Proceedings of the Fourth Harvard University Forum on Islamic Finance: Islamic Finance: The Task Ahead
Cambridge, Massachusetts. Center for Middle Eastern Studies, Harvard University. 2000. pp.13-25

Islamic Finance and Economic Stability

An Econometric Analysis

M. Kabir Hassan[1] and M. Imtiaz Ahmed Mazumder[2]

ABSTRACT

This paper examines the relative efficiency of an economic system that prohibits receipt and payment of pre-determined interest on financial transactions and the Western economic system, which does not have such prohibitions. Efficiency is defined in terms of stability of the velocity of money (Thornton, 1983, Darrat, 1988, and Hassan and Aldayel, 1998), policy controllability of monetary aggregates (Batten and Thornton, 1983, Hassan and Aldayel, 1998), and the monetary aggregate-ultimate policy goal linkages (Zaki 1995, Hassan and Aldayel, 1998, Darrat, 2000). A number of econometric models are used to examine the efficiency of the Islamic financial system using panel data over a 29-year period from 17 OIC countries with extensive Islamic financial systems. This study supports the relative effectiveness of interest-free banking in OIC countries in terms of stable and smooth velocity of money, controllability of monetary aggregates (MNI and MI), and stronger linkage between monetary policy instruments and the ultimate policy goals of the economy.

I. INTRODUCTION

Islamic banking and finance is gaining popularity in many countries. The basic premise of Islamic banking lies in the sharing of risk of profit-loss among depositors, investors, and the banks. The concept of Islamic banking and finance is spreading rapidly in the world because of a resurgence of Islamic values in many Muslim countries as well as significant theoretical research in support of the relative efficiency of Islamic financial system. According to the *International Association of Islamic Banks,* there are about two hundred "Islamic" banks in more than sixty nations worldwide.

Although there exists an extensive literature on Islamic economics, banking and finance, there are only a few studies that explore the relative efficiency of Islamic financial system. Khan (1986) demonstrates that the traditional practice of paying depositors a pre-determined interest, regardless of whether or not the bank is doing well, prevents banks instantaneously adjusting to potential asset shocks, and such rigidity could lead to financial instability. Khan, however, suggests that evidence generated from actual data may give credence to the claim that Islamic interest-free financial system is a superior alternative to Western interest-based financial system.

The concept of an Islamic bank is that it is completely based on Islamic values and rules. An important component of the Islamic economic system is the prohibition of any payment or receipt of fixed and predetermined interest rates. Money is treated as a store of value and medium of exchange under Islamic views. The Qur'an dictates the prohibition of interest in Islam. The Qur'an says "O' you who believe, fear Allah and give up what is left from *ribā* if you are believers. So, if you do not give it up, then he warned of war from Allah and His Messenger, and if you repent, you will have your principal, you will not be unfair to others and you will not be unfairly treated." *(Chapter 3, Verses 278-79).* For further discussion of the Islamic prohibition of interest, see Ahmed et. al. (1983), Darrat and Sulaiman (1990) and Chapra (1992).

Islam is not the only religion that prohibits the practice of interest. The Biblical religions as well as notable thinkers in human history condemned the institution of interest. Aristotle dwelt on the "barren nature of money" and condemned interest on the ground that interest is "birth of money from money." Under Judaism, the Israelites were forbidden to demand any increase on the principal of money lent among themselves, though interest could be charged by Israelites from Gentiles. In Christianity, the scripture "lend freely, hoping nothing thereby" (Luke 6:35) is taken by many Christian scholars as condemnation of interest. However, the Church gradually changed its doctrine on the subject of interest. The dichotomy of religion and state after the Reformation opened the door to the widespread practice of interest in the Christian world.

[1] Associate Professor of Finance, Department of Economics and Finance, University of New Orleans, New Orleans, La.
[2] Doctoral Student, Department of Economics and Finance, University of New Orleans.

Many contemporary Western theories to justify pre-determined interest rates have been refuted, including Bohem-Bowerks' Time-Preference (Uzair, 1976), and Abstinence Theory (Mawdudi, 1961), Samuelson's theory of interest as "rent for the use of money (Abu Saud, 1976), Patinkin's handling of interest as "a form of income from property" (Abu Saud, 1976) and Keynes' Liquidity Preference Theory (Uzair, 1976). While the Muslim scholars commend the interest-free financial system, Western scholars such as Pryor (1985) question the viability of an Islamic banking system. Khan (1986), however, shows that an interest-free banking system is quite compatible with both Keynesian and classical economic theories. Moreover, an interest-free banking system is not totally alien to Western economic thought. Simon (1948) and Kindleberger (1985) have proposed certain banking reforms that, in effect, yield a banking system resembling a secularized and asocietal Islamic system, in particular on the deposit side. Weitzman (1984) has rigorously advocated the principle of profit-loss sharing as opposed to a pre-determined wage rate as a cure for stagflation.

