives user firms are in better position as compared to non - derivatives users.

Recently, Nguyen, Kim, and Papanastassiou (2017) investigate this relatinship in a innovative way by considering 881 domestic and foreign multinations corporates between 2003 to 2013, seperatly. They find dual results for domestic corproates that effect of derivatives is positive but for foreign corproates it is negative. In 2018, Bae et al. examine the effect of derivatives on firm risk and performance during period of 2005 to 2010 on 3582 Korean firms and confirm that derivatives has positive effect in Korean market.

Contrary to above discussion, the use of derivatives as hedging tool to reduce volatility and add in firm value is examined on 331 firm listed in American, S& P 500 index and result showed that hedging through derivatives has no link with firm value and performance (Fok et al,. 1997) Similarity, Li et al. (2014) analyzed 134 non-financial firms that are listed in New Zealand Stock Exchange. They confirm that derivatives have no effect on the firm value.

Further, Ayturk et al. (2016) examine the effect of hedging through derivatives on non-financial 204 Turkish firms during period of 2007 to 2013. They conclude that overall their results show that hedging through derivatives has no effect on firm value. In another study, the negative or no effect of derivatives usage on firm risk, value and performance is confirmed (Nguyen, Kim, & Papanastassiou, 2017).

In conclusion, Bartram, Brown, and Conrad (2011) examine the association between the derivatives and corporate financial performance. Their conclusion is very prominent and considerable that this casual relationship highly sensitive and depends on the characteristics of sample. The change of sample will change the findings of study. Additional, Gilje and Taillard (2017) report that that it is a challenge to confirm casual effect of hedging through derivatives due to endogenous nature of hedging decision. These mixed results in literature and recommendations that this casual relation is difficult to confirm and highly sensitive to multiple factors in a research experiment.

These conclusions and recommendations lead us to re-visit this relationship by employing a unique: sample (U.S 100 index, NYSE), period (2009 to 2014) and econometric model (Partial Least Square, Structural Equation Modeling (PLS-SEM)), first time. We develop the hypothesis as follows;

***H1:*** Derivatives (DERV) usage has positive effect on American corporates financial performance

## METHODOLOGY

In this study, we employed the Partial Least Square, Structural Equation Modeling (PLS-SEM) technique that is used widely in finance and business to confirm the casual relationship among variables and constructs (Jamshidi & Hussin, 2018; Rasheed, Rafique, Zahid, & Akhtar, 2018; Fiksenbaum, Marjanovic, & Greenglass, 2017).

SEM allows the checking of multi-relationship at same time and does not required normality of data for formative construct (Hair et al., 2012). Further, Freeze and Raschke (2007) concluded that 71% of constructs are not specified as reflective or formative, normally. However, constructs that are related to business and finance are mostly formative in nature, such as corporate governance, corporate social responsibility, derivatives and financial performance (Hair et al., 2012). In a formative construct, it is supposed that indicators are not correlated that way the calculation of Cronbach Alpha is not required (Chin, 1998). The overall process of methodology of this study is presented in figure 1 and multiple step required to use PLS-SEM are as follows.

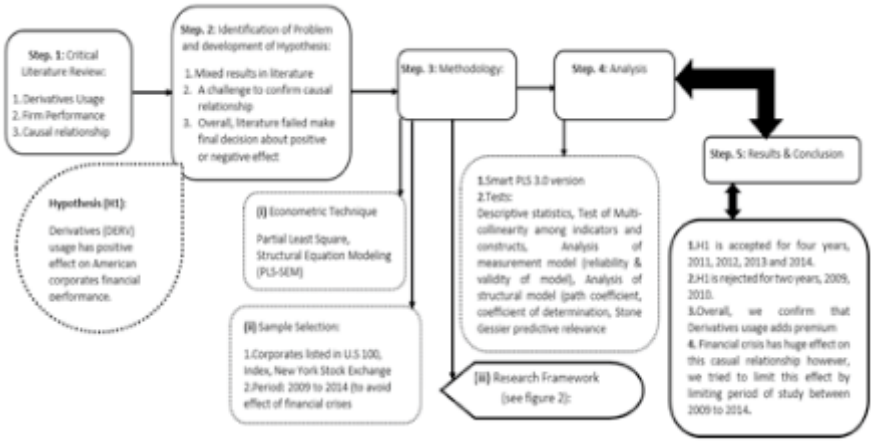


**Figure 1:** Methodological approach, source author's presentation\

### Details of Latent Constructs and Indicators

The first step is identification of latent exogenous (independent) and endogenous (dependent) constructs is prominent and vital step while applying PLS-SEM (Fiksenbaum et al., 2017). Further, the identification of indicators and their formative or reflective nature is most important step in SEM implementation as the indicators should be representative of latent construct and reflective or formative nature required different type of analysis (Chin, 1998). The detail of construct and indicators is present in table 1 as follows.

**Table 1:** Detail of Constructs and indicators (Variables)

| Construct | Sr. No | Indicator | Mathematical-Symbol | Measurement | Authors and Years |
|---|---|---|---|---|---|
| Latent Exogenous Derivatives (DERV) Symbol: ξ | 1 | Commodity Derivatives (COMD) | γx1 | Dummy variable, if Company use 1 otherwise 0 | Jin and Jorion (2006) |
| | 2 | Foreign Currency Derivatives (FCD) | γx2 | Dummy variable, if Company use 1 otherwise 0 | Allayannis and Weston (2001) |
| | 3 | Interest Rate Derivatives (IRD) | γx3 | Dummy variable, if Company use 1 otherwise 0 | Ahmed et al. (2012) |
| | 4 | Derivatives to Asset (DERV_ASSET) | γx4 | Derivatives /total Assets | Luiz and Junior (2011) |
| Latent Endogenous Financial Performance (FIN_PERF) Symbol: η | 1 | Return on Equity (ROE) | γy1 | Net Income/Equity | Kim et al. (2009) |
| | 2 | Earnings Per Share (EPS) | γy2 | Earnings Available for Common Stock holders/No of common shares outstanding | Farrell and Whidbee (2003) |
| | 3 | Tobin Q (TOBINQ) | γy3 | Total Book Value of Assets -Book Value of Equity + Market Value of Equity/Total Book Value of Assets. | Allayannis et al. (2012) |
| Random Disturbance Term | | | ε1 | Disturbance term in the SEM model | |

**Note.** The table provides the details related to constructs and indicators (variables). The measurement and the references from literature are presented.

