

Notre Dame University

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**Financial Ratios and Stock Prices: Consistency
or Discrepancy?
Longitudinal comparison between UAE and USA**

Palisade Conference, 2007



Purpose of the Study

The objective of this paper is to:

1. Analyze how the financial performance of some selected listed firms in the UAE and in the US is affecting their stock prices.
2. Identify to what extent the price of the stock is dependent on the company's financial ratios



Need for the Study

Since there is a complete absence of academic work studying the effect that a combination of financial ratios has on stock prices in the UAE, this paper tries to model and explain this correlation using the Palisade decision Tools for regression, boxplots, distribution, Bestfits, and independence test, etc.

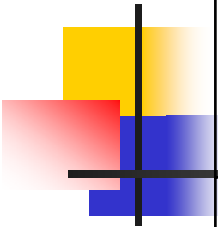


Research Design

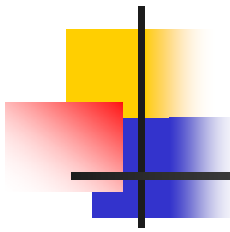
Sampling

Dubai Stocks:

- *Banking – 7 stocks*
- *Insurance – 10 stocks*
- *Real Estate and Related Financing – 5 stocks*



| <u>Banking</u> | <u>Insurance</u> | <u>Real Estate</u> |
|--|---|--|
| <ol style="list-style-type: none">1. <u>Commercial Bank of Dubai</u>2. <u>Dubai Islamic Bank</u>3. <u>Emirates Bank International</u>4. <u>Mashreqbank</u>5. <u>National Bank of Dubai</u> | <ol style="list-style-type: none">1. Arab Insurance Group2. <u>Dubai Insurance</u>3. <u>Dubai National Insurance</u>4. Dubai Islamic Insurance & Reinsurance (AMAN)5. <u>Islamic Arab Insurance Company</u>6. <u>National General Insurance</u>7. <u>Oman Insurance Company</u> | <ol style="list-style-type: none">1. Emaar Properties2. Union Properties3. Amlak Finance (Real Estate related financing) |



N.B.: The listed firms in the Dubai Financial Market are mainly divided up into three industries: Banking, Insurance, and Real Estate and Related Financing. The remaining stocks in this market fall into a variety of sectors, **with most stocks being the single stock in that sector**. Due to this lack of sector representation, we have chosen only sectors in which there is variety of companies in order to be able to detect trends and tendencies.



USA Stocks

| <u>Banking</u> | <u>Insurance</u> | <u>Real Estate</u> |
|--|---|--|
| <ol style="list-style-type: none">1. Bank of America Corp2. JP Morgan Chase And Co3. Wells Fargo & Company4. Wachovia Corp.5. Washington Mutual, Inc.6. Us Bancorp7. National City Corporation | <ol style="list-style-type: none">1. MetLife, Inc.2. The Allstate Corporation3. Prudential Financial4. Hartford Financial5. Loews Corporation6. The Progressive Corp | <ol style="list-style-type: none">1. St.Joe Company2. Thomas Properties Group3. Bluegreen Corporation4. California Costal Communities, Inc.5. Consolidated Tomoka Land Co.6. Stratus Properties |



The tested ratios are:

- Total debt to Equity Ratio
- Debt Ratio
- Return on Equity
- Return on Total Assets
- Total Assets turnover
- Profit margin on sales
- Basic Earnings Power



Data Collection and Cleansing

The main sources of information were:

- Reuters
- InFinancials
- Individual websites of each company to find historical financial statements.



Distributions of Variables

- The distribution have been produced using the BestFit program.
- For each variable, the **Chi-Square** **GOF** value has also been mentioned for the given histogram.