An "Islamic bank" can be defined as a financial institution that employs investors' funds in real product or capital markets under one or more modes of Islamic financial contracts. Therefore, it may enter into joint partnership agreements with the client to finance real investment, or it may act as a mutual fund or unit trust to buy shares in new or established companies. Islamic banks can be considered universal banks (along the German model) that offer all financial services rendered by commercial, merchant, investment, and development banks, but on interest-free basis, the constraints laid down by Islamic law.

The prohibition of interest in Islam derives from notions of property rights, values, and economic justice. Khan and Mirakhor (1985) attempted to explain interest as cited in the Qur'an and argued that "money represents the monetized claim of its owner to property rights created by assets that were obtained through work or transfer. The act of lending of money is a transfer of this right and in return one could not claim more than its equivalent." The minimization of agency costs between lenders and borrowers is a benefit of the Islamic prohibition of interest. Islamic banks are operated by the concept of *mu∞āraba*. Thus, the peer-monitoring system of Islamic financial institutions rules out insurance against financial defaults. All interest-free banks agree on the basic principle of money.

Darrat (1988) initiated tests of the relative efficiency of interest-free Islamic banking. Using data from Tunisia, Darrat found that the interest-free financial system exhibits stable income velocity of money, and that a strong positive link exists between policy instruments and the ultimate objective of monetary policy because there exists in an interest-free financial system an effective environment for controlling policy. Hassan and Aldayel (1998) followed a methodology similar to Darrat's for 15 Islamic countries and achieved consistent results. Darrat (2000) empirically examined the relative efficiency of the interest-bearing and interest-free banking system in Iran and Pakistan and found results similar to those of his from twelve years earlier.

The purpose of this paper is to examine empirically, using a longer and more recent annual data for selected Organization of Islamic Conference (OIC) countries, the hypothesis that the financial system becomes more efficient if interest-based financial transactions are eliminated. We define efficiency in terms of stability of the velocity of money (Thornton, 1983, Darrat, 1988, and Hassan and Aldayel, 1998), policy controllability of monetary aggregates (Batten and Thornton, 1983), and the monetary aggregate-ultimate policy goal linkages (Zaki 1995, Darrat, 2000). Econometric models and tests are employed to examine the efficiency of the Islamic financial system. First, we analyze the historical record of velocity of interest-bearing and interest-based money over a 29-year period for 17 OIC countries with an Islamic financial system. Second, we estimate demand for interest-based and interest-free money and run various stability tests to see which financial system is more stable. Finally, we examine within a co-integration framework the relative usefulness and effectiveness of interest-based and interest-free financial aggregates for policy purposes.

II. DATA AND METHODOLOGY

The data used in this paper is annual data over 29 years (1970–1998) from the *International Financial Statistics* (IFS). Interpolated data was used to approximate the missing observations when a country had up to two missing observations for a particular variable. Countries were dropped from the sample when more than two observations were missing. The sample countries are sub-divided into four groups based on their social, political and economic similarities. The names of the sample countries are listed in Table 1.

The definition and notation of the data are summarized in Table 2. Interest-free money (MNI) comprises of currency and checkable or demand deposits of commercial banks, which do not earn nor pay interest. Interest-bearing money (MI) consists of time and savings deposits, which both pay interest.

This study follows a co-integration method similar to Darrat's methodology in his study of Iran and Pakistan. Estimation of time series data involves spurious regression as it shows a trend (Phillips, 1986).

