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THE IMPACT OF CURRENT AND LAGGED STOCK PRICES AND RISK VARIABLES ON PRE AND POST FINANCIAL CRISIS RETURNS IN TOP PERFORMING UAE STOCKS

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Abstract

Following most recent events such as the global financial crisis, it has become more critical to understand important relationships of variables such risk and return. Aim of this study is to shed some further light in such relationships by analyzing three top performing stocks in three different leading sectors in the UAE economy. The analysis is robust tested by defragmenting the data in pre and post financial crisis time frames. Using regression analysis models, findings tend to support no significant relationships between daily stock prices, risk and returns. In both pre and post financial crisis settings, current and lagged stock prices provided weak evidence in explaining variability in current returns. In the post financial crisis period, only the risk variables, both current and lagged, had significant negative effects on the current returns of CBD.

Keywords: Risk, Returns, Pre and Post Financial Crisis, Stock prices

INTRODUCTION

A stock represents ownership in a company. Investing in a share or stock of a company is equivalent to sharing the proportional success or failure of the company (Sincere, 2004). While there is an extensive literature on the relationships between stock market movements and economic variables (see Narayan and Narayan (2012), Maysami and Koh (2000), and Flannery (2002) for a good review), the study by Ross (1976) can be arguably be the first to have introduced the Arbitrage Pricing Theory (APT) which supports that risk factors can explain the financial returns. It has to be noted that the return on the stock of a company is subject to several factors such as the overall economy, the sector performance, the company's financial performance, company size, company book-to-market equity and the market/investor

sentiments towards the company (Konency, 2013; Sincere, 2004; Simlai, 2009). Hence, the stock return is susceptible to several risks including market risks, stock market crashes, correction in value of overpriced stocks and failure of the company. Despite these risks, stocks are popular investments amongst investors, as historically, on a global basis, stocks have achieved higher returns than every other type of investment over any 10-year period in the last 75 years (Sincere, 2004).

To relate risk and return, Merton (1973) found the expected return in the equities market to be a linear function of its variance, suggesting risk averse investors require higher returns for bearing higher risk premiums. Lucas (1978) went further in generalizing such a relationship persists across financial assets. While Case, Cotter and Gabriel (2011) support Lucas' viewpoint for the housing assets, Han (2013) found mixed relationships between risk and return in the housing market due to different hedging incentives of investors. In line with the above discussion on stocks, this paper is aimed at analyzing the returns and returns of publicly listed companies in Dubai. More specifically, in line with Barth and So (2014), Pan (2002) and Bates (2000) who found investors pay higher risk premiums for stock with higher market volatility and vice versa, this study will be the first, using GCC financial markets data, to capture not only the effect of uncertainty in the security price in a risk-return framework, but also how lagged uncertainty can affect stock returns.

The key objectives of this paper are set out in the following section are to analyze the relationship between stock returns, standard deviation of returns, i.e. the risks and closing prices of stock for these companies; analyze how the companies' stock returns were overall impacted pre and post global recession in Sep 2008; and compare the three companies based on their individual stock returns and the impact of the recession on their individual stock returns. For the purpose of this study, the three companies selected were Emaar Properties PJSC ("Emaar"), representing the construction and the real estate sector; Commercial Bank of Dubai ("CBD"), representing the financial sector; and Aramex, representing the transportation and logistics sector. The remaining part of the paper provides an overview of the research methodology used, followed by the analysis of the key findings. Some conclusive remarks are provided at the end.