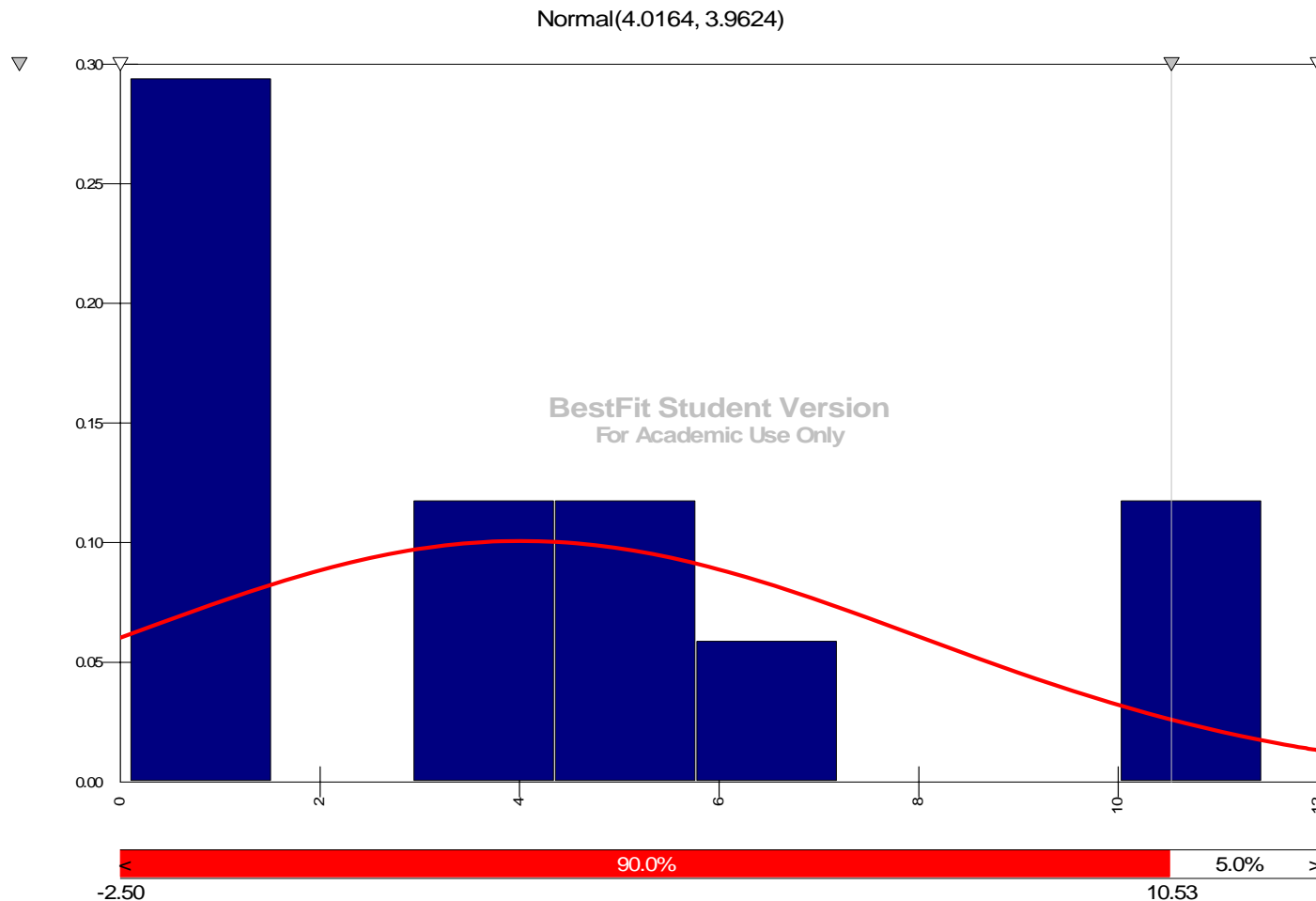
Test Values for USA and Dubai

variables

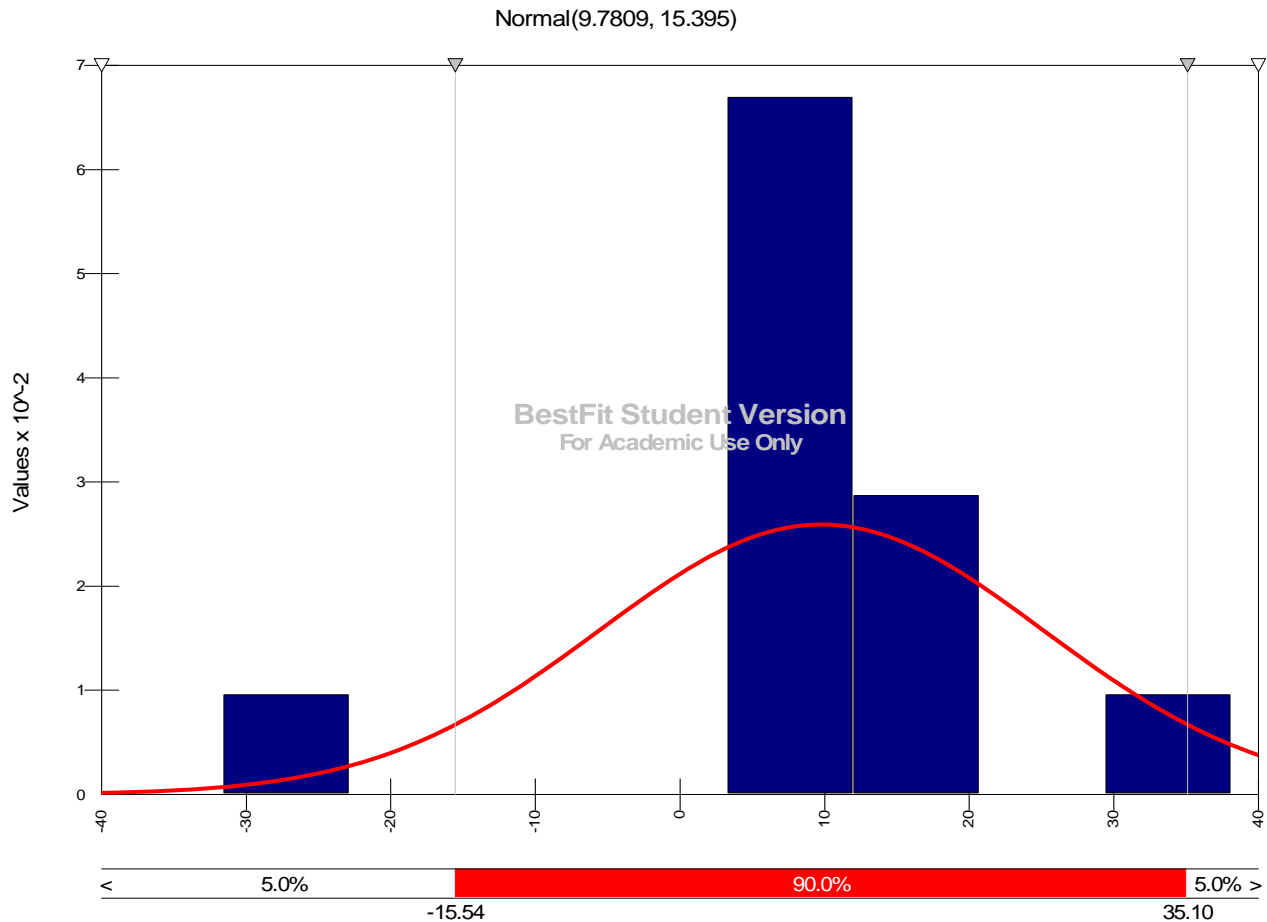
| <u>USA</u> | Chi-Square | Best Fit Probability Distribution |
|-----------------------|------------|-----------------------------------|
| Debt Ratio | 4.22 | Normal |
| Return On Equity | 1.11 | Normal |
| Return On Assets | 2.44 | InvGauss |
| Total Assets Turnover | 2.00 | Pareto |
| Profit Margin | 2.88 | Normal |
| Basic Earnings Power | 0.22 | Pareto |
| <u>Dubai</u> | | |
| Debt Ratio | 0 | Normal |
| Return On Equity | 3 | Normal |
| Return On Assets | 1.33 | Normal |
| Total Assets Turnover | 0.33 | Exponential |
| Profit Margin | 0.33 | Normal |