***Development of Structural, Measurement Model and Research Framework***

As per criteria of PLS-SEM the model need to format and examine on two levels (Jamshidi & Hussin, 2018; Rasheed et al., 2018; Bartram et al., 2011); (i) analysis at measurement model and (ii) analysis at structural model. The casual relationship between the derivatives usage and financial performance need to be examine at these two level to accept or reject the hypothesis (H1). The mathematical representation of (i) measurement model and (ii) structural model for hypothesis (H1) is presented as follows;

*(i) Measurement model equation:*

$$\xi = \gamma_{x1}X1_{+}\ \gamma_{x2}X2_{+}\ \gamma_{x3}X3_{+}\ \gamma_{x4}X4_{+}\ \varepsilon_1$$

$$\eta = \boldsymbol{\gamma}_{y1}Y1_{+}\ \boldsymbol{\gamma}_{y2}Y2_{+}\ \boldsymbol{\gamma}_{y3}Y3_{+}\ \varepsilon_3$$

*(ii) Structural model equation:*

$$\eta = \beta_{0(1)} + \tau\xi + \varepsilon_1$$

The overall research framework of study is presented in figure 2.

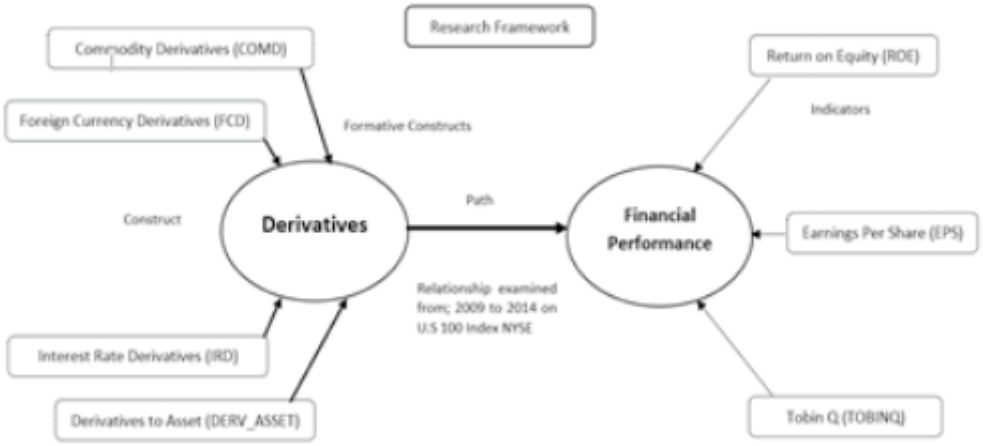


**Figure 2:** The figure illustrates the research framework utilized to investigate the H1: the effect of derivatives usage on financial performance of American Corporates.

***Sample Characteristics and data Collection***

Bartram et al. (2011) recommend that the casual relations of derivatives and corporate financial performance is highly sensitive to sample and its characteristics. The result of causal relationship changes as we change sample of study. Our random selection of U.S 100 index, New York Stock Exchange for investigation of casual relationship and period of study between 2009 to 2013 is unique and valuable in multiples ways, such as; first, these are top 100 U.S domestic multinationals listed in U.S 100 index, NYSE that covers 36% market capitalization of New York Stock Exchange (NYSE) (NYSE, 2018). These corporates are dealing around the world and provide a huge support to the economy of United State of America and large utilizer of derivatives contracts due to international operations. Second, as per our knowledge, U.S 100 index is not analyzed individually in literature, so we are first to examine this index for this causal relationship individually, because these are domestic American multinational that work in same type of culture and follow same rules & regulation for taxation, governance and listing.

Third, the period of study between 2009 to 2014 (six years) is exclusive and selected based on critical criteria to exclude the effect of financial and economic crisis, while investigating the casual relationship between the derivatives and financial crises. As financial crises in American housing was started in 2007 and reached to a new level of upto September 2008 and as result American financial institutions AIG and Lehman Brothers, collapsed (Marshall, 2009). In 2015, and 2016 the financial and economic crises about commodity price bubble (Oliver Wyman Group, 2016) and oil price plunge (Albert Edwards, 2017) were reported in American economy. Further, in 2017 a "Financial Crash Warning" is issued by the experts that debt bubble in American can bust and condition and situation of the economy is same as it was in 2007 (Albert Edwards,2017). So, we conducted this study during a specific period post 2008 financial crisis and pre-2015, 2016 and 2017 to mitigate the impact of crises. Further, our critical approach to limit the period of study is supported through literature as well; recently, Bae et al. (2018) examined the same causal relationship during period of 2005 to 2010. They presented the reason for selection of this period is a high level of volatility in Koran currency during this period.

Finally, after excluding financial (banks, insurance) corporates the final sample consist of 85 non-financial corporates listed in U.S 100 index, with 595 number of observations. The financial (bank, insurance) corporates are excluded because they have other motives of using and trading with derivatives as compared to non-financial corporates (G Allayannis & Weston, 2001). The secondary data on derivatives and financial performance is collected for six (06) years from 2009 to 2014 through published report and information available on corporates websites (jin & jorion 2006). The proxy statement (DEF 14A), annual reports (Form 10-K) and database of Market Watch are used. The reports are downloaded from the company's websites, which is creditable channel for information (Neu, Warsame, and Pedwell, 1998).

## RESULT AND DISCUSSION

The analysis under PLS-SEM is based on multiples tests (Jamshidi & Hussin, 2018), such as; descriptive statistics, test of multi-collinearity among constructs, and test of multi-collinearity among indicators. Once the model passes the above tests as per required criteria the next step is application of Partial Least Square analysis (Majid & Aziz, 2014). The step by step analysis, results and discussion is presented as follows.

***Descriptive Statistics***

The descriptive statistics of whole number of observation of sample is calculated for six (06) years from 2009 to 2014 to understand the complete data and examine dispersion ((Allayannis & Weston, 2001; Ayturk et al., 2016) as presented in table 2.

