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Stock Price Forecasting in an Interest Free Economy

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ABSTRACT

Stock price forecasting models are equally important for investor decisions in the western market as well as in the Islamic market. Both dividend discount and earning-based valuation models use interest rate as a fundamental measure to reflect the present value of future dividends and earnings respectively. In general terms, stock prices are forecasted based on the correlation between stock return and interest rate. However, in an Islamic, interest-free economy, no such correlation is available. This paper suggests that an interest-free economy could realize the principle of market efficiency more efficiently and would render stock prices more related to economic realities. In other words, stock prices would capture the real growth component of the concerned stock, rather than the speculative and artificial ones. It is argued that such an economy provides more accurate indicators to investors as to where to direct their funds for potential growth at a rate higher than the market capitalization rate.

JEL Classification: A13

Key words: Stock prices, interest rate, Islamic economy, Valuation models

1. INTRODUCTION

Security pricing is a critically important process in any economy irrespective of the fundamentals running that economy. Security pricing is determined, to a good extent, by the widely used price valuation models. Investors use these models to form their investment portfolios with the objective of increasing return and decreasing risk. In an interest-based economy, investors usually mix income-guaranteed securities with risky ones to manage risk. However, the question of risk is tightly coupled with the financial position of the firm and, in particular, with the amount of outstanding debts carried by the concerned firm and its ability to pay

back these debts. Moreover, in the same interest-based economy, the decision of whether to invest in income-guaranteed securities or in risky ones depends on the interest rate, which fluctuates in accordance with the rate of inflation.

In an interest-free economy, however, the picture is totally different. First, income-guaranteed securities are not acknowledged and would not be commercially available. Second, the whole financing process is different in principle and in operation. As a result, the question of risk has to be tackled from a different angle. This paper analyzes the relationship between interest-based loans and inflation volatility. It also describes the changes in the stock selection process in terms of investor satisfaction, as quantified by the utility function, and in terms of the investor attitude towards accepting risk.

2. DETERMINANTS OF STOCK PRICES

Prices of stocks, like all other investment securities, are controlled by the equilibrium of demand and supply. Beyond this general mechanism, stock prices can be attributed to the following three categories. The first is corporate-related factors such as the technology utilized in the organization, the management efficiency, the marketing strategy and the product innovativeness and attractiveness to customers. The second is sector-related factors such as the demand for the class of products, and the price of the raw material used in production. For example, demand for paint may decrease due to the introduction of paper wall, and demand for oil may decrease due to the introduction of electricity-powered cars. Also, an increase in leather price would drive up the prices of all leather product factories. The third is economy-related factors such as high inflation or recession as important stages of the business cycle, unemployment levels, effectiveness of monetary policy and banking systems, and availability of information to investors.

Since stocks should reflect the real value of a firm's assets, their prices should be predominately controlled by the factors of the above first and second categories. However, empirical data shows that stock prices do change for factors that have little relevance to the performance of their holding firms.

In Summers (1986), the author questioned the concept of market efficiency that states that asset prices are in some sense rationally related to economic reality. Summers argues that data, in conjunction with current statistical methods, provide no evidence against the view that financial market prices deviate widely and frequently from rational valuations. He concluded his paper by putting forward a word of caution in treating stock prices or their changes as rational reflections of fundamental values. Shiller (1981) used the S&P 500 and the modified Dow Jones Industrial Averages indexes over one century (1870 – 1970) to highlight the fact that stock price indexes are too volatile to be realistically attributed to any objective

new information or to actual subsequent events. As a way of saving the notion of efficient market, Shiller suggested that stock-price volatility should be attributed to changes in expected real interest rates.

Schwert (1989) analyzed the relationship between stock and bond prices with a large set of economic factors. He noticed that stock volatility increased by a factor of two or three during the Great Depression (1929-1939). Despite extensive data analysis, Schwert did not draw decisive conclusions about the causes behind stock volatility. Fama and Schwert (1977) showed that among government bonds and bills, common stocks, and private residential real estate, only the latter was a complete hedge against expected and unexpected inflation. However, common stock return was negatively related to the expected and the unexpected inflation, contrary to the long-standing belief that they serve as hedges against inflation. Bodie (1976) developed a measure of hedging effectiveness against inflation as the proportional reduction in the variance of the real return on a nominal bond attainable by combining it with the equity portfolio. Fama and Gibbons (1982) presented a new evidence for the Mundell-Tobin model that the expected real return component of interest rates is negatively related to the expected inflation component. Modigliani & Cohn (1979) suggested that the stock market is substantially undervalued because of the inflation illusion.