Dubai Market

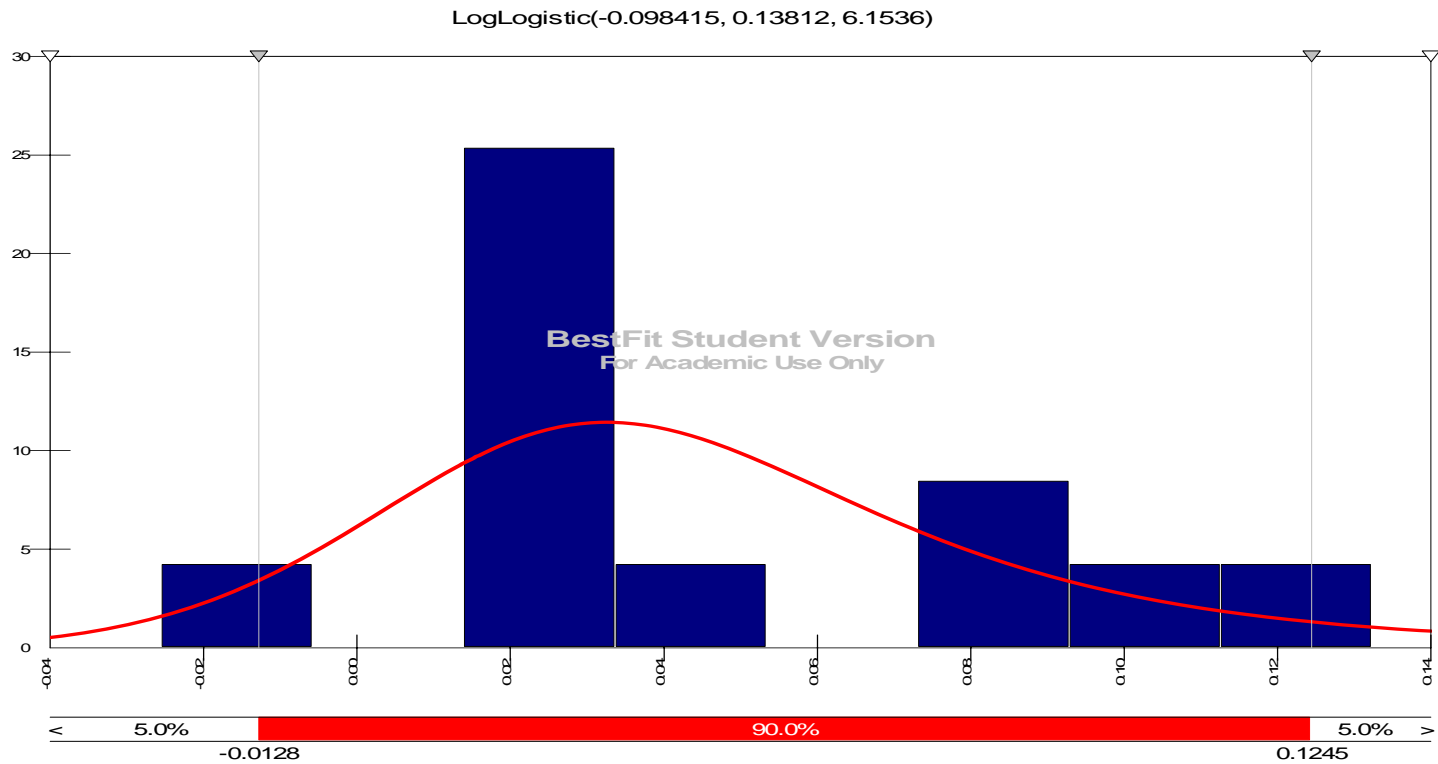
Total liabilities to Equity



Return on Equity



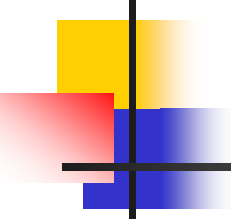
Basic Earnings Power





Stock prices' elasticity toward ratios variation

- The purpose here is to compare the effect of ratios' changes on stock prices for USA and Dubai stocks. Therefore,
 1. We measured the annual percentage change of the eight studied variables in each country and for each company individually.
 2. We calculated the average annual values of each ratio corresponding to each studied firm in both countries using the following equation:



$$\overline{R_{iD}} \approx \sum_{t=1}^{15} (A_D \times R_{it}) \div 15$$



Where:

R_{iD} is the average selected ratio for Dubai market

A_D is the adjustment factor

R_{it} is the value of each firm's selected ratio



Correlation Table Between Prices and Ratios

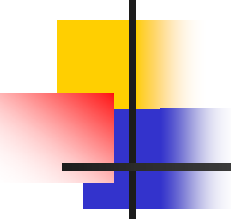
Dubai Market

| R_{ID} | $\overline{R_{Liabilities/Equity}}$ | Debt ratio | ROE | ROA | Total Assets turnover | Profit margin on sales | Basic Earnings Power |
|----------------------------|-------------------------------------|------------|-------|-------|-----------------------|------------------------|----------------------|
| Correlation (Ratio, price) | -0.529 | -0.591 | 0.598 | 0.841 | -0.275 | 0.997 | 1.000 |



