Co-linearity between Macroeconomic Drivers and Amman Stock Exchange Index- – Empirical Study for the Period (2005- 2013)

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Abstract

Index value is mainly reflected by stock prices related to companies listed in the market, as stock market index fluctuate in accordance to the change of stocks` prices pertaining to the index. Index is affected by domestic economic events as well as international effect. This study is an attempt to search into macroeconomic factors that are correlated with ASE index track. The major conclusions of the study imply that, macroeconomic variables do collectively own a high degree of positive and significant correlation with ASE index. But, by employing single regression, we found that inflation rate and rediscount rate are positively correlated with the index, while money supply. GDP, interest on loans and red are negatively and significantly associated with the changes in ASE index and the only two variables that showed no significant correlation with the market index were the industrial production and interest rate on deposit.

Keywords: ASE, Financial Crisis, Market Index, Co-linearity, Macroeconomics, Stocks.

Introduction:

Stock market is a place that provides a variety of investment opportunities and investments diversification that is available from the vast number of stocks of different listed companies that belong to different sectors. it provides different investment options to local as well as foreign capital, so stock markets plays a vital role in developing the national economy. There is no sound economy without a sound financial market and there is no sound financial market without a sound stock exchange market. Financial security market is a place where different types of securities are transacted; it's where listed companies obtain their financial needs

from. Also it's an institution that provide an investment opportunities for different types of investors whether individuals or institutional investors. Many authors and researchers indicated in their studies that stock market is considered as the main source of long term finance through issuance of stock or bonds, which means that stock market is a place that assist in enhancing the level of investment in the country which ultimately will lead to economic growth. (Ranjan & Sumanjeet, 2008), for the purpose of identifying the role of stock market into the growth of Indian economy they investigated the nature of relation between saving, economy and stock exchange market. They found that stock market plays a major role in reducing the risk degree by diversifying investment, while high volatility in the market will lead to uncertainty and an increase in risk level that will cause instability and decline in investment level which will at the end cause a reduction in economic growth level. Inconsistency in Stock index number is harmful to the country`s economy, as it will lead to lack of confidence by investors to invest in the country, thus hindering the level of economic growth.

Among price driver factors that have an influence on stock market and how it fluctuate over a certain time horizon can commonly be macroeconomic or microeconomic factors or it can be subjective as well as psychological factors. In case you have any disposable financial sources, equities are considered one of the available options through which you can appreciate your wealth, but equities prices are subject to spectacular price swings over short period, but over a long time horizon they provide the best and most profitable investment option, despite the fact that investing in equities involve a high degree of risk that can be awarded with reasonable returns. Taking an investment decision in equities should not be taken without studying and analyzing different economic and non-economic factors that might affect the value of your investment in the future. (Flannery and Protopapadakis, 2002) emphasized on the importance of macroeconomic factors that have an impact on stock returns and cash flow. Therefore any investor should pay much attention to these factors when investing in securities.

Regarding stock prices or stock market index, the question is – do stock prices move without predictable pattern or they do follow certain pattern? , there is so many contradiction regarding the factors that may have an impact on the movement of stock market index and the direction of such movement. The importance of this paper stems from the aforementioned questioning.

This research is an endeavor to emphasis on the country`s specific macroeconomic factors (domestic factors) that may have an impact on Amman Stock Exchange Index, and to identify which of the macroeconomic factors have the most significant impact on ASE index fluctuation. The factors that we are going to include are: GDP, Inflation Rate – IR, Rate of Interest – RI (Interest on Loans, Interest on Deposit and Rediscount rate), Industrial production – IP and Money Supply – MS.

The paper will be set as follow: section – 1 will deal with the theoretical part and most significant literature related to the study issue, section -2 will concentrate on the research methodology and statistical analysis, while the last section – 3 will focus on result discussion and conclusion.

Literature Preview and Previous Studies:
The emerging stock markets have been recognized as being at least partially segmented from international stock markets. As a result, it has been pointed out that domestic risk factors

rather than global risk factors are the main source of equity return fluctuation in these markets.