RESEARCH METHODOLOGY

The data in relation to the stock prices of the companies has been retrieved from the Dubai Financial Market ("DFM") and Bloomberg. Daily stock related data for the period between January 2005 and May 2014 for Emaar and CBD has been retrieved from DFM. For Aramex the daily data has been retrieved from DFM for the period Jul 2005 to May 2014 as the

company got listed on DFM in July 2005 (DFM, 2014). The monthly data for the same corresponding periods and companies has been retrieved from Bloomberg. Information regarding the companies was collected from their respective website. Monthly data was used for the calculation of the monthly stock returns. The following models are being analyzed to shed further light in the relationships between closing prices, returns and standard deviations, in both a current and lagged framework.

$$Return_t = \alpha + \beta.Closing\ Price_t + \varepsilon_t$$

$$Return_t = \alpha + \beta.Closing\ Price_{t-1} + \varepsilon_t$$

$$SD_t = \alpha + \beta.Closing\ Price_t + \varepsilon_t$$

$$SD_t = \alpha + \beta.Closing\ Price_{t-1} + \varepsilon_t$$

$$Return_t = \alpha + \beta.SD_t + \varepsilon_t$$

$$Return_t = \alpha + \beta.SD_{t-1} + \varepsilon_t$$

The daily data was then divided into two periods, from 2005 to September 2008 and from September 2008 to May 2015, respectively, to understand and analyze the impact of the global recession on the aforementioned equations, representing relationships between daily returns, closing prices and risk (represented by standard deviations of returns). The use of standard deviation as a proxy of risk can be found in Gurrib (2007) who found PARCH (standard deviation based) models exhibited more stability than GARCH (variance based) models in explaining volatility in returns in the US futures markets. Similarly, Gurrib (2010) found that the standard deviation based model explained the volatility of key market players in US more accurately by exhibiting a greater number of negative components of volatility than the variance based counterpart.

The statistical analysis of the data was carried out using the 'Data Analysis' toolkit in MS Excel. The primary mode of analysis of the aforementioned relationships between returns, closing prices and standard deviation in prices was done through the ANOVA table, generated through regression analysis. Table 1 below is a sample regression output from the Data Analysis toolkit.

Table 1: Sample Regression Results

Regression Statistics	
Multiple R	0.957530
R Square	0.916864
Adjusted R Square	0.896080
Standard Error	1.726991
Observations	6

ANOVA

	Df	*SS*	*MS*	*F*	*Significance F*
Regression	1	131.5699	131.569	44.113	0.0026
Residual	4	11.930002	2.9825		
Total	5	143.5			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	0.484016	0.9288081	0.5211	0.6298	-2.094768	3.0628	-2.0947	3.0628
X variable	0.159575	0.0240258	6.6418	0.0026	0.092869	0.2262	0.0928	0.2262

In Table 1 above, an R^2 of 0.9168 indicates that the model explains 91% of the variability of the dependent variable (MIT, 2014; Minitab, 2013; Cameron, 2009; Muller and Fetterman, 2002). In relation to the ANOVA table, if the computed t-statistics of the coefficient for the given level of significance is less than the computed p-value then the coefficient is not statistically significant, otherwise the coefficient is statistically significant. For the purpose of regression analysis, the level of significance is kept at 95%.

Descriptive Statistics

This section presents the findings on the mean and standard deviation of the monthly stock returns for Emaar, CBD and Aramex Dubai from the period between 2005 to May 2014.

Table 2: Mean and Standard deviation on return and stock price (2005-May 2014)

Company	**Mean Stock return**	**Standard Deviation of Stock Return**
Emaar	1.98%	0.178
CBD	0.31%	0.146
Aramex Dubai	0.35%	0.119

It is important to note that Aramex stock data are from July 2005 onwards as the stock was listed in Dubai Financial Market in July 2005. It can be noted from Table 2 that for the period between 2005 and May 2014, CBD recorded the lowest average monthly return on stock of 0.31%, while Emaar recorded the highest average return of 1.98%.

It can be also noted that Emaar stock accounted for the highest standard deviation of returns at 0.178, underpinning the significant risk in the real estate sector that leads to higher return, according to the financial principle of high risk high return. As the period between 2005 to May 2014 encompasses the recession and is long enough for stocks to have multiple cycles of price fluctuations, to further understand the returns and pricing of the company stocks, yearly analysis was done as presented in Table 3.