The table 2 shows that average value of each category of derivatives, such as commodity, foreign currency, and interest rate is increasing from 2009 to 2014, means corporates are more inclined towards to the derivatives usage, especially post financial crises of 2008 (Aebi, Sabato, & Schmid, 2011). The average and standard deviation of derivatives to asset ratio (DERV_ASSET) from 2009 to 2014 are 0.5717, 0.6108, 0.6368, 0.6593, 0.7227,0.7941 and 1.0431,1.2545, 1.2546, 1.2156, 1.3176, respectively. It can be interpreted that these corporates are making huge investment in derivatives to minimize the risk and improve the firm value and performance. On average, all the indicators are stable during the six years, so it can be inferred that these corporates are managing their risk properly through derivatives usage, as use of derivatives contract is also increasing.

**Table 2:** Descriptive Statistics

| Construct | Indicator | Year | Minimum | Maximum | Mean | S. D |
|---|---|---|---|---|---|---|
| Derivatives (DERV) | COMD | 2009 | 0 | 1 | 0.31 | 0.464 |
| | FCD | | 0 | 1 | 0.75 | 0.434 |
| | IRD | | 0 | 1 | 0.67 | 0.473 |
| | DERV_ASSET | | 0 | 7.3893 | 0.57173 | 1.0431 |
| Financial Performance (FIN_PERF) | ROE | | 1.0963 | 68.0648 | 20.9732 | 14.5284 |
| | EPS | | 0.61 | 12.72 | 4.3582 | 2.69055 |
| | TOBINQ | | 0.5203 | 5.5861 | 2.1919 | 1.0748 |
| Derivatives (DERV) | COMD | 2010 | 0 | 1 | 0.3400 | 0.4770 |
| | FCD | | 0 | 1 | 0.7500 | 0.4340 |
| | IRD | | 0 | 1 | 0.6900 | 0.4640 |
| | DERV_ASSET | | 0 | 8.5308 | 0.6108 | 1.2546 |
| Financial Performance (FIN_PERF) | ROE | | 0.0976 | 71.8871 | 21.0705 | 14.5925 |
| | EPS | | 0.0600 | 9.8400 | 4.2895 | 2.3618 |
| | TOBINQ | | 0.4968 | 4.6314 | 1.9560 | 0.9237 |
| Derivatives (DERV) | COMD | 2011 | 0 | 1 | 0.3400 | 0.4770 |
| | FCD | | 0 | 1 | 0.7600 | 0.4270 |
| | IRD | | 0 | 1 | 0.7100 | 0.4580 |
| | DERV_ASSET | | 0 | 7.5836 | 0.6368 | 1.2156 |
| Financial Performance (FIN_PERF) | ROE | | 0.1095 | 70.8833 | 21.0708 | 15.3969 |
| | EPS | | 0.0200 | 14.8800 | 3.9118 | 2.8833 |
| | TOBINQ | | 0.5051 | 4.5732 | 1.7540 | 0.8170 |
| Derivatives (DERV) | COMD | 2012 | 0 | 1 | 0.3412 | 0.4769 |
| | FCD | | 0 | 1 | 0.7412 | 0.4406 |
| | IRD | | 0 | 1 | 0.7059 | 0.4583 |
| | DERV_ASSET | | 0 | 8.6683 | 0.6593 | 1.3176 |
| Financial Performance (FIN_PERF) | ROE | | 2.5885 | 68.8413 | 19.5759 | 12.3708 |
| | EPS | | 0.4300 | 9.7200 | 3.7749 | 2.1487 |
| | TOBINQ | | 0.5276 | 5.0115 | 1.7349 | 0.8020 |
| Derivatives (DERV) | COMD | 2013 | 0 | 1 | 0.3400 | 0.4770 |
| | FCD | | 0 | 1 | 0.7300 | 0.4470 |
| | IRD | | 0 | 1 | 0.6900 | 0.4640 |
| | DERV_ASSET | | 0.0000 | 8.0424 | 0.7227 | 1.2694 |
| Financial Performance (FIN_PERF) | ROE | | 1.7287 | 82.3551 | 23.3878 | 17.2487 |
| | EPS | | 0.0800 | 9.5300 | 3.3626 | 1.8992 |
| | TOBINQ | | 0.5129 | 5.6150 | 1.8110 | 0.8396 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Derivatives (DERV) | COMD | 2014 | 0 | 1 | 0.3294 | 0.4728 |
| | FCD | | 0 | 1 | 0.7176 | 0.4528 |
| | IRD | | 0 | 1 | 0.6941 | 0.4635 |
| | DERV_ASSET | | 0 | 8.5075 | 0.7941 | 1.4047 |
| Financial Performance (FIN_PERF) | ROE | | 0.6774 | 73.5238 | 19.5780 | 15.3294 |
| | EPS | | 0.1000 | 10.1200 | 2.9078 | 1.8808 |
| | TOBINQ | | 0.5720 | 9.2830 | 1.7963 | 1.0971 |

**Note.** The table provide the details about the descriptive statistics of sample from 2009 to 2014, authors own calculation.

***Test of Multicollinearity among the Constructs and Indicators***

The next step is to examine the multicollinearity among latent construct and indicators. The multicollinearity should be checked through the VIF values and Variance Inflation Factor (VIF) value should be less than 10 (Kleinbaum et al., 1988). The results show that in all six years from 2009 to 2014 the VIF value is less than 10 and there is no multicollinearity exist among constructs and indicators (for indicators see table 3). Overall, both passed the multicollinearity test.