As shown above, speculative factors play a major role in determining stock prices in an interest-based economy. These speculative factors can be significantly reduced in an interest-free economy. The discussion focuses on the impact of inflation volatility on stock prices and suggests that an interest-free economy reduces this volatility and renders stock prices more reflective of a firm's performance and of the condition of the concerned sector. First, the relationship between interest-based financing and inflation is established and analyzed. Second, the utility function is used as a tool for determining the demand on a stock. Using the results of the first section, expected changes of the outcomes of the utility function in an interest-free economy are presented. Third, data analysis is used to show that rising inflation increases the volatility of stock prices. Finally, concluding remarks are given.

3. INFLATION

Like any complex phenomenon, inflation depends on many factors.[1] Some of these factors include financing government debts through printing money, a taxation policy that does not respond to current the inflation rate, lack of technology or natural resources which leads to export of costly equipment, and unequal opportunity, naturally associated with corruption, which excludes many capable personnel from the productive cycle and focuses

business and profitable industry in a tiny class of society. In addition to all the above factors, and admitting their indubitable contribution to inflation, there is a factor that usually receives less analysis despite its significant and constant contribution to inflation, that is interest-based loans.

To set the stage for understanding the role of interest-based loans, let us briefly analyze the underlying mechanism behind inflation through the first factor, which is financing government debts through printing money. Sometimes governments resort to their power of printing money to pay back their debts and cover their budget deficit. By increasing the quantity of money in circulation, the aggregate price level increases, leading to inflation. By printing money out of thin air to pay its debts back to the public sector, the government effectively shifts funds from the public to its own account; see Krugman and Wells (2006). In other words, inflation is caused by redistribution of funds or alternatively, shifting money from one sector to another. In this case, the public pays the inflation tax through the increase of the aggregate price level.

4. HOW DO INTEREST-BASED CONTRACTS CONTRIBUTE TO INFLATION?

This question can be answered by considering financing projects through intermediate- and long-term loans. According to these loan contracts, the borrower has to repay a certain amount of money by a certain date. The burden of this repayment depends greatly on the rate of inflation at the time of repayment. If the inflation rate turns out to be higher than the interest rate associated with the loan, then inflation favors borrowers while lenders are disadvantaged because they did not recover the real value of the money they lent. On the other hand, if the inflation rate turns out to be lower than the interest rate, then lenders are favored and borrowers are disadvantaged.

The negotiation of an acceptable interest rate depends on the expectations of the borrower and the lender when they enter into the loan contract. Obviously, the borrower would negotiate for an interest rate lower than the inflation rate he expected; and the lender would negotiate for an interest rate higher than the inflation rate he expected. Since expectations, by definition, imply uncertainty, every party would try to add a safety margin to protect himself from an unpleasant surprise. Knowing that estimation of inflation is a notoriously difficult problem even for a short term, let alone for many years, interest-based loans usually carry unpleasant surprises for one party, usually favoring lenders who have the stronger negotiation position, and thus resulting in shifting money to one class of society at the expense of another. As we recall, shifting funds is the very same mechanism that leads to inflation when the government tries to fix its budget deficit by resorting to its money printing

press. Since interest-based loans are conducted constantly and frequently in financing projects, they raise inflation more often and consistently than the government does by printing money to get free service from the public sector.

The above scenario shows how unexpected inflation is advantageous to either lenders or borrowers. Inflation works in favor of lenders in many instances, and even if it is not in their favor, it harms them less. Nonetheless, it is not unusual that inflation seriously damages lenders. In fact, some U.S. mortgage companies were pushed into bankruptcy in the early 1970s under the impact of the higher-than-expected, double digit inflation rate. They failed because the real value of the payments they got was lower than the loans they made, but they had to pay a high interest rate on deposits based on the actual inflation rate in order to attract customers; see Krugman and Wells (2006).