Table 3: Yearly Mean and Standard deviation on return and stock price (2005-2014)

Company		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014 Jan-May
Emaar	Mean return	14.80%	-4.19%	2.59%	-11.39%	5.99%	0.16%	-2.32%	3.54%	6.68%	6.64%
	Std dev return	0.359	0.124	0.106	0.139	0.178	0.135	0.084	0.085	0.111	0.061
CBD	Mean return	-3.63%	-8.51%	3.05%	-4.85%	0.54%	-0.34%	-1.40%	1.37%	12.14%	10.97%
	Std dev return	0.275	0.119	0.071	0.183	0.127	0.063	0.034	0.075	0.073	0.142
Aramex	Mean return	4.14%	-5.23%	2.06%	-9.04%	5.84%	2.99%	-0.79%	0.97%	3.63%	1.47%
	Std dev return	0.218	0.086	0.143	0.122	0.134	0.113	0.087	0.043	0.040	0.036

As can be noted in Table 3, the return on the stocks of all the three companies dropped sharply in 2008 with the onset of recession. Although the returns picked up slightly in 2009, the returns across the three stocks continued to drop till 2011. CBD and Emaar faced a steeper and significant decline in the stock prices during this recession period as compared to Aramex. This can be attributed to the nature of the sector in which these companies operate which are banking and finance, and, construction and real estate, respectively. Both these sectors in Dubai were significantly affected during the recession period. From 2012 to May 2014, with the recovery in the market, the average daily stock prices for the three companies also reflected the increase.

While the performance of the company's stock is significantly reliant on the company's overall performance, it can be noted that the general price trend in the stocks was relatively in line with the global market during recession and recovery period indicating a positive correlation between overall economy (i.e. both Global and Dubai's economy) and the stock performance of the companies.

Stock Price and Returns

The three sectors considered for this study include Construction/real estate, Banking and Finance, and Transportation and logistics were selected for this study. These sectors are major contributors to Dubai's GDP. Within these sectors, leading companies for each sector was selected so as to be significant representative of the movement in the sector performance. As such, Emaar Properties, CBD and Aramex were selected. Set out below is a brief description of the selected companies.

Key Market and Financial Highlights of the Companies

Table 4: Yearly Mean and Standard deviation on return and stock price (2005-2014)

	Emaar	**CBD**	**ARAMEX Dubai**
Market Data			
Market capitalisation AED (mn)	61, 931.74	13,453.12	4,553.35
Shares outstanding (mn)	7,159.74	2,242.19	1,464.10
Current P/E ratio(ttm)	20.5065	12.8178	15.8466
Estimated P/E (12 2014)	20.8434	11.7647	14.3318
EPS AED (ttm)	0.4218	0.4681	0.1963
Financials			
Revenue in AED mn (Q1-2014)	2,480.1950	585.408	851.6220
Revenue (Q1-2013)	2,274.3390	581.4050	803.3900
% increase in revenue (Y-0-Y)	9.05%	0.68%	6%
Net income in AED mn (Q1-2014)	862.5170	284.811	78.7330
Net income in AED mn (Q1-2013)	555.8640	245.4790	69.3650
% increase in net income (Y-0-Y)	55%	16%	13.5%
Profit margin (Q1 -2014)	34.77%	55.05%	9.25%

As per Table 4, Emaar is the largest company in terms of market capitalization, revenue and net income. The company is currently trading at a high P/E ratio of 20.5, which is indicative of positive market sentiments and growth prospects of the company. CBD and Aramex are also trading at high P/E ratios. All three companies have had double digit annual growth in their net income (Aramex, 2014; CBD, 2014; Emaar, 2014).