**Table 3:** Test of Multi-collinearity and Indicator Reliability of Measurement Model

| Construct | Indicator | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 |
|---|---|---|---|---|---|---|---|
| | | Variance Inflation Factors (VIF) | | | | | |
| Derivative Use (DERV) | COMD | 1.061 | 1.078 | 1.065 | 1.076 | 1.049 | 1.077 |
| | FCD | 1.222 | 1.186 | 1.162 | 1.255 | 1.269 | 1.235 |
| | IRD | 1.242 | 1.351 | 1.279 | 1.395 | 1.402 | 1.345 |
| | DERV_ASSET | 1.060 | 1.085 | 1.062 | 1.085 | 1.091 | 1.081 |
| Financial Performance (FIN_PERF) | ROE | 1.220 | 1.463 | 1.219 | 1.116 | 1.198 | 1.161 |
| | EPS | 1.027 | 1.178 | 1.032 | 1.015 | 1.048 | 1.141 |
| | TOBINQ | 1.227 | 1.355 | 1.186 | 1.101 | 1.221 | 1.021 |

**Note.** The table provide the details test of multi-collinearity among indicators and reliability of measurement model. The both test are preferred and investigated through the Variance Inflation Factor (VIF) and VIF value should be less than 10 (Kleinbaum et al., 1988). The results show that there is no multi-collinearity exist among indicators and they also fulfill the criteria of reliability of measurement model for sample of 2009 to 2014, authors calculation.

***Partial Least Square Analysis***

PLS-SEM analysis is run through Smart PLS 3.0 version and constructs are analyzed on two stages (Majid & Aziz, 2014; Barclay et al. 1995) First, state is analysis of measurement model that includes (i) validity test and (ii) reliability test. Second, stage is analysis of structural model that includes (i) path coefficient (β) and (ii) overall model estimation and testing of model, through coefficient of determination (R2) and Stone Geissor Predictive Relevance (Q2). The details analysis of each test is presented as follows.

**Stage: 1** Analysis of Measurement Model

The first stage of under PLS-SEM is analysis of measurement model that examined based on two tests as explained above (Majid & Aziz, 2014); (i) Validity and (ii) reliability test.

***(I) Validity Test***

The validity of model is checked by bootstrapping through 500 resample with replacement for six years from 2009 to 2014 by using Smart PLS 3.0 version. The table 4 shows result for validity test of model. The table 5 show that in derivatives construct; the interest rate derivatives remain significant in all six years (1.844, P<0.10; 1.743, P<0.10; 1.681, P<0.10; 1.749, P<0.10; 1.658, p<0.10; 1.743, P<0.10) and other indicators remained mixed. On the other side, in financial performance construct; the return on equity remain significant in all six years from 2009 to 2014 (1.710, P<0.10; 1.650, P<0.10; 1.653, P<0.10; 1.658, P<0.10; 1.831, P<0.10; 1.720, P<0.10) and other indicators have mixed results. Our findings are consistent with Brett et al. (2018), however some indicators remain insignificant but kept in the model to maintain the content validity under formative construct (Nunnally & Bernstein, 1994).

**Table 4:** Indicators Validity Test of Measurement Model

| Construct | Indicator | Year | Weights | t-value | Significance Level* |
|---|---|---|---|---|---|
| Derivatives (DERV) | COMD | 2009 | -0.517 | 0.952 | P>0.10 |
| | FCD | | -0.268 | 0.622 | P>0.10 |
| | IRD | | -0.162 | 1.844* | P<0.10 |
| | DERV_ASSET | | 0.899 | 1.308 | P>0.10 |
| Financial Performance (FIN_PERF) | ROE | | 0.173 | 1.212 | P>0.10 |
| | EPS | | -0.876 | 1.712* | P<0.10 |
| | TOBINQ | | 0.339 | 0.664 | P>0.10 |
| Derivatives (DERV) | COMD | 2010 | 0.343 | 1.200 | P>0.10 |
| | FCD | | 0.035 | 0.114 | P>0.10 |
| | IRD | | 0.694 | 1.743* | P<0.10 |
| | DERV_ASSET | | 0.324 | 0.928 | P>0.10 |
| Financial Performance (FIN_PERF) | ROE | | 0.834 | 2.278** | P<0.05 |
| | EPS | | 0.334 | 1.720* | P<0.10 |
| | TOBINQ | | 0.002 | 0.005 | P>0.10 |
| Derivatives (DERV) | COMD | 2011 | -0.384 | 1.102 | P>0.10 |
| | FCD | | -0.186 | 0.673 | P>0.10 |
| | IRD | | 0.409 | 1.681* | P<0.10 |
| | DERV_ASSET | | 0.822 | 1.882* | P>0.10 |
| Financial Performance (FIN_PERF) | ROE | | 0.520 | 1.687* | P<0.10 |
| | EPS | | 0.798 | 1.650* | P<0.10 |
| | TOBINQ | | -0.170 | 0.564 | P>0.10 |
| Derivatives (DERV) | COMD | 2012 | 0.381 | 0.935 | P>0.10 |
| | FCD | | -0.660 | 1.152 | P>0.10 |
| | IRD | | 0.249 | 1.749* | P<0.10 |
| | DERV_ASSET | | 0.616 | 1.214 | P>0.10 |
| Financial Performance (FIN_PERF) | ROE | | -0.371 | 0.716 | P>0.1.0 |
| | EPS | | 0.970 | 1.653* | P<0.10 |
| | TOBINQ | | -0.022 | 0.050 | P>0.10 |
| Derivatives (DERV) | COMD | 2013 | 0.563 | 1.448 | P>0.10 |
| | FCD | | -0.562 | 1.140 | P>0.10 |
| | IRD | | 0.746 | 1.658* | P<0.10 |
| | DERV_ASSET | | 0.142 | 0.422 | P>0.10 |
| Financial Performance (FIN_PERF) | ROE | | 0.494 | 1.652* | P<0.10 |
| | EPS | | 0.832 | 1.813* | P<0.10 |
| | TOBINQ | | 0.013 | 0.029 | P>0.10 |

| | | | | | |
|---|---|---|---|---|---|
| Derivatives (DERV) | COMD | 2014 | 0.343 | 1.200 | P>0.10 |
| | FCD | | 0.035 | 0.114 | P>0.10 |
| | IRD | | 0.694 | 1.743* | P<0.10 |
| | DERV_ASSET | | 0.324 | 0.928 | P>0.10 |
| Financial Performance (FIN_PERF) | ROE | | 0.834 | 2.278** | P<0.05 |
| | EPS | | 0.334 | 1.720* | P<0.10 |
| | TOBINQ | | 0.002 | 0.005 | P>0.10 |

**Note.** The table provide the details about indicators validity test for measurement model. Some of indictors are remain insignificant, however kept in the model to maintain the content validity of formative construct Nunnally and Bernstein, 1994), authors calculation. *Level of Sig. at 10% (1.645), ** Level of Sig. at 5% (1.96), *** Level of Sig.at 1% (2.576).