US Market

| R_{IUS} | Liabilities/ Equity | Debt ratio | ROE | ROA | Total Assets turnover | Profit margin on sales | Basic Earnings Power |
|----------------------------------|------------------------|---------------|--------|--------|-----------------------------|------------------------------|----------------------------|
| Correlation (Ratio, price) | 0.892 | 0.586 | -0.593 | -0.598 | -0.921 | -0.722 | -0.025 |

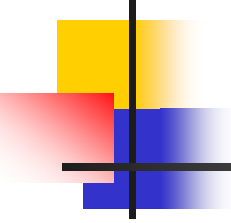


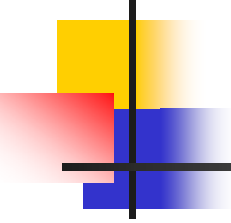
Too much emphasis cannot be given to the above figures despite the presence of a couple of high correlation



Hypothesis Testing:

- We used a two-sample **t test** for the difference between means of different variables to see whether the two variables being tested are independent or not.

- 
-
- Null hypothesis: Price and Any ratio are independent of each other
 - Alternative Hypothesis: There is dependence between price and that ratio
 - **Two Sample Analysis is chosen**

- 
-
- Null hypothesis value being 0 and
 - Alternative hypothesis being “**not equal to null value**”.
 - It is a two-tailed test because results in either positive or negative direction can lead to rejection of the null-hypothesis.

Results (Sample for one ratio: TL/E)

| <i>Hypothesis Test (Difference of Means)</i> | Variances | Variances |
|--|------------------|------------------|
| Hypothesized Mean Difference | 0 | 0 |
| Alternative Hypothesis | $\diamond 0$ | $\diamond 0$ |
| Sample Mean Difference | 0.2403 | 0.2403 |
| Standard Error of Difference | 0.077466075 | 0.077466075 |
| Degrees of Freedom | 6 | 3 |
| t-Test Statistic | 3.1017 | 3.1017 |
| p-Value | 0.0211 | 0.0532 |
| Null Hypoth. at 10% Significance | Reject | Reject |
| Null Hypoth. at 5% Significance | Reject | Don't Reject |
| Null Hypoth. at 1% Significance | Don't Reject | Don't Reject |



- ***Equality of Variances Test:***

Test Ratio of Sample Variances:

45.9860

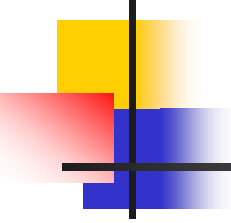
p-Value: 0.0105

Hypothesis Testing Results for Dubai Stocks

| | |
|---------------------------|------------------------------|
| Liability/Equity | Don't reject null hypothesis |
| Debt ratio | Don't reject null hypothesis |
| ROE | Don't reject null hypothesis |
| ROA | Don't reject null hypothesis |
| Total Assets Turnover | Don't reject null hypothesis |
| Profit Margin on Sales | Don't reject null hypothesis |
| Basic Earnings Power | Don't reject null hypothesis |

Hypothesis Testing Results for US Stocks

| | |
|---------------------------|---|
| Liability/Equity | Reject null hypothesis (at 10% significance level) |
| Debt ratio | Reject null hypothesis (at 10% significance level) |
| ROE | Don't reject null hypothesis |
| ROA | Don't reject null hypothesis |
| Total Assets Turnover | Reject null hypothesis (at 5% and 10% significance levels) |
| Profit Margin on Sales | Don't reject null hypothesis |
| Basic Earnings Power | Don't reject null hypothesis |



Although these initial results are somewhat indicative, we insisted to studying each sector in each country separately using:

- Time-series graphs
- Scatterplots and correlation
- Regression

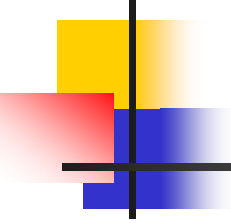


Sectors' Assessment: Longitudinal comparison between USA and Dubai markets' reaction to financial performance

All the companies are broken down into their respective sectors in order to draw sectors comparison between USA and Dubai.

This comparison is expected to accurately narrow down results.