Stock markets in general play a major role in indicating the economic stability of the country economy while stock exchange market is an indicator for the degree of the economy health. Moreover from the investor point of view the stock market index provide work as an indicator towards stock prices direction and trend. There were many studies and researches in developing and developed countries that searched the issue related to factors affecting securities exchange market index. The financial market is sensitive to many factors and mostly economic factor on the long run. In 1997 Fama & Schwert searched into the effect of inflation rate on stock market`s return in New York stock exchange market during the period 1953 – 1971 and concluded that expected and unexpected inflation rate do posses a negative influence on New York stock exchange market. Also in (Fama, 1981) found that there is what is called a proxy effect that is reflected by the adverse effect of inflation rate and stocks` returns.

Ho., C., (2011), studied the role of macroeconomic factors and the world stock exchange market on the performance of ASEAN financial markets related to emerging countries, where they found that interest rate, foreign exchange rate and the level of domestic economic growth level have an effect on the financial markets. While Joseph (2003) in his research could not reach to any proof that rate of interest and foreign exchange rate can forecast the U.S. financial sector indices. Shanken & Weinstein (2006) concluded that the only factor that affects stock market is the industrial production index.

Tursoy, et al., (2008) studied the relationship between macroeconomic indicators and the Istanbul securities market for the period 2001 – 2005 using daily data. The results pointed out the existence of a significant association between the securities returns and the macroeconomic indicators, but these macroeconomic factors demonstrated a weak explanatory power related to ISM

Benaković& Posedel, (2010) on their study on the Croatian market found that stock market index demonstrate a high statistical effect on to all stocks of the study sample and a positive effect on the stock returns. They also concluded that factors such as rate of interest, oil prices and industrial production volume also have a positive impact on the market returns.

Hsing (2013) tested the expected potential influence of both monetary and fiscal policy on the performance of Polish stock market. The researcher pointed that polish market index is not influenced by the GDP and that money market rate is affecting the market index negatively, while industrial production volume is having a positive effect on the market index

Schotman & Schweitzer (2000) displayed that the sensitivity of equities returns to expected and unexpected inflation rate is an imminent determinant for equities and they concluded that equities can act as a hedge against inflation rate especially in the long run.

Sirucek1, (2012) focused on the influence and relationship between macroeconomic factors and the USA indices (S&P 500 and DJIA), the study was conducted during 1999 – 2012. The study conceded that macroeconomic factors (Inflation Rate, Money Supply, Interest Rate, Oil Prices, producer Prices and Industrial Production) is highly correlated with DJIA than with S&P 500.

Maysami, et al., (2004). On their research on the macro economic variables that have a relationship with all sectors indices found that changes in the long run as well as the short run regarding rate of interest, prices level, industrial production level and foreign exchange rate do constitute an integrated relationship with Singapore stock market index.

Omran (2003) by employing co-integration analysis, he emphasized on studying the impact of interest rates as a primary factor on Egyptian Stock market – ESM performance with respect to its activity and liquidity, were he showed that rate of interest had a significant impact on the performance of the ESM.

El-Nader & Alraimony (2012) applied the GARCH to investigate into the macroeconomic factors that may form an influence on the performance of ASE, they concluded that RMS2 (Real Money Supply), (RGDP), Exchange rate and (WAIR) (Weighted Average Interest Rates on Loans and Advances) do form a negative influence on the ASE index while Gross Domestic Product Volume shown a positive influence on the index.

Kyereboah & Agyire (2008) investigated the effect of macroeconomic factors on Ghana security market. They reached to a conclusion that macroeconomic factors such as bank`s lending rates and the rate of inflation do expose an influence on securities market performance. The results of their study suggest that macroeconomic factors should be taken into consideration by investors in developing countries.

Hsing (2011) adopted the GARCH model in order to test the nature of relationship between Hungary's stock exchange index and the macroeconomics factors, the research concluded the existence of positive significant relationship between the Hungary's market index with GDP and with money supply rate, but the result indicated that it's insignificant at 10% level.

Hussainey & Ngoc (2009) taking into consideration two macroeconomic factors (rate of interest and production index) and their effect on Vietnamese stock prices, found that there is a significant statistically significant association between production index and stock prices.

Factors affecting Stock Market Prices (Market Index):
There are several variables that have an impact on the performance of the stock markets, for instance, political, economic, and external and company specific variables. The stock markets` indices are influenced by many factors such as economic growth, monetary and fiscal policies, political issues and foreign exchange rate. For a company's share price, the factors that may impact the share price could be profitability rate, sales volume, statement of financial position, board of directors` members, launching new product and dividend policy.