***(II) Reliability test***

As stated above the reliability of formative construct is checked through VIF and its value should be less than 10 (Kleinbaum et al., 1988). The VIF values of all the indicators is less than 10 as shown in above table 3, while calculating the multicollinearity among indicators. So, model pass the criteria of reliability test. Our model cleared the first stage, analysis of measurement and our findings are consistent with Fiksenbaum et al. (2017).

**Stage: 2** Analysis of Structural Model

The second stage under PLS-SEM technique is to analyze of structural model (Brett et al., 2018). Once the model passed stage first, related to analysis of measurement model, we need to examine second stage test as explained above; (i) Path Coefficient, (ii) Overall estimation and test of model, through coefficient of determination (R2) and Stone Geissor Predictive Relevance (Q2), respectively.

**(I) Path Coefficient (β)**

The casual relationship between the derivatives usage and financial performance is examined through patch coefficient for all six years from 2009 to 2014 by following (Brett et al.,2018; Rasheed et al., 2018; Majid & Aziz, 2014) as shown in figures 3 and table 5. The result shows that β value remain insignificant for two years 2009, 2010 and significant for years 2011, 2012, 2013, and 2014.

The patch coefficient for 2009 (β=0.299) and 2010 (β=0.250) show that relationship is insignificant for these two years and there is casual relationship between derivatives usage and financial performance. Our findings for these two years is consistent with findings of Li et al. (2014) and Nguyen, Kim, and Papanastassiou (2017) that they founds that there is no effect of derivatives on financial performance. Instead of insiginificnt results of these two years, the result meets the criteria of acceptance of β value that should be greater or equal to 2.0 (Chin, 1998), means value greater or equal to 2.0 shows that relationship exists among variables.

Further, the path coefficient remained significant in four years 2011, 2012, 2013 and 2014 (β=0.446, 0.317, 0.330, 0.430) and fulfill the criteria of β value (Chin, 1998). Our results are supported multiple studies which found that derivatives have positive and significant effect on financial performance (Kapitsinas, 2008, Donoboe, 2015; Bae, Kim, & Kwon, 2018). ). In specfic context of American corproates, our results also supported through the findings of Allayannis and Weston (2001), Jin and Jorion (2006), Erez-gonz (2013), these authors examined this casual relationship for American corporates and founds positive effect. Overall, we can conclude that the derivatives have positive

effect on the financial performance in case of American corporates.

The rejection of hypothesis in two years 2009 and 2010 is due to effect long-term effect of financial crises of 2008 in U.S market because the risk management through derivatives has cost, which effect during and after crises so much. Our these results and logic is consistent with findings of Aebi, et al. (2012), they found that the effect of governance related-risk management is negative on firms during financial crises. Further, we draw a policy conclusion from our results that derivatives usage adds in financial performance and value of corporates, however that effect is nullified due to impact of financial and economic crises. As shown in our results the path coefficient fulfills the criteria as per Chin (1998) but remain insignificant. The findings of the study also support, our logic and criteria to limit the period of study between 2009 to 2014 to exclude the effect of financial and economic crises on casual relationship.

**Table 5:** Path Coefficient and Overall Model Estimation Statistics

| Year | Path | Beta Coefficient | t-value | Significance | $R^2$ | $Q^2$ | Criterion |
|---|---|---|---|---|---|---|---|
| 2009 | DERV→FIN_PERF | 0.299 | 0.072 | P>0.10 | 0.089 | 0.039 | >0.000 |
| 2010 | | 0.250 | 0.665 | P>0.10 | 0.063 | 0.062 | >0.000 |
| 2011 | | 0.446* | 1.953 | P<0.10 | 0.199 | 0.027 | >0.000 |
| 2012 | | 0.317* | 1.734 | P<0.10 | 0.100 | 0.027 | >0.000 |
| 2013 | | 0.332* | 1.655 | P<0.10 | 0.109 | 0.005 | >0.000 |
| 2014 | | 0.432** | 2.059 | P<0.05 | 0.185 | 0.032 | >0.000 |

Note. The table provide the path coefficient and overall model estimation, which are investigated through the co-efficient of determinant (R2) and Stone Gessier predictive relevance (Q2). The R2 greater than 10% is satisfactory (Bellman 2003) and Q2 greater than zero is acceptable (Chin 1998), authors calculation.

*Level of Sig. at 10% (1.645), ** Level of Sig. at 5% (1.96), *** Level of Sig.at 1% (2.576).

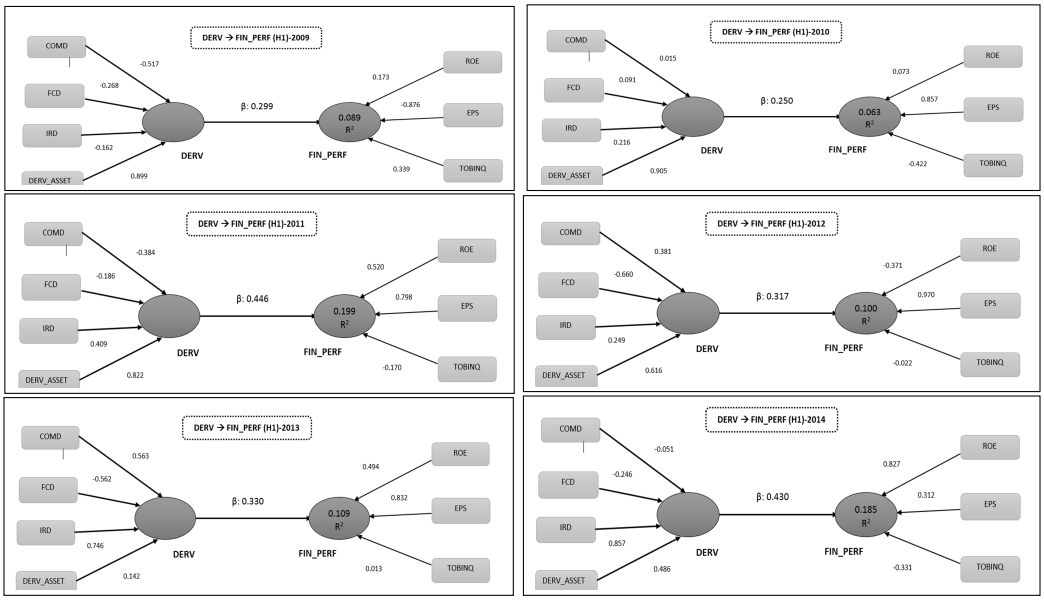


**Figure 3.** The figure shows the structural model for year 2009 under formative construct and relationship between derivatives usage and financial performance is analyzed. The weights, path coefficient (β)and coefficient of determinant (R2) is reported, authors calculation through Smart PLS.