5. LOANS AND THE EXPECTED INFLATION RATE

At this point, let us turn our attention to the impact of interest-based loans when the expected inflation turns out to be equal to the actual inflation. It may appear that inflation creates losers and winners in loan contracts only when the unexpected component of inflation is not zero. Actually, even though, in such a case, inflation does not surprise either party, it would still burden one party more than the other and contribute to rising inflation through the same money-shifting mechanism. The reason behind that lies in a simple fact: interest on loans is paid out of the profit generated from the financed project. Borrowers do not accept a certain interest rate based on the expected inflation rate alone. They also do so based on the expected return of their project. Actually, the expected return rate is more significant in that decision than the expected inflation rate since the former is the real source of money out of which the interest will be paid. Since the project's rate of return is as hard to expect as the inflation rate, or perhaps more, the interest rate will continue to be a biased and tilted balance that works in favor of one party at the expense of the other, and may drive borrowers out of business if the interest rate eats up their actual profit. The unexpected component of inflation does aggravate the impact of the shock on the losing party and makes it harder for this party to recover. But the mere interest-based loans lead to rising inflation even if the unexpected inflation component is equal to zero.

6. THE GREEDY CUTTER

In some instances, the borrowers, who are running productive projects, are forced to terminate their projects and liquidate their assets to be able to pay back their due loans plus the interest. In this way, the whole economy loses.

This is, in my view, one of the most important impacts of interest-driven inflation. Surprisingly, western literature listed less significant consequences of inflation, such as the shoe leather cost, but did not list this one. This may be due to the western perception that interest is unavoidable and has to be accepted as a price for getting loans. However, any impartial treatment of this issue should list this factor among other consequences of inflation. I will call this factor "the greedy cutter" to reflect the scenario of a greedy cake cutter who insists on a fixed-size piece of the cake regardless of how big or small the cake is and of the number of people who deserve a share of the cake with him.

7. THE FISHER EFFECT

The tendency to overlook the adverse impact of interest-based loans on the economy under the expected inflation rate and to connect the problem of misallocation of resources to the unexpected component of inflation probably started with the proposal of the Fisher effect. According to Fisher (1930), every expected percentage rise in the inflation rate has a corresponding and equal percentage rise in the nominal interest rate. In other words, lenders target a real interest value through their requested nominal interest rate. Thus, they would calculate their nominal interest rate as a summation of the expected inflation and their target real interest rate. The Fisher effect makes logical sense and is supported with strong empirical evidence as shown in Griffiths & Wall (2007). Yet it gives a subliminal message that lenders and borrowers would be making an informed decision regarding accepting the loan as long as the actual inflation does not deviate from the expected one. In Griffiths and Wall (2007), it is stated that uncertainty about future price levels, as represented by the unexpected inflation, is likely to lead to misallocation of resources by discouraging long-term loans. They attributed this effect to the reaction of savers and lenders to uncertainty by demanding a premium to cover the perceived extra risk. Once again, in my view connecting the problem of misallocation of funds to the unexpected inflation goes in line with Fisher's proposal that assumes that expected inflation poses no problem since it is taken into consideration upon accepting loan contracts. As highlighted above, the ability of borrowers to pay interest is influenced by the inflation rate *and* the actual return of the project. Even if the unexpected component of inflation is zero, the real return of the project is unknown beforehand and may jeopardize the financial position of the borrowers exactly as the unexpected inflation may do.

8. LOANS DURING DEFLATION PERIODS

Interest-based loans do not inhibit economic growth only during times of inflation. Interestingly, the negative correlation between these loans and economic growth is more obvious during periods of deflation. According to the Fisher effect, deflation lowers the nominal interest rate and increases demand for money. Deflation is more problematic to handle, by the central bank, than inflation. The central bank cannot intervene during times of deflation by lowering the interest rate once the zero-bound point, i.e. zero nominal interest rate, is reached. Since the central bank cannot impose a negative interest rate, the monetary policy cannot be used. Consequently, deflation takes money away from borrowers and surrenders it to lenders through interest-based loans. Krugman and Wells (2006) call the situation of halting the effectiveness of the monetary policy to stimulate economy during deflation the liquidity trap. This trap highlights a logical contradiction. Deflation carries, no doubt, some desirable effects. It increases the purchasing power of money and lowers the initial and operation costs of projects. However, using interest-based loans as an instrument to finance projects inhibits economic growth during that desirable time. In other words, the liquidity trap indicates the failure of using interest as a mechanism for rewarding money lending.