Various articles and studies have displayed an affirmative association between macroeconomics factors and stock returns (Index), Studies conducted by (Bodie, 1976) and (Geske & Roll, 1983) proved that rate of inflation and money supply growth rate are having a negative effect on total stock returns. Stock prices are very sensitive to many elements such as economics' variables as well as some other factors that are unpredictable and immeasurable. Domestic economic basic elements that are affected by the international elements are the major determinants of stock market prices and the index value, as nations economy are integrated with each other. There are three main and common theories that are related to explaining the stock market performance. The Random Walk Theory was illustrated by (Malkiel, 1973), the theory is deeply integrated with efficient market theory, as stock prices constantly respond to new information, once the information reaches the market stock price within an efficient market will correct accordingly. Another theory was adopted by (Hamilton, 1922), according to Hamilton the theory emphasis on the long term market performance rather than day to day volatility or secondary movement. The third theory called the Elliot Wave Theory as tested by (Prechter & Frost, 2000) was an endeavor to predict the stock market trends in relation to different swells at all trends. (Levin & Wright, 2006) stated that gold price volatility is another decisive factor that affect securities market, were gold act as a safe investment tool; this refers to the fact that gold prices are expected to hike during

inflation, so investment in gold in such circumstances act as a hedge against inflation. This conclusion was affirmed by (Hiller et al. 2006) on their research of the impact of commodities and gold on stock market, they found that during the period 1976-2004 gold was having a negative correlation with S&P 500, and that the portfolio that contains a slight percentage of its investment in the form of gold was better than the one that contained no gold. In addition to that, foreign exchange is considered as one of the most important factors that influence stock market movement, and this is due to globalized economy and the international transfer of funds ((Mumcu, 2005). Also (Ghosh et al. 2010) found that dollar exchange rate, oil and gold prices do have remarkable impact on stock market index, while inflation rate do not have any impact on stock market index. (Islam & Watanapalachaikul, 2003) study showed a momentous long-run relationship between rate of interest and rate of exchange from one side and stock prices in the Thailand stock market from the other side during the period 1992-2001.

Interest Rate:
Interest rate is considered one of the most major factors that affect investment volume. Rise in interest rate will lead to increase in cost of borrowing, so demand on available funds will decline resulting in decrease in investment. Moreover increase in interest rate will lead to increase in discount rate which means a decline in stock prices and ultimately this will affect the stock market adversely. (Mukherjee & Naka, 1995) assumed that changes in both short term and long-term government bond rates would influence the ordinary risk-free rate and thus influence rate of discount. While any reduction in the borrowing interest rate will act as an incentive for more investments.

Inflation Rate:
There are different views regarding the effect of money supply on stock market index. (Friedman & Schwartz, 1963) illustrated the type of relationship between stock index and money supply by simply assuming that the growth of money supply volume would affect the gross economy and hence the expected stock market returns. While in (Fama, 1981) study pointed that any increase in money supply volume will result into inflation and this will lead to increase in discount rate and ultimately will cause a reduction in stock prices. On the other hand (Maysami & Koh, 2000) concluded that there exist a positive association between change in money supply quantity and stock market returns.

Money Supply:
Money supply and inflation rate are inter-related with each other as they act in a opposite direction. Many studies have affirmed that there is a strong and positive correlation between the volume of money supply and securities market index. (Maysami & Koh, 2000) concluded a very strong and positive correlation between supply of money and SGX index, also (Shaoping. 2008) confirmed such type of correlation on the Chinese stock market index during the period 2005 – 2007.

Economic Growth & GDP:
In order to attract investors to stock market the country should ensure a sustainable economic growth pace. From the point view of many authors and economist they confirmed that sustainable economic growth will be beneficiary to the security index as it will have a favorable impact on it. Financial market efficiency is an outcome of an economic growth due

to the ability of financial markets to attract and accumulate financial capital, this will have a remarkable effect on stock prices and ultimately the securities market index. (Levine & Zervos, 1996) affirmed that there is a positive association between securities market development and economic growth. Moreover (Becsi & Wang, 1997) and (Wachtel, 2001) have asserted that economic growth do have a positive influence on the performance of stock markets.
Ralph & Eriki (2001) ; (Hsing, 2013) ; (Wachtel, 2001) and (Ho., C., 2011), on their studies related to macroeconomic factors that affect security index returns, asserted that security market index is highly respondent to the change in country`s GDP.