***(I) Overall Model Estimation and Testing***

Under overall model estimation and testing, the R2 measures the proportion of change in dependent variable (derivatives) due to change in independent variable (financial performance). The results in above table 5 shows the value of R2 for all six years from 2009 to 2014 (R2 in % = 8.9, 6.3, 19.9, 10, 10.9, 18.5). The models demonstrate an acceptable power of determination in dependent variable in four years 2011, 2012, 2013, and 2014 as per criteria of Bellman (2003) that R2 value should be greater than 10% is satisfactory. The value of R2 for two years 2009 and 2010 is not acceptable and we can conclude these two years there is not impact of derivatives usage on financial performance. Overall, we conclude that derivatives have positive effect on financial performance of U.S corporates with average explanatory power of 13% which is satisfactory (Bellman 2003).

Further, the model predictive validity is examined through non-parametric text Stone Gessier test (Makki & Aziz, 2014) as presented in table 5. The value of Q2 for all six years from 2009 to 2014 shows that (Q2 = 0.039, 0.062, 0.027, 0.027, 0.005, 0.032) in all years the model passes the criteria of predictive validity even for years 2009 and 2010 which have insignificant results. The value of Q2 reflects us that how much well the model is constructed (Fornell and Cha, 1994) and value of Q2 greater than zero is acceptable (Chin 1998). The test shows us that our model and results are reliable.

***Hypothesis testing***

The hypothesis testing is conducted base on the power and strength of the path coefficient (β) by using Smart PLS 3 version for all six years as given in table 6. The path coefficient shows that there is significant relationship between exogenous latent construct (independent variable) and endogenous latent construct (dependent variable) (Rasheed et al., 2018). As per Chin (1998) the path coefficient minimum value should be 0.2 and ideal is 0.3.

The table 6 show that path coefficient for years 2009 (β =0.299) and 2010 (β=0.250) pass the criteria of Chin (1998) but remain insignificant. However, the path coefficient for years 2011(β=0.446, P<0.10), 2012 (β=0.317, P<0.10), 2013 (β=0.332, P<0.10), 2014 (β=0.432, P<0.05) pass the criteria of Chin (1998) and relationship remain significant. The relationship remains significant for four years and insignificant for two years and path coefficient range between 0.250 to 0.432 during all six years.

It is concluded that derivatives have positive effect on the American corporates financial performance during a specific period of study 2009 to 2014. However, causal relationship exists during 2009 and 2010 but remain insignificant due to some other factors, such as effect of financial crises, which lead to high cost of derivatives (Aebi et al., 2012). Overall, our results are consistent with previous research studies that derivatives have positive and significant effect on the financial performance (Guay, 1999; G Allayannis & Weston, 2001; Jin & Jorion, 2006; Kapitsinas, 2008, Erez-gonz, 2013; Donohoe, 2015; Dan et al., 2005; Kim, Papanastassiou, & Nguyen, 2017; Bae, Kim, & Kwon, 2018).

Finally, we conclude that this causal relationship highly dependent on other factors, such as, sample characteristics, period of study, econometric technique, financial, and economic conditions like crises or boom. Our results and conclusion are supported by Bartram, Brown, and Conrad (2011) that this relationship is highly sensitive to these multiple factors. Further, our approach to limit the period of study between 2009 to 2014 to exclude the financial and economic crises in American economy is well supported by our finding related to 2009 & 2010 and which are also consistent with results of Aebi et al. (2012) regarding the effect of financial crises on causal relationship. Further, we also conclude from our critical review and analysis of portfolio of top 100 American caproates; that they

are consistent user of derivatives contracts and derivatives are key players in their risk management system to hedge against multiple type of risks, such as commodity, interest rate and currency.

**Table 6:** Hypothesis Testing

| Year of Study | Hypothesis | Expected effect | Path Coefficient | Significance* | Confirmed |
|---|---|---|---|---|---|
| 2009 | H1: Derivatives (DERV) usage has positive effect on American corporates financial performance. | Positive | 0.299 | P>0.10 | No |
| 2010 | | | 0.250 | P>0.10 | No |
| 2011 | | | 0.446* | P<0.10 | Yes |
| 2012 | | | 0.317* | P<0.10 | Yes |
| 2013 | | | 0.332* | P<0.10 | Yes |
| 2014 | | | 0.432** | P<0.05 | Yes |

Note. The table provide results of established hypothesis for six years from 2009 to 2014. The results show that the hypothesis is accepted for four years (2011, 2012, 2013, 2014) and rejected for two years (2009, 2010), authors calculation.
*Level of Sig. at 10% (1.645), ** Level of Sig. at 5% (1.96), *** Level of Sig.at 1% (2.576).

## CONCLUSION

In this study, we investigated a causal relationship between derivatives usage and financial performance of American corporates by apply Partial Least Square, Structural Equation Modeling (PLS-SEM) during period of 2009 to 2014 to avoid the effect of financial and economic crises. As per our knowledge, we first time used PLS-SEM to examine this association in literature. The hypothesis which examined under this study; Derivatives (DERV) usage has positive effect on American corporates financial performance.