Regressing a time series dependent variable against other independent variables often produces inflated R^2 and incorrect test statistics although there might not be any economically meaningful relationship among them. Gujrati (1995) shows that a stochastic or random process can generate any time series data and a specific set of data can be regarded as a realization of the underlying stochastic process. Recent studies by Stock and Watson (1988) and Harris (1995) reveal that to avoid the spurious regression problem any estimated time series equation should not comprise non-stationary variables. Empirical research based on time series data assumes that the basic time series is stationary. A variable is stationary and has no unit root if stochastic properties (mean, variance and covariance) of the variable are time invariant. A time series data is non-stationary if its stochastic properties are time variant. If the time series data is non-stationary then serial correlation exists among the time series variables. Thus any regression result will be biased and the tested parameter will produce inconsistent regression output. For any empirical time series study non-stationarity test of data becomes important. A non-stationary variable can be converted to a stationary process by differencing it properly. Most time series economic variables are non-stationary in levels but achieve stationarity in first-differences (Darrat 2000).

Two variables are co-integrated if they move close together and have long-run equilibrium relationship. There are two steps to test the co-integration: First, checking the stationary properties of the individual variable and testing the order of integration of the variables by employing unit root tests. Second, likelihood ratio tests (eigenvalue and trace statistics) are employed to test for the number of co-integrating vectors among the tested variables. Following Engle and Granger (1987) we check whether all the series are integrated of the same order prior to estimating the demand for money. This is done by using augmented Dickey-Fuller (1981) and Phillips-Perron (1988) test. The presence of co-integration implies the existence of a logical error-correction model (Granger, 1986 and Engle and Granger, 1987). The Granger representation theorem, developed in Engle and Granger (1987), confirms that the presence of co-integration implies the existence of an error-correction model. Prior to attempting to model the short-run dynamics, it is important to check whether co-integration exists among the variables. An error correction model adds an error correction term (i.e., residual with one lag obtained from the underlying co-integration relationship) to the original model that contains stationary variables. The coefficient of the error correction term shows the process by which the dependent variable in the error correction model equation adjusts in the short-run to its long-run equilibrium position. We use the stationary properties of monetary variables in this study.

III. VELOCITY OF MONEY

For a useful policy target the demand for money should be a stable function of a relatively small number of economic variables and the central bank must be able to control the monetary growth. We know that the stable behavior of the velocity of money (V) is a pre-condition for effective monetary policy. Here we will use the Fisher's equation of exchange:

$$M * V = Y$$

where M = Money (alternatively defined in this study), V = Velocity of Money and Y = Nominal income or GDP. The variance of V indicates the stability of the demand for alternatively defined money.

The central bank controls the money stock because one of the principal objectives of monetary policy is to have a stable high nominal income with low inflation and low unemployment. With a stable velocity of money, the monetary authority can use the money supply to control the overall economic activities and consequently the growth rate of GDP (Blanchard and Fisher, 1989). The government is concerned with the demand for money function to predict the effects of changes in the money supply on interest rates, real income, prices etc. (Laidler, 1993). However if velocity is unstable over time, this objective cannot be achieved in the long run. An unstable V may lead to macroeconomic and financial instability and induce high inflation with low unemployment. Inflation makes money an inequitable standard of deferred payments and an untrustworthy store of value (Hassan and Aldayel, 1998). Purchasing power is decreased as too much money chases too few goods due to inflation. Investment and savings are decreased as inflation increases monetary value of consumption. Thus, capital formation is hampered, which leads to a misallocation of resources. This further impairs the efficiency of the monetary system and imposes huge welfare costs on the economy. Inflation tends to pervert values, rewarding speculation (discouraged by Islam) at the cost of productive activities (idealized by Islam) and intensifying inequalities of income (condemned by Islam) (Hassan and Aldayel, 1998). The monetary authority of Islamic countries can expand money supply with the long-run growth of the economy if the interest-free money is stable over time. Stable and smooth money velocity is an important factor for successful monetary policymaking and for an affluent economy.

Darrat (1988, 2000) tests the velocity and stability of money (both interest-bearing and non-interest-free) for Tunisia (Darrat, 1988) and for Iran and Pakistan (Darrat, 2000). He uses the variance of velocity of alternatively defined money finds that the variance of the velocity of non-interest-bearing money is less than that of interest-bearing money, which implies that non-interest-bearing money is more stable than the interest-bearing money. Darrat argue that introducing interest-free banking practices would promote financial and economic stability, thus providing monetary authorities with a more conducive environment in which to conduct effective policies.

We test the hypothesis that variance of the velocity of interest-free money is less than that of interest-based money. The statistics for the velocity of interest-bearing and interest-free money are shown in table 3. When we compare the velocity of money we find a consistent and expected result across countries and subgroups. The Variances of VMNI are lower than VMI across the sample. Even the standard deviation of the variance of VMNI is lower than that of VMI for the sample countries. We performed an F-test of the hypothesis that variance of VMNI is lower than the variance of VMI, and the results support our hypothesis. The test results confirm significantly that the interest-free money is more stable than the interest-bearing money.