9. CHOOSING A STOCK USING THE UTILITY FUNCTION

Unless an investor has internal information about the current situation and future plans of a firm, the best he can do to make an informed decision is to use the past information as an indicator of the future. Basically, a potential investor would assume that if a firm has done well in the past, then it will continue to do well in the future. This is the typical approach described in western literature. Following such an approach, an investor would naturally choose a stock with an average high rate of return. However, a high rate of return may be accompanied with high variance, indicating high risk. Therefore, the best combination is to choose a stock with an average high rate of return and a low return variance. Bodie, Kane and Marcus (1992) mathematically expressed this expression in the following formula:

$$(1)\ U = E(r) - 0.5\ A\ \sigma^2$$

In (1), U is the utility function that represents the satisfaction of an investor with the past performance of the stock. U increases with a higher return rate and with a lower value of the variance σ. A is a parameter that reflects the level of risk-aversion of the investor; high A represents

risk-averse investors, and low A represents risk-neutral investors. Two investors with different degrees of risk aversion would rate a stock differently. Based on the above formula an investor would have the same level of satisfaction with two stocks, one with high return and high risk and the other with lower return and lower risk. The stocks with the same utility value are represented by a curve called the indifference curve as in Bodie, Kane and Marcus (1992).

As discussed in the previous section, interest-based loans contribute significantly to inflation volatility. In an interest-free economy, these loans simply disappear and are replaced with a different mode of finance in which the financer shares gain and loss as a partner of the project. As a result, lower inflation volatility is expected in an interest-free economy. Accordingly, the utility function of the respective stock will increase due to the reduction in the value of σ. This implies that the utility function of a security with a certain return in an interest-free economy is higher than that of a security with the same return in western economy. Alternatively, in interest-free economy the indifference curve of a certain utility value would represent securities with lower returns than those of a corresponding indifference curve of the same value in western economy. In short, by lowering inflation volatility, one of the speculative factors that contribute to stock price volatility would be eliminated, and the factors related to the firm and sector performances would gain higher contribution to stock prices.

Interest-free economy shapes the behavior of investors toward being more risk neutral. Accordingly, their indifference curve would be flatter reflecting the fact that they accept more risk in return for an incremental return. The tendency of investors toward being more risk neutral is due to the fact that there are no income-guaranteed securities in interest-free economy. Instead there is a set of securities ranging from low-risk to high-risk. Traditionally, income-guaranteed securities, such as bonds and treasury bills, are used to mitigate risk and constitute diversified portfolios in western economies. In interest-free economy, however, a diversified portfolio would balance risk by adding low-risk securities, rather than seemingly no-risk ones. Removing risk-free securities may give a misleading signal that investors in an interest-free economy are exposed to a higher risk than those in western economies. However, this apparent risk exposure is neutralized by the lower variability in inflation. Furthermore, income-guaranteed securities may in reality be risky if inflation volatility is not controlled. Even though these securities guarantee the nominal rate of return, they do not guarantee the future purchase power of its cash flow. When the rate of inflation equals the nominal interest rate, the prices of

goods increase as fast as money accumulates from the investment and there is no growth of its purchasing power.[2]