Our study as multiple findings; first, we verify that overall derivatives usage has positive effect on American corporate's financial performance during period of 2009 to 2014. Second, in years 2009 and 2010 the association exist but remain insignificant due effect of financial crises of 2008 that is consistent with findings of Aebi et al. (2012). Third, our critical assumption to limit the period of study between 2009 to 2014 to avoid effect of financial and economic crises is supported through rejection of H1 in 2009 and 2010. Forth, we fixed our period of study between 2009 to 2014 to avoid the effect pre-2009 financial crises of 2008 (Marshall, 2009) and post-2014, financial and economic crises in American economy, such as 2015 & 2016 (Oliver Wyman Group, 2016) and 2017 (Albert Edwards, 2017). Forth, we draw a conclusion based on our findings that this causal relationship is highly sensitive to sample, period of study, econometric technique, financial, and economic conditions, such crises or boom and this finding is consistent with the result of Bartram, Brown, and Conrad (2011). Fifth, we also conclude from our critical review and analysis of portfolio of top 100 American caproates; that they are consistent user of derivatives contracts and derivatives are key players in their risk management system to hedge against multiple type of risks, such as commodity, interest rate and currency.

There are two main limitation of this study; first, limit of period of study between 2009 to 2014 to avoid the effect of financial crises to examine the causal relationship, however, we recommend future research study to cover a longer and updated period upto 2017, while considering control variable. Second, our sample is only American corporates and to generalize the findings that derivatives have positive effect on the financial performance, it is recommended to conduct future research country to country basis to implement the policy.

## REFERENCES


Abdel-khalik, a. R., & Chen, P.-C. (2015). Growth in financial derivatives: The public policy and accounting incentives. *Journal of Accounting and Public Policy, 34*(3), 291–318.

Abdullah, M. H. S. B., Janor, H., Hamid, M. A., & Yatim, P. (2017). The effect of enterprise risk management on firm value: Evidence from Malaysian technology firms. *Jurnal Pengurusan, 49*, 3–11.

Aebi, V., Sabato, G., & Schmid, M. (2012). Risk management, corporate governance, and bank performance in the financial crisis. *Journal of Banking and Finance, 36*(12), 3213–3226.

Ahmed, H., Azevedo, A. and Guney, Y. (2012), "Agency conflicts and hedging financial risks decisions – Evidence on corporate governance influence", 44(0), 1–23.

Albert Edwards. (2017). Beware The Great 2016 Financial Crisis. Retrieved June 3, 2018, from https://www.theguardian.com/business/2016/jan/12/beware-great-2016-financial-crisis-warns-city-pessimist

Allayannis, G., Lel, U. and Miller, D. P. (2012), "The use of foreign currency derivatives, corporate governance, and firm value around the world", *Journal of International Economics, 87*(1), 65–79.

Allayannis, G., & Weston, J. P. (2001). The use of foreign currency derivatives and firm market value. *Review of Financial Studies, 14*(1), 243–276.

Altuntas, M., Liebenberg, A. P., Watson, E. D., & Yildiz, S. (2017). Hedging, Cash Flows, and Firm Value: Evidence of an Indirect Effect. *Journal of Insurance Issues, 40*(1), 1–22. Retrieved from

Ayturk, Y., Gurbuz, A. O., & Yanik, S. (2016). Corporate derivatives use and firm value: Evidence from Turkey. *Borsa Istanbul Review, 16*(2), 108–120.

Bae, S. C., Kim, H. S., & Kwon, T. H. (2018). Currency derivatives for hedging: New evidence on determinants, firm risk, and performance. *Journal of Futures Markets, 38*(4), 446–467.

Bartram, S. M., Brown, G. W., & Conrad, J. (2011). The effects of derivatives on firm risk and value. *Journal of Financial and Quantitative Analysis, 46*(4), 967–999. 75

Bessembinder, H. (1991), "Forward Contracts and Firm Value: Investment Incentive and Contracting Effects", *Journal of Financial and Quantitative Analysis*, 26 (4), 519-532.

Brett, B. L., Kuhn, A. W., Yengo-Kahn, A. M., Jeckell, A. S., Solomon, G. S., & Zuckerman, S. L. (2018). On-Field Signs Predict Future Acute Symptoms After Sport-Related Concussion: A Structural Equation Modeling Study. *Journal of the International Neuropsychological Society,*

Cenfetelli, R. T. and Bassellier, G. (2009), "Interpretation of Formative Measurement in Information Systems Research", *Mis Quarterly,* 33(4), 689–707.

Chen, H.-W., Chen, Y.-C., Yang, F. M., Wu, W.-J., Li, C.-C., Chang, Y.-Y., & Chou, Y.-H. (2018). Mediators of the Effects of Gender on Uric Acid Nephrolithiasis: A Novel Application of Structural Equation Modeling. *Scientific Reports, 8*(1), 6077.

Chin, W.W. (1998), "The Partial Least Square Approach to Structural Equal Modeling, George Marcoulides (Eds.), *Modern Methods for Business Research,* Lawrence Erlbaum Associates, N.J.

Dam, D. (2012), "The usage of Foreign Currency Derivatives: Determinants and impact on firm's Market Value", *Master Thesis submitted in Universiteit Van Tilburg* (873563).

Dan, C., Gu, H., & Xu, K. (2005). The Impact of Hedging on Stock Returns and Firm Value : New Evidence from Canadian Oil and Gas Companies The Impact of Hedging on Stock Returns and Firm Value : New Evidence from Canadian Oil and Gas. Working Paper, *Dalhousie University,* 1–41.

Donohoe, M. P. (2015). The economic effects of financial derivatives on corporate tax avoidance. *Journal of Accounting and Economics,* 59(1), 1–24.

Erez-gonz, F. P. (2013). Risk Management and Firm Value : Evidence from. *The Journal of Finance, LXVIII*(5), 2143–2176.

Farrell, K. a. and Whidbee, D. a. (2003), " Impact of firm performance expectations on CEO turnover and replacement decisions", *Journal of Accounting and Economics, 36*(1-3), 165–196.

Fiksenbaum, L., Marjanovic, Z., & Greenglass, E. (2017). Financial threat and individuals' willingness to change financial behavior. *Review of Behavioral Finance, 9*(2), 128–147.

Fok, R. C. W., Carroll, C., & Chiou, M. C. (1997). Determinants of Corporate Hedging and Derivatives : A Revisit, 6195(X).

