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Using Analytical Hierarchy Process (AHP) to form Shares Portfolio in Kingdom of Bahrain's Bourse

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Abstract

This study comes to Use the Analytic Hierarchy Process (AHP) approach to build shares portfolio in kingdom of Bahrain shares? market. So that, we want to find out to what extent the Analytical Hierarchy Process approach is helpful taken in the account the importance of the investment decision to the investors as individuals or fund manager. We perform this assessment depending on the information of Bahrain stock market activities? handbook and some experts who have good experience in financial planning and some colleagues in university who are teaching financial and investment decision courses. The results demonstrated that (AHP) can help the decision maker to rank the sectors of the stock market according to their relative importance.

Index terms— analytical hierarch process (AHP), pair-wise comparisons, multi-criteria decision making.

1 Introduction

sing the Analytic Hierarchy Process (AHP) to build a shares portfolio in Kingdom of Bahrain stock market is described. AHP can be characterized as a multi-criteria decision technique in which qualitative factors are of prime of importance. A model of the problem (shares portfolio) is developed using a hierarchical representation (Zeleny 1982), **??**McCord & Neufville 1983) and (Kirkwood 1997). At the top of the hierarchy is the overall goal or prime objective one is seeking to fulfill (Saaty 1986), Saaty 1996). The succeeding lower levels then represent the progressive decomposition of the problem. We complete a pair-wise comparison of all entries in each level relative to each of the entries in the next higher level of the hierarchy. The comparison of these judgments indicates the relative priority of the entities at the lowest level (e.g. investment sectors) relative to achieving the top-most objective **??**Saaty 1994).

II.

2 An Overview of the Analytical

Hierarchy Process (ahp)

The Analytical Hierarchy Process (AHP) grew and evolution, at the Wharton School of Business by (Thomas Saaty 1980). It is a structured approach Author: e-mail: Alsamaray@yahoo.co.uk facilitates the process of analyzing the problem by breaking it down to small problems with multistage (Saaty 1990) which leads to show the problem of decision in analytical and systematic Fashion and in the way that shows the degree of similarity with the thinking of the decision-maker in the filming of the problems. The (AHP) style is not a style of complex processes designed for the analysis of complex problems but rather simple operations designed to analyze complex problems.

The (AHP) style views the problem of decision hierarchal with multiple levels, making it easier to use pairwise comparisons to determine the relative importance of all elements of the pyramid using a series of objectives / subjective judgments. This style shows its ability to detect the mistakes of Consistency of Judgments. By using (AHP) provisions to determine priorities more accurately depending on verbal judgments even if the words used

are not accurate, building on this property, it is possible to use the words of comparison as quality variables for a relative measure could be coupled with quantitative variable to calculate the priorities that can affect or contribute to every variable in determining the final decision. (AHP) uses to overcome the negatives that accompany the process of using the other entries in the decision-making process likes the style of pros / cons, weights and scores techniques by identifying all aspects of the problem and the variables which reflect the relative importance of each variable within the group but not individually **??**Alsamaray & Almadhon 1990). Using (AHP) needs four steps (Saaty 1977), (Dyer 1990) and **??**Saaty 1990a).

3 a) Decompose the Problem and Represents it Hierarchically

The first step in using (AHP) is to divide the problem and analysis it to its components, and synthesis it in hierarchically form. So that, the problem should contain at least at the following levels: the first level is the Goal, second level Criteria and the third level is the alternatives which are the course of actions.

4 b) Setting priorities for the problem components c) Synthesis of Results

Calculated relative importance of each alternative depends on the relative contribution of each criterion in determining the degree of preference. Sum of the relative importance of each alternative represents an appropriate degree that alternative standards for. The alternative with higher relative importance has the higher chance in the selection process (Forman, Saaty, Selly and Waldron 1983) and (Forman1990).

5 d) Evaluate the homogeneity of the verdicts

Pairwise comparison adopted in (AHP) does not specify randomly but can be derived from a set of judgments. These Judgments whether quality or quantity are governed by mathematical rules. At this stage, is assessing the degree of homogeneity of these verdicts and case heterogeneity Inconsistency must be equal to or less than 0.10 (Saaty 1980). Individuals often give a high bias in the estimation of the verdicts, overweighing bias requires tested statistically in order not to affect the importance of giving the proportion of non-real value (Dyer and Forman 1991). The lack of high inconsistency at any level or in the final assembly process does not invalidate the model as a whole, but give the indicator on the need to re-test some of the provisions (Saaty 1977), **??**Saaty 1994).