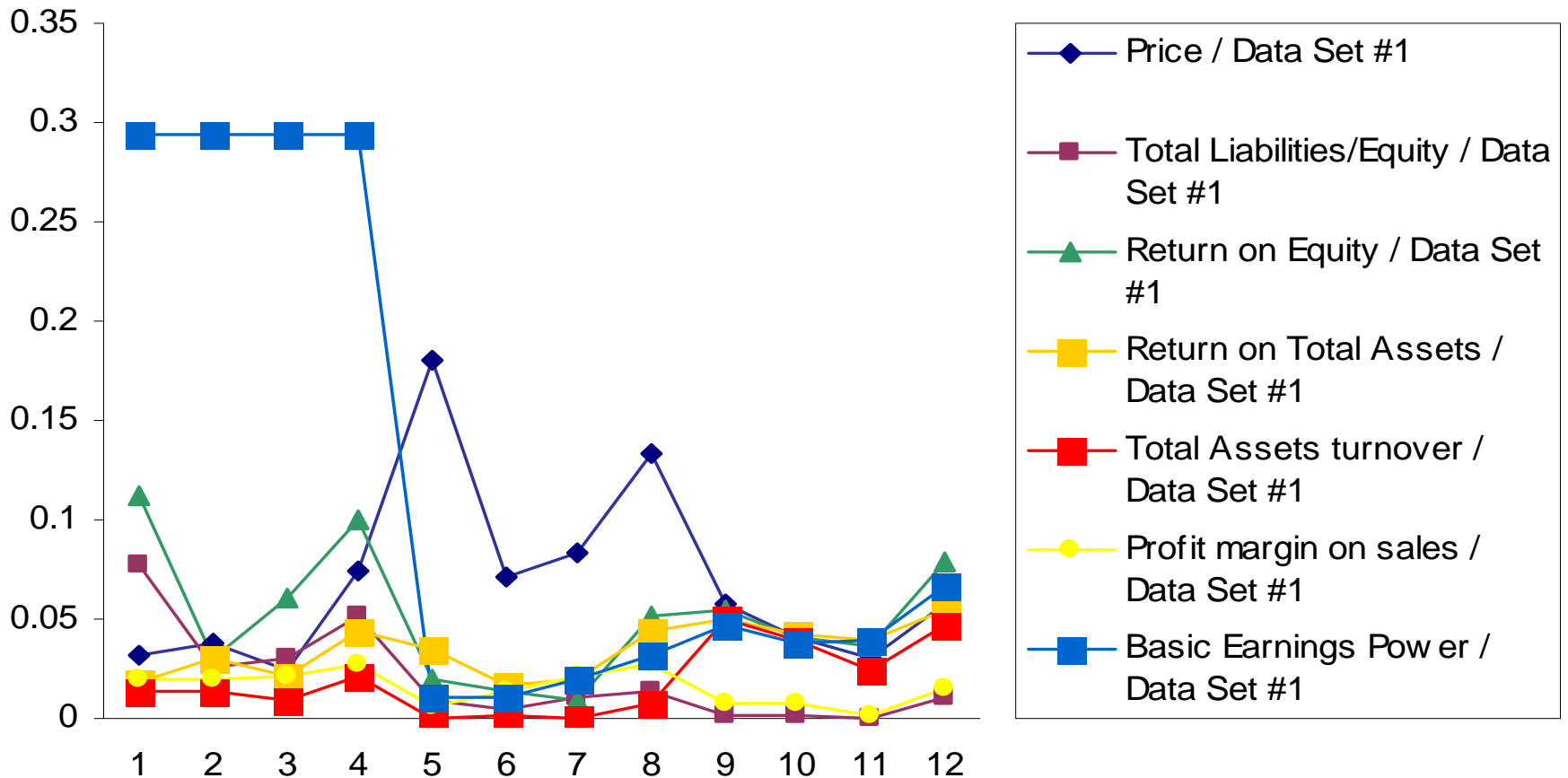
Times series graphs were attempted for each variable along with price.