Graphical Relationships between Stock prices, Returns and Risk

Figure 1: Emaar: Daily stock prices versus returns

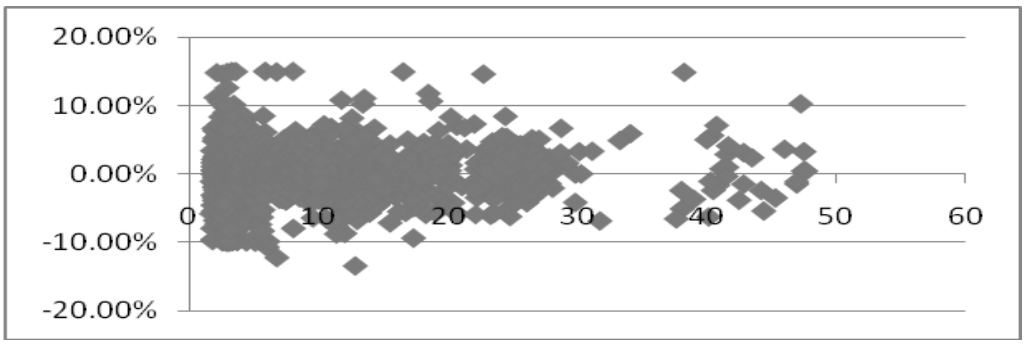


Figure 1: CBD: Daily stock prices versus returns

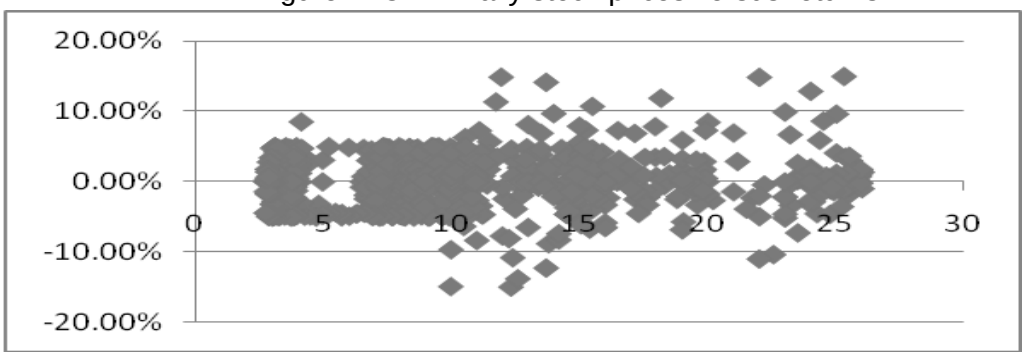