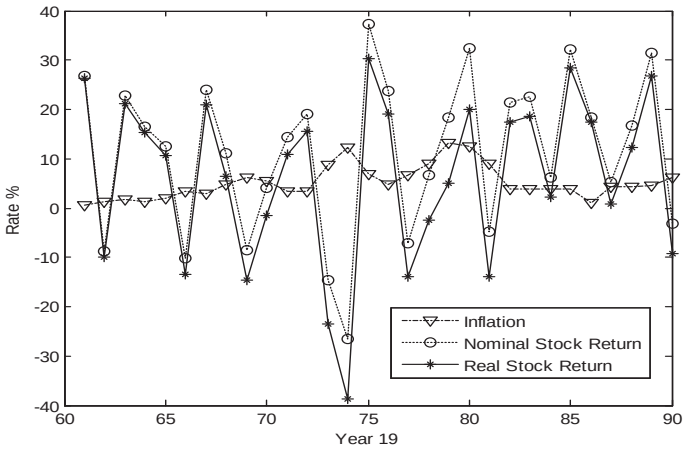
10. DATA ANALYSIS

The relationship between rising inflation and stock-price volatility can be demonstrated through stock returns[3] in the United States over the three decades of 1961 till 1990. While inflation rose to double-digits, considerably high values in the second decade (1971-1980), it had been relatively low in the first and the third ones. To show the impact of inflation, the three decades will be analyzed individually as shown in Table 1. Furthermore, real stock returns are calculated by subtracting the inflation rate from the nominal stock return to better reflect the monetary power of the returns.[4] Variability of real stock returns in each decade is determined using the variance.[5] Figure 1 shows the inflation rate, the nominal stock return and the real stock return. Data analysis shows two results. First, when inflation volatility, as quantified by the variance, increased in the second decade (1971-1980), stock-price volatility increased considerably relative to the first and the third decades. Second, volatility of real stock return was higher in the three decades than the volatility of the nominal stock return, which is in line with the theoretical analysis that inflation volatility adds to the risk associated with the real return.

TABLE 1
Stock Performance of S&P500 from 1961-1990

Year	Nominal Stock Return (NSR) %	Inflation Rate %	Real Stock Return (RSR) %	Parameters per decade
1961	26.89	0.67	26.22	Variance of inflation = 3.7529
1962	- 8.73	1.22	-9.95	
1963	22.8	1.65	21.15	Variance of NSR = 201.75
1964	16.48	1.19	15.29	
1965	12.45	1.92	10.53	Variance of RSR = 231.14
1966	- 10.06	3.35	-13.41	
1967	23.98	3.04	20.94	
1968	11.06	4.72	6.34	
1969	- 8.50	6.11	- 14.61	
1970	4.01	5.49	- 1.48	
1971	14.31	3.36	10.95	Variance of inflation = 13.5603
1972	18.98	3.41	15.57	
1973	- 14.66	8.80	- 23.46	Variance of NSR = 427.61
1974	- 26.47	12.20	- 38.67	
1975	37.20	7.01	30.19	Variance of RSR = 473.28
1976	23.84	4.81	19.03	
1977	- 7.18	6.77	- 13.95	
1978	6.56	9.03	- 2.47	
1979	18.44	13.31	5.13	
1980	32.42	12.40	20.02	
1981	- 4.91	8.94	- 13.85	Variance of inflation = 3.9357
1982	21.41	3.87	17.54	
1983	22.51	3.80	18.71	Variance of NSR = 175.11
1984	6.27	3.95	2.32	
1985	32.16	3.77	28.39	Variance of RSR = 210.86
1986	18.47	1.13	17.34	
1987	5.23	4.41	0.82	
1988	16.81	4.42	12.39	
1989	31.49	4.65	26.84	
1990	- 3.17	6.11	- 9.28	

FIGURE 1
Rates of returns of S&P500 composite index of common stocks in US from 1961-1990.



11. CONCLUSION

This paper discussed the contribution of interest-based loans to inflation volatility. It does not claim that these loans are the only significant contributor to inflation, as it does not deny the contribution of other economic factors besides inflation, to stock-price volatility. It has been shown that interest-based loans trigger the money-shifting mechanism that underlies inflation and thus constantly contribute to volatile inflation. Assuming other factors are equal, an interest-free economy should exercise better control over inflation and thereby lower its volatility. Taking the utility function as a guide in making an investment decision regarding a stock, investor satisfaction would increase due to lower inflation risk. Accordingly, a stock price would better reflect firm performance, rather than the speculative inflation parameter. Empirical data of stock returns and inflation over three decades in US have confirmed the positive correlation between rising inflation and real stock return volatility that should strengthen the case in favor of an interest-free economy.

ENDNOTES

1. Voluminous literature discusses causes and solutions of inflation. Among others, Colander (1979) and Coleman (2007).

2. See Bodie, Kane and Marcus (1992), 172.
3. This data was presented in Bodie, Kane, and Marcus (1992), 166-167, and originally extracted from the Center for Research of Security Prices, University of Chicago.
4. The same approach was used in Ibbotson, R. G., and Sinquefield, R. A. (1989): 74-75.
5. Rate of change represents volatility, too and has been used in Grant, Ireson and Leavenworth (1990): 362-363, to represent volatility. However, rate of change may give misleading sparks at some points of time, contrary to variance, which gives a collective measure of volatility over the whole period.

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