We created single time-series graphs with only those variables which had some similarity in movement with price

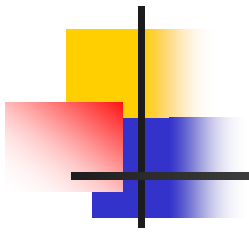
The Dubai Banking Sector's Performance

Time Series

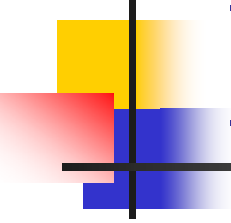


Correlation comparison per sector and per country

| $\rho_{R_i, P}$ | Banking Sector | | Insurance | | Real Estate | |
|--------------------------|----------------|--------|-----------|--------|-------------|---------------------|
| | US | Dubai | US | Dubai | US | Dubai |
| Total Liabilities/Equity | 0.031 | -0.434 | 0.958 | -0.541 | 0.931 | -0.741 |
| Debt ratio | -0.033 | -0.422 | 0.366 | -0.527 | 0.846 | -0.704 |
| Return on Equity | 0.426 | -0.919 | -0.789 | 0.445 | -0.226 | 0.781 |
| Return on Total Assets | 0.582 | -0.569 | -0.781 | 0.676 | -0.212 | 0.998 |
| Total Assets turnover | 0.165 | -0.712 | -0.949 | -0.502 | -0.591 | -0.953 |
| Profit margin on sales | 0.563 | 0.121 | -0.676 | 0.952 | -0.249 | 0.979 |
| Basic Earnings Power | 0.519 | -0.912 | 0.401 | 0.981 | -0.221 | 0.869 ³² |

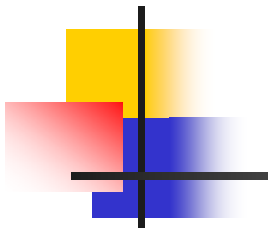


Six regressions are also built for each sector in each country in order to trace any possible explanation for the price variability as a response to changes in the financial ratios of the sector under consideration



*Recapitulation of the sectors'
regressions in the US and in Dubai*

| | | Regression Equation | Interpretation |
|----------------|-------|--|---|
| Banking Sector | US | $\Delta\text{Price} = 0.02614 + 11.9533\Delta\text{Debt Ratio} + 0.31859\Delta\text{ROE}$ Multiple R: 0.6512 R-Square: 0.4241 p-value: 0.7589 | There does not seem to be a significant relationship between price and ratios. |
| | Dubai | $\Delta\text{Price} = 0.3351 - 0.7819\Delta\text{ Total Liabilities/Equity}$ Multiple R: 0.4342 R-Square: 0.1885 p-value: 0.7141 | Complete absence of relationship. |
| Insurance | US | $\Delta\text{Price} = 0.1081 - 3.1192\Delta\text{Total Assets Turnover}$ Multiple R: 0.9488 R-Square: 0.9001 p-value: 0.0512 | There is a strong relationship between price and ratios. |
| | Dubai | $\Delta\text{Price} = 1.3124 + 3.2844\Delta\text{Debt Ratio} - 5.4756\Delta\text{ Total Assets Turnover}$ Multiple R: 0.9814 R-Square: 0.9631 p-value: 0.1231 | The explanatory variable does not account for the variability in price. |
| Real Estate | US | $\Delta\text{Price} = 0.2452 + 0.0480\Delta\text{Basic Earnings Power}$ Multiple R: 0.9892 R-Square: 0.9785 p-value: 0.1466 | Shy relationship between price and ratios due to the high p-value. |
| | Dubai | $\Delta\text{Price} = 0.2693 + 1.0618\Delta\text{ ROA}$ Multiple R: 0.9983 R-Square: 0.9965 p-value: 0.0376 | The variability of price can be explained up to an acceptable level by the change of ROA. |



1. Although the above results are statistically confirmed, we assessed all the firms included in the sample individually by conducting individual regressions to each company and by using actual values.

2. Variables with multicollinearity between explanatory variables have been highlighted and consequently redundant variables were excluded.