6 III.

7 The Research Problem

The decision problem considered in this study is how to determine the priorities of the sectors in Bahrain stock market to form the shares portfolio depending on their relative importance. Generally speaking, we develop an (AHP) model as multi-criteria decision making method in the field of investment. Accordingly, the emphases had been put to shade the light on using the Analytical Hierarchy Process (AHP) as new way to form shares financial portfolio.

8 IV.

9 Research Design

We built (AHP) model to research problem to form shares portfolio in Bahrain Bourse market. The structure of multi-criteria decision making according to (AHP) model consists of a number of alternatives (banks, investment, insurance, services, industrial and hotels &tourism) after setting the overall goal (shares portfolio) as well as a number of criteria like(balance sheet, income statement, shares trading, profitability and leverage & liquidity) as depicted in table (1).

10 Model Analysis

Figure (1) illustrates the decision problem according to (AHP) model which consist of six alternatives and five criterions. This is some of the pairwise comparison judgment. We evaluated the six alternatives in term of five decision criteria. The following matrix represents the corresponding judgment matrix with the pairwise comparison. So that the corresponding priority vector and the consistency coefficients are given as well. Table (2) illustrates the judgment matrix for the case of comparing the importance of the six alternatives. AHP provides a measure of the consistency of the decision maker's judgment process. Consistency is very important because we would not want to base an important decision upon a set of judgment that lack consistency. Inconsistency can result from many reasons such as improper conceptualization of the hierarchal, leak of information, a mental lapse or clerical errors. As Dyer and Forman (1991) said "accurate judgments are fairly consistency, but consistency judgments need not be accurate. This consistency is necessary but not sufficient for a good decision".

Perfect judgment rarely occurs in the real world and should not be the objective when making judgments. However, perfect consistency should not be expected in working with AHP. The issue really is, how much

inconsistency is accepted or tolerable in the expression of our preferences? AHP provides a method called the inconsistency ratio that calculates the degree of inconsistency of judgment. As a rule of thumb, if the inconsistency ratio is greater than about 0.10, here one must investigate and try to ascertain the possible cause of the inconsistency (Schoner & Wedley1989) and (Saaty 1991). If each of the possible causes is eliminated, then it is reasonable to proceed even though the inconsistency ratio is slightly greater than the 10 percent rule -of thumb value (Schenkerman 1997).

We will see how the inconsistency ratio can be approximated measures. The steps for estimating the inconsistency ratio are as follows:

1) Multiply the first row of the original pairwise comparison matrix for Balance sheet by the relative priority of bank (0.36). Performing the same multiplication for column 2,3,4,5 and 6. (e.g., column 2 X 0.22, column 3 X 0.05, column 4 X 0. CI = (Lmax -n)/(n -1)

Where n = number of items being compared For the balance sheet evaluation with n = 6, we obtain CI = (.9945 -6)/5 =.10 d) Compute the consistency ratio (CR), which is defined as follow:

11 CR =CI/RI

Where RI = random index

The random index is the consistency index of many randomly generated pairwise comparison matrices of size n as follow: N RI We previously mentioned as rule -of thumb was that a consistency ratio od 0.10 or less was accepted. Ours judgment resultsare in any estimate of the consistency ratio of .08, indicating that our priorities for balance sheet seem very accepted.

12 Limitations

The crucial thing that I faced is the delay of the companies in Bahrain stock market to announce their final report, the riot in Bahrain which affect the investment in the stock market because many companies let or have no desire to invest by limiting their activities. As well as, the limited number of pages for the proposal which force me not to include supporting materials for the study? VIII.

13 Conclusions

The most important conclusions can be determined as follows:

1. Shares portfolio must be respectively contains (Commercial banks 0.30%, Investment 0.20%, Services and Industrial 0.15%, Hotels & Tourism 0.11% and at the end came the insurance sector in 0.09%) shares according to the relative importance of these sectors. [1] [2]

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[2] Using Analytical Hierarchy Process (AHP) to form Shares Portfolio in Kingdom of Bahrain's Bourse