Figure 3: Aramex: Daily stock prices versus returns

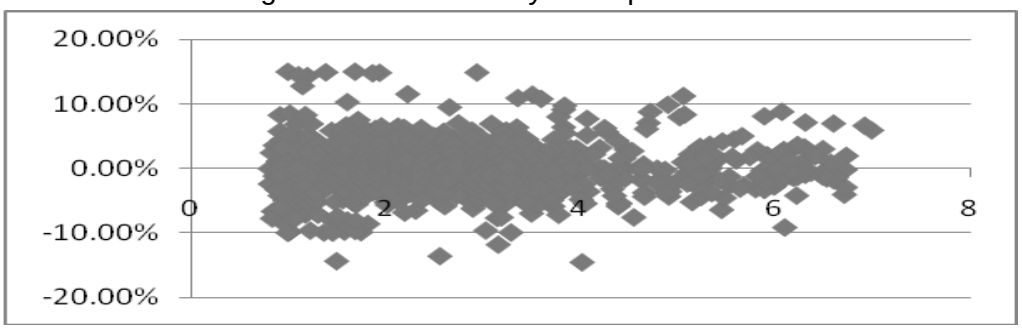


Figure 4: Emaar: Return versus Risk

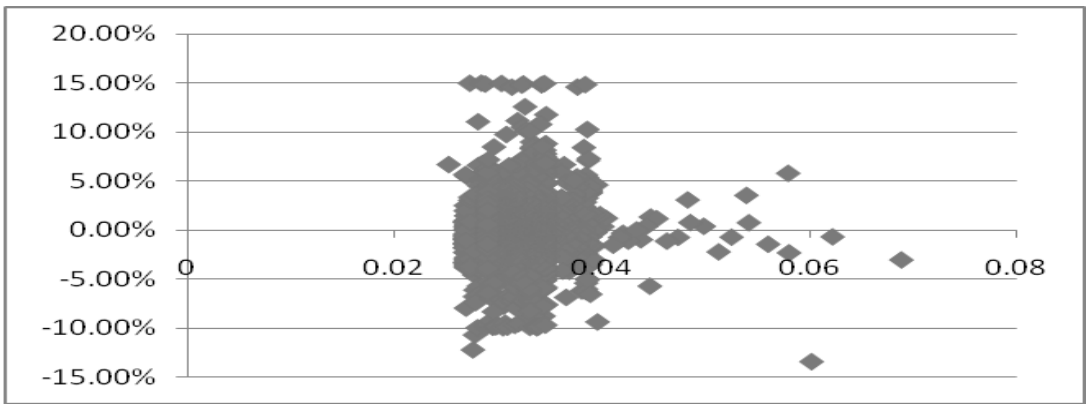


Figure 5: CBD: Return versus Risk

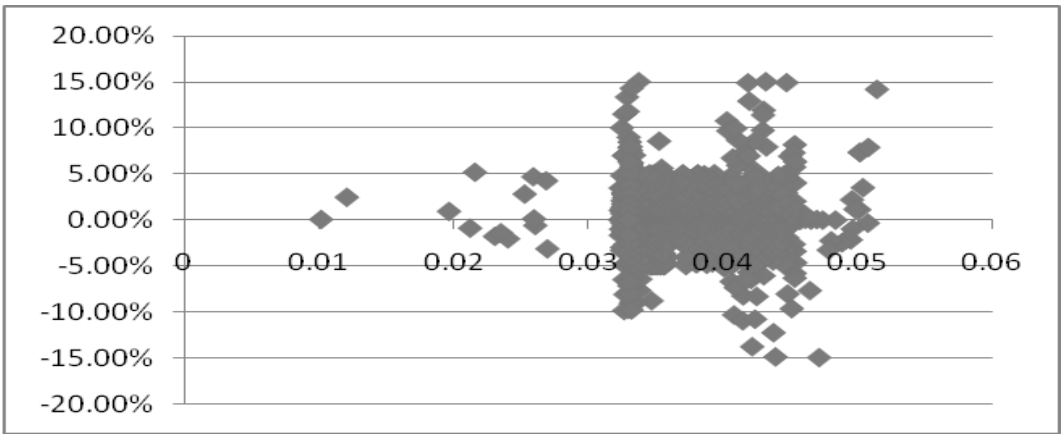
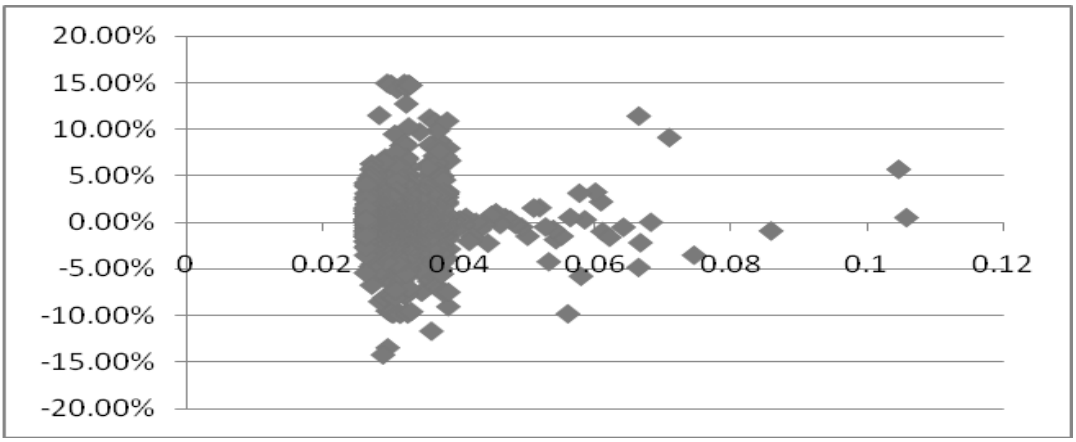