Industrial Production:
Industrial production is considered as a parameter to real sector investments, as an increase in industrial production will improve expected cash flow in the future which means a high chance for cash dividend. Cash dividend will attract investors to buy the said company`s stock which will cause a high demand in such stock and ultimately will increase its price. This conclusion was approved by McMillan (2005) and Nasseh &Strauss (2000) studies concluded such strong relation between industrial production index and stocks prices.

Amman Stock Exchange Profile:
Previously known as Amman Financial Market which was inaugurated in 1978 with 66 listed company and now the number of listed companies reached 240 companies, Arab bank was the first public shareholding company in Jordan that was established in 1930. As a result of restructuring governmental program the AFM was sectioned into three major bodies – Amman Stock Exchange -ASE, Jordan Securities Commission – JSC and Securities Depository center - SDC. ASE has witnessed tremendous changes regarding trading volume and market capitalization during the last decade. Table – (1) below present some of the major indicators progress related to ASE during 1995 – 2013:

Table – 1: ASE Financial Indicators

Year	% non Jordanian Holdings	Market value of listed companies in million – J.D.	No. of listed companies	Value Traded in million
2013	49.90%	18,233.49	240	3,027.26
2012	51.70%	19,141.52	243	1,978.80
2011	51.30%	19,272.76	247	2,850.20
2010	49.60%	21,858.18	277	6,690.00
2009	48.90%	22,526.92	272	9,665.30
2008	49.20%	25,406.27	262	20,318.00
2007	48.90%	29,214.20	245	12,348.10
2006	45.50%	21,078.24	227	14,209.90
2005	45.00%	26,667.10	201	16,871.00
2004	41.30%	13,033.83	192	3,793.30
2003	38.80%	7,772.75	161	1,855.20
2002	37.40%	5,028.95	158	950.30
2001	38.50%	4,476.36	161	668.70
2000	41.70%	3,509.64	163	334.70

1999	43.10%	4,137.71	151	389.50
1998	43.90%	4,156.56	150	464.40
1997	39.10%	3,861.95	145	355.20
1996	32.80%	3,461.16	135	248.60
1995	31.00%	3,495.44	106	418.90

Source: CBJ, MIT, SD and ASE data base

Importance of the Study:

As we know that stock market act as a parameter for the level of economic health and growth, so it's very remarkable to search into the factors that have an impact on the performance of stock market index`s returns. Moreover previous studies and researches revealed different and contradicting results related to the most significant macroeconomic factors that do strongly and positively affect the direction of securities market index. In addition to that very few studies have been conducted on ASE index, thus this research is a maneuver to identify as which of the macroeconomic factors that could have a significant and positive association with ASE index.

Data collection method:

The financial data used for the purpose of achieving the goals of this study is collected on the basis of monthly financial reports released by Central Bank of Jordan - CBJ, the Ministry of Industry and Trade - MIT , department of Statistics - SD and Amman stock exchange - ASE for the period (2005 – 2013).

Study Hypothesis:

The problem of this study is stemmed from the phenomena as how do the macroeconomic drivers correlate with Amman Stock Exchange Index?, so the problem of the research can be digested and analyzed with the help of the following main and secondary null hypothesis:

H_{01} **:** The macroeconomic drivers do not correlate with Amman Stock Exchange index.

$H_{0}1.1$: The industrial production does not correlate significantly with Amman Stock Exchange index.

H_{0} **1.2:** The inflation rate does not correlate significantly with Amman Stock Exchange index.

H_{0} **1.3:** The interest rate does not correlate significantly with Amman Stock Exchange index.

H_{0} **1.4:** The money supply does not correlate significantly with Amman Stock Exchange index.

H_{0} **1.5:** The GDP does not correlate significantly with Amman Stock Exchange index.

H_{02} **:** The correlation between macroeconomic drivers and Amman Stock Exchange index do not vary prior and post the financial crisis period (2008).

Statistical Approach:

The following statistical and financial approaches are employed to prove or reject the above mentioned null hypothesis:

1- Multi - Linear correlation between all macroeconomic drivers as independent variables from one side and the Amman Stock Exchange index as dependent variable from the other side in order to determine how they correlate together.