Individual companies' analysis output

| <u>US Firms</u> | Adjusted Square | R | p-value ANOVA | of | Significant variables | explanatory |
|------------------------|-----------------|---|---------------|----|--|-------------|
| Bank of America Corp | 85.17% | | 0.0163 | | Total Assets Turnover | |
| JP Morgan Chase & Co. | 91.84% | | 0.0408 | | Debt Ratio, Total Liabilities/Equity, ROA, Profit Margin on Sales, BEP | |
| US Bancorp | 63.51% | | 0.0666 | | ROE, ROA, Profit Margin on Sales, BEP | |
| Wells Fargo & Co. | -0.0703% | | 0.6279 | | - | |
| Washington Mutual Inc. | 73.33% | | 0.0405 | | ROE, ROA, Profit Margin on Sales, BEP | |

| <u>Dubai Firms</u> | | | |
|--------------------------|--|--------|---|
| Commercial Bank of Dubai | 0.9455 | 0.0183 | Total Liabilities/Equity, Debt Ratio |
| Dubai Islamic Bank | No variables entered regression equation | - | - |
| Emirates Bank | 75.70% | 0.0846 | Debt ratio, Liabilities/Equity, ROE, ROA, Profit Margin on Sales, BEP |
| Mashreqbank | 93.59% | 0.0216 | Debt Ratio |
| National Bank of Dubai | 98.76% | 0.0643 | Liabilities/Equity, Total Assets Turnover, Debt Ratio |



Insurance Sector

| <u>US Firms</u> | | | |
|-----------------------------|--------|--------|--|
| Hartford Financial | 69.60% | 0.0498 | Log(Total Assets Turnover) |
| Loews Corporation | 50.03% | 0.1113 | - |
| MetLife Inc. | 88.83% | 0.0106 | Total Assets Turnover |
| The Progressive Corporation | 91.88% | 0.0065 | Debt Ratio, Total Liabilities/Equity |
| Prudential Financial | 91.48% | 0.0070 | Log(Total Liabilities/Equity), Log(Debt Ratio), Log(ROE), Log(ROA), Log(Total Assets Turnover), Log(Profit Margin on Sales), Log(BEP) |

| <u>Dubai Firms</u> | | | | |
|--|--|--|--------|--------------------------------------|
| Dubai Islamic Insurance and Reinsurance (AMAN) | | 86.29% | 0.1687 | - |
| Arab Group insurance | | 99.78% | 0.0273 | Total Liabilities/Equity, Debt Ratio |
| Dubai insurance Company | | No variables entered regression equation | - | - |
| National Insurance General | | No variables entered regression equation | - | - |
| Oman Insurance Company | | 95.36% | 0.1243 | ROE, Profit Margin on Sales |

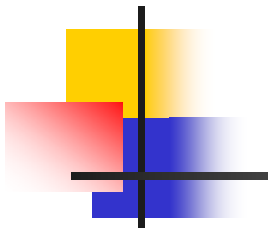


Real Estate Sector

| <u>US Firms</u> | | | |
|-------------------------------------|--------|--------|--|
| Bluegreen Corporation | 97.83% | 0.0009 | ROE, ROA, Total Assets Turnover, Profit Margin on Sales, BEP |
| California Coastal Communities Inc. | 85% | 0.0171 | Total Assets Turnover |
| St.Joe Company | 92.50% | 0.0375 | Log(Debt Ratio), Log(Total Assets Turnover) |
| Strauss Properties | 99.92% | 0.0184 | Total Assets Turnover, ROE |
| Consolidated Tomoka Land Co. | 69.98% | 0.0488 | Log(Total Liabilities/Equity), Log(Debt Ratio) |



| <u>Dubai Firms</u> | | | |
|--------------------|--|--------|----------------------|
| Emaar Properties | No variables entered regression equation | - | - |
| Union Properties | No variables entered regression equation | - | - |
| Amlak Finance | 93.87% | 0.0206 | Basic Earnings Power |

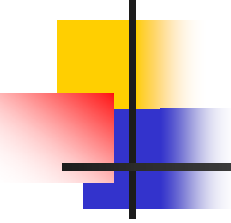
- 
- The number of entries under significant explanatory variables are **higher for US companies compared to Dubai ones.**

- This trend is obvious in both **the insurance and real estate sectors**, where **almost all US firms have a strong relationship between stock prices and ratios**, whereas in Dubai there are **hardly few firms showing this relationship.**



Conclusion

From the regression analysis on all sectors in the UAE, there does not seem to be much of a relationship between **price and ratios.**

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- Therefore, we can infer that in the US, stock prices are indeed based on objective measures, in contrast with Dubai, where at least the objective measures considered in the research does not seem to have any relationship with price.
 - The Dubai stock market does seem to be one that is driven by investors' sentiment



Limitations

- Limited observations
- Limited number of companies represented in the sample