Figure 6: Aramex: Return versus Risk



Statistical Relationships

Return to Closing Prices (current and lagged)

Table 5: Statistical relationship between returns and closing prices (current and lagged) for 2005-2014

Company	R^2
Emaar	
Closing price $_t$	0.001405
Closing price $_{t-1}$	0.000007
CBD	
Closing price $_t$	0.001124
Closing price $_{t-1}$	0.00024
Aramex	
Closing price $_t$	0.00039
Closing price $_{t-1}$	0.001826

In relation to the regression of closing price of the period and the return for the period (Table 8), even though the intercept and closing price are statistically significant, the coefficient of determination (R^2) is extremely low (0.1405%) being close to 0 for Emaar. The R^2 for the regression between daily return to previous day's closing price is even lower at 0.00107%. As mentioned earlier in the literature review, a low R^2 indicates that the model offers very little explanation of the variability. This can be also witnessed in the graphs set out above, which indicates there is no correlation between the closing prices and the returns. Therefore, the closing price may not be an appropriate predictor for return on the stock price. As such, the closing price may not convey anything about the return given that a high or low closing price may not explain the return given that a stock with high closing price can either have a high return, negative return or a zero return. Similar to the Emaar's, the regression of CBD and Aramex daily returns with closing price of the day and the closing price of the previous days are not economically significant.

Standard deviation to Closing Prices (current and lagged)

Table 6: Statistical relationship between standard deviation and closing prices (current and lagged) for the period 2005-2014

		Emaar		**Aramex**		**CBD**	
		CP_t	CP_{t-1}	CP_t	CP_{t-1}	CP_t	CP_{t-1}
Sum of Squares	**Regression**	0.0023735	0.0023681	0.0076787	0.0076312	0.0039530	0.0039800
	Residual	0.0245062	0.0245116	0.0484462	0.0484938	0.0211026	0.0210756
	R^2	0.0883036	0.0881032	0.1368153	0.1359679	0.1577714	0.1588466
	A	0.0306457	0.0306453	0.0270833	0.0270975	0.0359947	0.0359899
	B	0.0001305	0.0001307	0.0017454	0.0017393	3.64259E-05	3.64743E-05
p-value	**A**	0	0	0	0	0	0
	B	9.38582E-51	1.22715E-50	1.35618E-74	4.14325E-74	2.81637E-51	1.20651E-51

Table 6 presents the regression results for the relation between standard deviation (proxy for risk) against the closing price of that day and the closing price of the day before, represented by CP_t and CP_{t-1} respectively, for all the three companies. As supported by Wiebull (2014), a lower residual sum of squares is preferred. The regression results indicate that the relationship between standard deviation to closing price is stronger than that between return and closing price due to higher R^2 values, albeit the value of R^2 is less than 0.20 (20%). Therefore, the closing price in itself may not explain or predict the variability of the standard deviation of the stock.

Amongst the three companies, the R^2 is the highest for CBD at 15.7% (CP_t) and 15.8 % (CP_{t-1}). While the regression results for Emaar have the lowest R^2. For an individual company however, there is insignificant difference between the value of R^2 for relations between SD and CP_t and SD and CP_{t-1}.

Return to Standard Deviation: 2005 to May 2014

Table 7: Statistical relationship between return and SD (current and lagged) for 2005-2014

		Emaar		Aramex		CBD	
		SD_t	SD_{t-1}	SD_t	SD_{t-1}	SD_t	SD_{t-1}
Sum of Squares	**Regression**	0.000242685	0.001072044	0.000285798	9.59439E-07	0.000138589	9.49675E-06
	Residual	2.027322148	2.022096179	1.568080873	1.568344344	1.445055544	1.445184411
	R^2	0.000119693	0.000118241	0.000182227	6.11752E-07	9.58966E-05	6.57E-06
	A	-0.002403165	-0.005763818	-0.001884873	0.000481399	0.003582275	0.001558115
	B	0.09501848	0.199737657	0.071359412	-0.004135462	-0.07437234	-0.01947431
p-value	**A**	0.670034338	0.306404897	0.592759407	0.891407823	0.644259765	0.840944164
	B	0.589777845	0.256669128	0.520147496	0.970283553	0.721843301	0.925782442