Fornell, C. and Cha, J. (1994), "Partial Least Squares in Advanced Methods of Marketing Research", *Bagozzi, and R. P. edition,* Blackwell, Oxford.

Freeze, R. D., & Raschke, R. R. L. (2007). An assessment of formative and reflective constructs in IS research. *ECIS 2007 Proceedings. Paper 171. Http://Aisel.Aisnet.Org/Ecis2007/171*, 1481–1492.

Gerrit, K., & Posch, P. N. (2018). How does hedge accounting influence firm value ? SSNR.

Gilje, E. P., & Taillard, J. P. (2017). Does Hedging Affect Firm Value? Evidence from a Natural Experiment. *The Review of Financial Studies,* 30(12), 4083–4132.

Guay, W. R. (1999). The impact of derivatives on firm risk: An empirical examination of new derivative users. *Journal of Accounting and Economics, 26*(1–3), 319–351.

Hair, J.F., Black, W.C., Babin, B.J. and Anderson, R.E. (2012). *Multivariate Data Analysis,* Seventh Edition. Prentice Hall, N.Y

International Monetary Fund. (2011). Making OTC Derivatives Safe—A Fresh Look. Retrieved June 2, 2018, from https://www.imf.org/en/Publications/WP/Issues/2016/12/31/Making-OTC-Derivatives-Safe-A-Fresh-Look-24726

International Swaps and Derivatives Association, I. (2017). DERIVATIVES – FACTS AND FIGURES. Www.ISDA.Org, (2017).

Jamshidi, D., & Hussin, N. (2018). An integrated model of Islamic credit card adoption: a PLS-SEM based approach. *Journal of Islamic Accounting and Business Research, 29*(3).

Jankensgård, H. (2015). Does centralisation of FX derivative usage impact firm value? *European Financial Management, 21*(2), 309–332.

Jin, Y. and Jorion, P. (2006), "Firm Value and Hedging: Evidence from U. S Oil and Gas Producers", *The journal of Finance*, 11(2), 893–919.

Kapitsinas, S. (2008), "The Impact of Derivatives Usage on Firm Value: Evidence from Greece", *MPRA Paper No. 10947.*

Kim, J. K., Xiang, J. Y. and Lee, S. (2009), "The impact of IT investment on firm performance in China: An empirical investigation of the Chinese electronics industry", *Technological Forecasting and Social Change, 76*(5), 678–687

Kim, H. T., Papanastassiou, M., & Nguyen, Q. (2017). Multinationals and the impact of corruption on financial derivatives use and firm value: Evidence from East Asia. *Journal of Multinational Financial Management, 39*, 39–59.

 

Kleinbaum, D.G., Kupper, L.L. and Muller K.E. (1988), "Applied Regression Analysis and other Multivariate Analysis Methods", *PWS-Kent Publishing, Boston,* MA. USA.

Krause, T. A., & Tse, Y. (2016). Risk management and firm value: recent theory and evidence. *International Journal of Accounting & Information Management, 24*(1), 56–81.

Lau, C. K. (2016). How corporate derivatives use impact firm performance? *Pacific Basin Finance Journal, 40*, 102–114.

Li, H., Visaltanachoti, N., & Luo, R. H. (2014). Foreign Currency Derivatives and Firm Value : Evidence from New Zealand, (September), 96–112.

Luiz, J. and Junior, R. (2011), "Exchange Rate Exposure, Foreign Currency Debt, and the Use of Derivatives: Evidence from Brazil, *Emerging Market Finance and Trade,* 47:1, 67-89.

Makki, A., & Aziz, S. (2014). Impact of Corporate Governance on Intellectual Capital Efficiency and Financial Performance. *Pakistan Journal of Commerce and Social Sciences 2014, 8*(2), 305–330.

Marshall, J. (2009). The financial crisis in the US: key event, causes and responses. *House of Common Library, 09*(34), 55. Retrieved from

NEW York Fed. (2017). Understating, the impact of a Derivatives Market- Business Insider. Retrieved June 2, 2018, from http://www.businessinsider.com/new-york-fed-derivatives-500-trillion-market-2017-5?IR=T

Neu, D., Warsame, H. and Pedwell, K. (1998), "Managing public impressions: environmental disclosures in annual reports", *Accounting, Organizations and Society,* 23 (3), 265-282.

Nguyen, Q., Kim, T., & Papanastassiou, M. (2018). *Policy uncertainty, derivatives use, and firm-level FDI. Journal of International Business Studies* (Vol. 49). Palgrave Macmillan UK.

Nunnally, J. C. and Bernstein, I. H. (1994), *"Psychometric theory", McGraw-Hill*, N.Y.

NYSE. (2018). NYSE US 100 INDEX NY.ID. Retrieved June 2, 2018, from https://www.nyse.com/quote/index/NY.ID

Oliver Wyman Group, R. (2016). THE FINANCIAL CRISIS OF 2015. Retrieved June 3, 2018, from http://www.businessinsider.com/the-financial-crisis-of-2015-2011-1?IR=T

Phan, D., Nguyen, H., & Faff, R. (2014). Uncovering the asymmetric linkage between financial derivatives and firm value - The case of oil and gas exploration and production companies. *Energy Economics, 45*, 340–352.

Prevost, A. K., Rose, L. C., & Miller, G. (2000). Derivatives usage and financial risk management in large and small economies: A comparative analysis. *Journal of Business Finance and Accounting, 27*(5–6), 733–759.

Rasheed, M. H., Rafique, A., Zahid, T., & Akhtar, M. W. (2018). Factors influencing investor's decision making in Pakistan. *Review of Behavioral Finance, 10*(1), 70–87.

Sette, S., Zuffianò, A., Lucidi, F., Laghi, F., Lonigro, A., & Baumgartner, E. (2016). Evaluating the Student–Teacher Relationship Scale in Italian Young Children. *Journal of Psychoeducational Assessment*, 073428291667460.

Shin, D. S., Jeong, B. Y., & Park, M. H. (2018). Structural equation modeling of office environment quality, sick building syndrome, and musculoskeletal complaints on aggregate satisfaction of office workers. *Human Factors and Ergonomics In Manufacturing,* (April 2016), 148–153.