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BANK INVESTMENT		BANK INVESTMENT	BANK INVESTMENT	BANK INVESTMENT		
INSURANCE SERVICES INDUSTRAIL HOTEL & TORUSM		INSURANCE SERVICES INDUSTRAIL HOTEL & TORUSM	INSURANCE SERVICES INDUSTRAIL HOTEL&	INSURANCE SERVICES INDUSTRAIL HOTEL&		
Hotels & Tourism 213.4	Industrial 1.264M	services Insurance 1.152 Figure (1) :	Investment Structure of the decision problem according to (AHP	Banks 1) : Consolidated Market Information TORUSM TOI		
32.5		402,3 280.8	392,6	14.7	19.4	
52.7		147.6 257.4	113,88	2.153	1.285	
180.9	V.	861.6 871.4	209,7	2.9	2.520	
13.627		98.5 100.8	11.8	207,633	197,165	
8.032		40.6 59.770	3.7	21,432	166,188	
516.036	1,468M	2.558M	501	8.495m	13.162m	Number of shares
0.35		1.13 1.67	0.53	0.57	2.94	
0.351		0.587 0.337	0.372	0.313	0.174	
0.026		0.067 0.037	0.025	0.019	0.014	
0.016		0.028 0.023	0.007	0.003	0.009	
1.01		0.73 1.09	0.79	0.52	1.01	Price to book value
4.39		6.50 6.38	2.55	1.67	5.02	
7.53		11.43 11.10	6.84	5.96	7.86	
6.38		7.79 8.30	2.11	0.83	0.82	
84.75		68.17 74.81	30.94	13.98	10.39	Total equity to total
0.18		0.47 0.33	2.11*	5.98	-	
-		- -	-	-	-	Total liability to tot

*Investors' Guide, Bahrain Bourse, 2013
** Management will be assessed subjectively
We perform this assessment depending on the information of Bahrain stock market activities' handbook and some experts who have good experience in financial planning and some colleagues in university who are teaching financial and investment decision courses. The results demonstrated that (AHP) can help the decision maker to rank the sect market according to their relative i

Figure 1: Table (

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VI. Measuring the Inconsistency of the Judgments

Balance Sheet	C. bank	investment	insurance	Services	Industrial	Hotels & tourism	Priority Vector
C. bank	0.41	0.46	0.28	0.18	0.52	0.28	0.36
investment	0.20	0.23	0.23	0.18	0.26	0.23	0.22
insurance	0.09	0.06	0.06	0.04	0.03	0.03	0.05
Services	0.13	0.08	0.12	0.06	0.03	0.23	0.11
industrial	0.10	0.12	0.28	0.24	0.13	0.18	0.18
Hotels & tourism	0.07	0.05	0.03	0.30	0.03	0.05	0.09

Inconsistency = 0.08

Figure 2: Table (2) : Pairwise comparison matrix for balance sheet

[Note: Bank=.41(.36)+.46(.22)+.28(.05)+.18(.11)+.52(.18)+.28(.09) =.4014/.36 = 1.115 Investment=.20(.36)+.23(.22)+.23(.05)+.18(.11)+.26 (.18)+.23(.09)=.2214/.22 = 1.006 Insurance=.09(.36)+.06(.22)+.06(.05)+.04(.11)+.03 (.18)+.03(.09) =.0611/.05 = 1.222 Services=.13(.36)+.08(.22)+.12(.05)+.06(.11)+.03(.18)+.23(.09) =.1031/.11 =.937 Industrial=.1(.36)+.12(.22)+.28(.05)+.24(.11)+.13(.18)+.18(.09) =.1424/.18 =.7911 Hotel & Tourism =.07(.36)+.05(.22)+.03(.05)+.3(.11)+.03(.18)+.05(.09) =.0806/.09 =.8956 a) Divide each sum of row entries from step 1 by their corresponding priority values, for balance sheet evaluation, the calculations are .4014/.36 = 1.115,.2214/.22 = 1.006,.0611/.05 = 1.222,.1031/.11 =.937,.1424/.18 =.7911,.0806/.09 =.8956 b) Compute the average of the values specified in step 2; this average is denoted by Lmax. For the balance sheet example we have Lmax= (1.115 + 1.006 + 1.222 +.937 +.7911 +.8956)/6 = 5.9667/6 =.9945 c) Compute the consistency index (CI), which is defined as follow:]

Figure 3:

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Investment	0.22	0.24	0.13	0.19	0.21	0.07
Insurance	0.05	0.10	0.06	0.13	0.11	0.09
Services	0.11	0.19	0.07	0.20	0.16	0.36
Industrial	0.18	0.19	0.19	0.12	0.13	0.19
Hotels & tourism	0.09	0.11	0.15	0.08	0.14	
Commercial Bank = 0.30						
Investment Bank=0.20						
Insurance Sector=0.09						
Services Sector =0.15						
Industrial Sector=0.15						
Hotels &tourism = 0.11						
VII.						
Balance		Income	Shares	Profitability	Leverage&	
Sheet		0.07	Trading	0.36	Liquidity	
0.29			0.09		0.19	
C. Bank	0.36	0.17	0.40	0.28	0.25	0.29

Figure 4: Table (3

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