Table 7 presents the regression results for the relation between daily returns against the standard deviation (risk) respectively, for all the three companies. The regression results indicate that the relationship between the return and the standard deviation to closing price is weak given the low value of R^2. Therefore, on an individual stock level, the daily standard deviation is not a good predictor of daily return. If the standard deviation is taken for the entire sample of daily return for the three stocks, it could help assess the capital allocation line or the capital market line when considered together with the risk free rate of return.

Robustness Testing

Relationship between Returns and Closing Prices (Pre Financial Crisis)

Table 8: Statistical relationship between returns and closing prices (current and lagged) for 2005-Sept 2008

Company		R^2
Emaar	Closing price $_t$	0.007432
	Closing price $_{t-1}$	0.000311
CBD	Closing price $_t$	0.002011
	Closing price $_{t-1}$	0.000429
Aramex	Closing price $_t$	0.001988
	Closing price $_{t-1}$	0.002301

Similar to the entire period of 2005 to 2014, the regression of daily return and closing price of the day and the closing price of the prior day for the period 2005 to September 2008 are weak in explaining the variability of the daily return against the daily closing price, as reflected by the near zero R^2 in the case of all the three stocks in Table 8. Similar to the entire period of 2005 to 2014 and 2005-September 2008, the regression of daily return and closing price of the day and the closing price of the prior day for the September 2008 are weak in explaining the variability of the daily return against the daily closing price, as reflected by the near zero R^2 in the case of all the three as per Table 9.

Relationship between Returns and Closing Prices (Post Financial Crisis)

Table 9: Statistical relationship between returns and closing prices (current and lagged) for the period September 2008-2014

Company		R^2
Emaar	Closing price $_t$	0.000308
	Closing price $_{t-1}$	0.002055
CBD	Closing price $_t$	0.001395
	Closing price $_{t-1}$	0.018203
Aramex	Closing price $_t$	0.001595
	Closing price $_{t-1}$	0.001332

Standard Deviation to Closing Prices: Pre Financial Crisis

Table 10: Statistical relationship between SD and Closing Prices (current and lagged) for the period 2005-September 2008

		Emaar		**Aramex**		**CBD**	
		CP_t	CP_{t-1}	CP_t	CP_{t-1}	CP_t	CP_{t-1}
Sum of Squares	**Regression**	0.006477156	0.006490278	0.006964431	0.006870824	0.000418688	0.000423521
	Residual	0.016062442	0.01604932	0.034916269	0.035009875	0.012356587	0.012351753
	R^2	0.287367852	0.287950029	0.166292139	0.164057055	0.032773283	0.03315162
	α	0.026434724	0.026408291	0.025354802	0.025401611	0.039127078	0.039122418
	β	0.000353364	0.000355265	0.002537598	0.002521775	1.29762E-05	1.30304E-05
p-value	**α**	0	0	3.6656E-182	4.958E-182	0	0
	β	5.97289E-77	3.93627E-77	7.20467E-36	2.29346E-35	1.30964E-06	1.13531E-06

Standard Deviation to Closing Prices: Post Financial Crisis

Table 11: Statistical relationship between SD and Closing Prices (current and lagged) for the period September 2008-2014