2- Single - Linear correlation between each macroeconomic driver as independent variable and the Amman stock exchange index as dependent variable in order to calculate the correlation coefficient between variables separately.

3- To accept or reject the hypothesis, the authors will take into account Sig ≤ 0.05 which means if the correlation coefficient accompanied with sig ≤ 0.05, the null hypothesis will be rejected and the alternative will be accepted and vice versa.

Statistical Analysis Results:

First of all the monthly values of all macroeconomic drivers and the monthly readings pertaining of ASE index are recruited. Regarding interest rate, the authors preferred to consider three types of interest rate (Interest rate on loans to investigate the effect of lending cost on investment trend, interest rate on deposits in order to check whether the increase in deposit interest will divert the investment from the financial market toward banks' deposits and and finally rediscount rate to focus on CBJ role), as we assume that different forms of interest have different forms or nature of impact on the movement of ASE index. due to deferent explanation of each type of interest rates from investor`s point of view reaction to the stock market. Table -2 present the annual reading of the study variables for the period (2005 – 2013):

Table – 2: Independent Variable and Dependant Variables Annual Values (2005 – 2013):

Year	ASE Index	Money supply	GDP	IR	Lending Interest	Interest on Deposit	Rediscount Rate	Industrial production Quantity Index
2013	2,065.80	27363.4	23,851.30	5.47	9.00%	4.85%	4.84%	152.60
2012	1,957.60	24945.2	21,965.50	4.77	9.00%	3.78%	4.96%	150.72
2011	1,995.10	24118.9	20,476.59	4.41	8.70%	3.41%	4.42%	150.45
2010	2,373.60	22306.7	18,762.02	5.01	9.00%	3.53%	4.34%	150.83
2009	2,533.50	20013.3	16,912.21	-0.68	9.10%	4.94%	5.47%	155.69
2008	2,758.40	18304.2	15,593.41	14.93	9.50%	5.47%	6.73%	158.34
2007	3,675.00	15606.8	12,131.42	5.39	8.90%	5.44%	7.33%	156.21
2006	3,013.70	14109.7	10,675.37	6.25	8.60%	4.63%	7.24%	151.37
2005	4,259.70	12364	8,925.40	3.49	8.10%	2.91%	4.96%	143.19

Source: CBJ, MIT, SD and ASE data base

In relation to the main hypothesis: which states that the macroeconomic drivers do not correlate with Amman stock exchange index, a multi correlation analysis has been conducted between the macroeconomic drivers and Amman Stock Exchange index. The results showed that the correlation coefficient (R) = 0.887 which is considered high degree of positive correlation and these macroeconomic drivers correlate with Amman Stock Exchange significantly at sig F = 0.000. Moreover the macroeconomic drivers explain 78.6% of the change that afflicts Amman Stock Exchange index where the coefficient of determination - R^2 = 0.786 as shown in table (3). Accordingly, and on the basis of the aforementioned analysis and result the first main null hypothesis will be rejected.

Table–3:   Statistical coefficients of multi correlation
between variables

Coefficient	R	R^2	Sig F
Value	0.887	0.786	0.000

Regarding the secondary null hypothesis (**H$_0$1.1**- **H$_0$1.5**), the single linear correlations shown in table (4) below which indicates that the industrial production and interest rate on deposits do not correlate significantly with Amman stock market index since their significance level were 0.441 and 0.075 respectively, so the null hypothesis 1.1and 1.3 are accepted, however the authors noted that interest rate on loans has negative significant correlation with ASE index and explain 32.5% of any change in ASE index, while rediscount rate has positive significant correlation with ASE index and explains 32.4% % of any change in ASE index according to $R^{2\cdot}$ value. Moreover the inflation rate reflects positive significant correlations with Amman Stock Exchange index but explains only 2.6% of ASE index behavior, while money supply and GDP have negative significant correlations and explain 47.8 % and 69.5% respectively of ASE index behavior. Based one these results the secondary null hypothesis 1.2, 1.4 and 1.5 have been rejected.

Table–4:   Statistical coefficients of single correlation
between variables (2005-2013).