		Emaar		Aramex		CBD	
		CP_t	CP_{t-1}	CP_t	CP_{t-1}	CP_t	CP_{t-1}
SS	**Regression**	0.002071371	0.002088229	0.003844612	0.003852955	1.09741E-05	1.28671E-05
	Residual	0.00264498	0.002628122	0.002379369	0.002371026	0.000476421	0.000474528
	R^2	0.439189245	0.44276369	0.61770949	0.61904995	0.022515823	0.026399765
	α	0.034231802	0.034248913	0.035843335	0.035860279	0.033313227	0.033287921
	β	-0.000633022	-0.000637358	-0.00309491	-0.003105112	0.00010413	0.000110615
p-value	**A**	0	0	0	0	0	0
	β	8.0568E-182	8.2967E-184	1.1193E-300	9.0889E-302	0.000160517	4.29814E-05

Between September 2008 and 2014, the risk of the stocks (standard deviation of returns) have appeared to be statistically significant for Emaar and Aramex against the closing prices of that day and the prior day closing price with high value of R^2, but not for CBD. This suggests that the closing price to be a good predictor of the risk of the two companies.

Return to SD: Pre Financial Crisis

Table 12: Statistical relationship between Returns and SD (current and lagged) for the period 2005-September 2008

		Emaar		Aramex		CBD	
		SD_t	SD_{t-1}	SD_t	SD_{t-1}	SD_t	SD_{t-1}
SS	**Regression**	0.000178898	0.001090157	0.000520168	1.03956E-05	7.4622E-05	1.79419E-05
	Residual	0.744816974	0.739483824	0.676213678	0.676696538	0.848878874	0.848935155
	R^2	0.000240133	0.001472043	0.000768645	1.53621E-05	8.78988E-05	2.11342E-05
	α	-0.002406232	-0.006670417	-0.003974296	-0.000748055	0.004028771	-0.0004913
	β	0.08909011	0.220038069	0.111446079	0.015760363	-0.076427264	0.037512001
p-value	**α**	0.680281425	0.252289467	0.400633806	0.874457241	0.742711928	0.968127292
	β	0.621071538	0.221066525	0.416240888	0.908571141	0.803748519	0.903088204

Return to SD: Post Financial Crisis

Table 13: Statistical relationship between Returns and SD (current and lagged) for the period September 2008-2014

		Emaar		Aramex		CBD	
		SD_t	SD_{t-1}	SD_t	SD_{t-1}	SD_t	SD_{t-1}
SS	**Regression**	0.00042461	0.000330125	0.000224861	0.000142548	0.005909031	0.006449413
	Residual	1.323558122	1.323652607	0.912466067	0.91254838	0.602740046	0.602199664
	R^2	0.000320707	0.000249342	0.000246371	0.000156184	0.009708436	0.010596275
	α	-0.00884469	-0.007708543	-0.004962468	-0.003808895	0.117788075	0.12298677
	β	0.300048943	0.264101467	0.190073968	0.151451911	-3.481910152	-3.63586262
p-value	**α**	0.528209736	0.581837892	0.604980222	0.691599566	0.013200612	0.009616135
	β	0.498314711	0.550467931	0.552991885	0.636668014	0.013500584	0.009841613

Based on the results from Table 12 and 13, daily return and daily standard deviation (risk) were found not to be statistically significant for either of the two time periods (2005-September 2008 and September 2008 to 2014) across all the three shares.

CONCLUSIVE REMARKS

Linear and time series regressions are useful tools used for predictions of dependent variables. An analysis of the findings support it is difficult to establish strong coefficient of determinations for most of the cases for all the three shares for the three given time periods. Nonetheless, the equations could be further refined. The residuals of the regression terms could be tested for violations of basic assumptions of linear regressions. These violations may include non-constant variance of the residual terms and also that the residual terms might be correlated with each other. The selection of the independent variable proved to be a major factor for the outputs generated such that the functional form of the model is key to establish a robust model. This can be achieved by ensuring no important variable is omitted, proper transformation of variables, where applicable and data is pooled properly. Further, a function of the dependent variable if used as an independent variable, could lead to inconclusive results. In relation to the three stocks under study, the similarity of the observed results across various time periods indicates that the models have room for improvement. Overall, the findings tend to support that stock prices and standard deviation, whether current or lagged, do not have significant implications upon the returns of the selected performing stocks.

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