Coefficient	R	R^2	Sig F
Production Index	0.014	0.000	0.441
Inflation Rate	0.162	0.026	0.047
Interest Rate on Loans	-0.570	0.325	0.000
Interest Rate on Deposits	0.139	0.019	0.075
Rediscount Rate	0.569	0.324	0.000
Money Supply	-0.692	0.478	0.000
GDP	-0.833	0.695	0.000

The second main null hypothesis: States that "the correlation between macroeconomic drivers and Amman Stock Exchange index do not vary in the period prior and post the financial crisis (2008)". For the purpose of testing this hypothesis the study period was divided into two intervals and the values were divided accordingly: the first interval covers the period between 2005-2008 (prior to financial crisis period) and the second interval covers the period between 2009-2013 which is (post the financial crisis period). A multi correlation has also been executed between the macroeconomic drivers and Amman stock exchange index prior and post the financial crisis to see if the global financial crisis had any significant role in differing the value of the correlation between macroeconomic drivers and ASE index.

Pre financial Crisis Analysis - 2005 – 2008:

The statistical results show that the correlation coefficient (R) = 0.812 which is considered high positive correlation and these macroeconomic drivers correlate with Amman stock exchange significantly at sig F = 0.000. In addition to that the macroeconomic drivers explain 65.9% of the change that happens for the Amman Stock exchange index movement where the value of coefficient of determination R^2 = 0.659 as shown in table (5) below.

Table–5:   Statistical coefficients of multi correlation
 between variables (2005-2008)

Coefficient	R	R^2	Sig F
Value	0.812	0.659	0.000

The statistical results of period post the financial crisis (2009-2013) show that the macroeconomic divers and ASE index are completely positive correlated whereas R = 0.962 significantly at sig F = 0. The macroeconomic divers explain 92.5% of the change that happens for the Amman stock exchange index post the financial crisis where the R^2 = 0.925 as shown in table (6).

Post Financial Crisis Analysis (2009 – 2013):

Table–6:   Statistical coefficients of multi correlation
between variables (2009-2013)

Coefficient	R	R^2	Sig F
Value	0.962	0.925	0.000

The post financial crisis analysis implies that the relationship between the independent variables (macroeconomic factors) and ASE index has been enhanced comparing to pre financial crisis period as the R value was 81.2% before the financial crisis and it increased to 96.2 % during the financial crisis period, also determinant coefficient was better in the post financial crisis period and these results are statistically significant, sig F = 0.000

Results discussion:

Amman Stock Exchange is significantly correlated by the macroeconomic variables collectively and this is a normal trend as the stock market reflect the economic condition of the market and vise versa, this result was concluded by (Kyereboah & Agyire, 2008) and (Sirucek1, 2012), so investing in common stocks should be taken by individual investor as well as institutional investor in connection with the macroeconomic factors. By analyzing each component of the macroeconomic factors separately and its effect on ASE index, it was concluded that when interest on loans declines the demand for many will increase, leading to more investment in the stock market this will affect the market index upward so the nature of correlation implied here is adverse as we previously described in table – 3 above. Also the study approved a positive correlation between money supply and GDP separately from one side and ASE index from the other side, but this correlation was adverse as any decrease in money supply or in GDP will lead to increase in ASE index value and this may be attributed to the fact that most of ASE investors are individuals and that a reasonable portion of listed companies in ASE are family companies who don't pay much concern to such factors in the process of taking investment decision in the market but this is not a unique feature of ASE as the same result related to money supply was reached by (Bodie, 1976) and (Geske & Roll, 1983) also in (Hsing, 2011) study he found that there is no statistical significance impact by money supply and GDP on Hungary's stock exchange index. Regarding inflation rate correlation which equaled 16.2% with ASE index, it indicates that an increase in the inflation rate will lead to increase in securities prices to compensate the devaluation in the real value of assets due to decline in the purchasing power of money. We also should shed the light on the fact that industrial production and interest on deposit do not have any role in relation to ASE index, this is may be due to the fact that interest on deposit is very low and its not an attractive investment opportunity to resort for in absence of investment opportunity in stocks.   Reaching to the final concept of the research, where we analyzed the ASE performance in during the pre-financial crisis and post financial crisis, we reached to a conclusion that the microeconomic variables correlation with the index have been elevated and this may be attributed to the consciousness of the investors in taking their investment decision, that should be based mainly on the microeconomic factors that affect the stocks returns, so to avoid any further loses that they incurred and suffered due to the financial crisis

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