IV. POLICY CONTROLLABILITY

Havrilesky and Boorman (1980) and McCallum (1989) show that the policy usefulness of alternative monetary aggregates depends on two issues: Policy controllability and linkage to economic policy goal. Darrat (2000) and Zaki (1995) argue that a given monetary aggregate is useful for the purpose of policy if it satisfies two prerequisites: First, the monetary authority must control the monetary aggregate and second, there is reliable linkage between the monetary aggregate and principal policy goal. The monetary aggregate will lose its policy appeal in the absence of this linkage even if it is under policy control. On the other hand, the monetary aggregate that has strong links to the major policy goal may not be useful if the monetary authority cannot control and handle it. Batten and Thornton (1983) propose two criteria for any monetary aggregates to be policy-effective. Firstly the central monetary authority must have full and direct control over monetary aggregate and secondly there should be strong and reliable link between monetary aggregate and the goals of the monetary authority. Monetary base (MB) is one of the main instruments of monetary policy and one can examine the statistical relationship between MNI (or MI) and MB to gauge controllability of MNI or MI. Darrat (1988) and Hassan and Aldayel (1998) regress MNI against MB and alternatively MI against MB and conclude that if MNI (or MI) is highly correlated (in terms of high R^2 value) with MB then the particular monetary aggregate is more policy controllable and the monetary authorities have more and direct control on the money supply.

To apply the co-integration procedures, the main prerequisite is to test the unit root properties of the time series data. The unit root properties of the data are presented in Table 4. Two sets of statistics were used: augmented Dickey-Fuller (ADF) and Phillips-Perron test. The latter was relied upon, as it is a more powerful test than ADF. Non-stationarity was tested in MNI, MI and MB and it was determined that all the series of MNI, MI and MB were non-stationary in their levels and stationary in their first difference. Proper lags are selected by using Akaike Information Criterion (AIC). Each variable is transformed to logarithmic form as a convention to stabilize error processes across time. Each of the three variables is individually non-stationary in log-levels. Thus, it is important to check and determine the co-integration (long-run) relationship (1) between MB and MNI and (2) between MB and MI.

Co-integration tests based on Johansen (1988) were also conducted. Table 5 reports the Johansen test of Co-integration. When focusing on the λ_{max} test results, the null hypothesis of no co-integration ($r = 0$) was rejected in favor of alternative hypothesis of $r = 1$ only for MNI in each group. The calculated λ_{max} test statistics for MNI range from a low of 35.71 in the Gulf to a high of 41.48 in other countries consisting of Iran, Jordan, Syria, and Turkey. Both the trace-value and Eigenvalue suggest that there is a long-run relationship between MNI and MB and there is no co-integration relationship between MI and MB. Thus the monetary authority of the OIC countries can control the MNI as it has a long-run relationship with MB. Since there is no potential long-run relationship between MI and MB, the monetary authority of OIC countries cannot control MI as a monetary aggregate.

This paper is also interested in the short-run relationship between MNI and MB and between MI and MB, as monetary authorities have some short-run goals along with long-run goals. Error correction results are presented in table 6. A long-run relationship between MNI and MB was found; thus an error correction term, denoted by ECM, entered into the estimated equation of MNI. The MI equation was regressed without an ECM, as no long-run relationship between MI and MB was ascertainable. The regression results show high correlation between MNI and MB and low correlation between MI and MB. These are represented by the R^2 value. The growth of MNI is more closely correlated with the growth of MB. MB explains 69%, 78%, 53%, 79% and 56% of the total variation in MNI of Africa, Asia, Gulf, other countries and the whole sample respectively. Compared to this, the MB explains

25%, 33%, 5%, 32% and 17% of the total variation in MI of Africa, Asia, Gulf, other countries and the whole sample respectively. The differences between the elasticity of the two monetary aggregates (the degree of responsiveness of MNI or MI to changes in MB) are also significant. The coefficients of the independent variable (MB) reflect this, as most of the coefficients are statistically significant. This suggests that if the monetary authority increases the monetary base (MB) it will increase the MNI more than the MI.

V. LINKAGE BETWEEN THE MONETARY AGGREGATE AND ECONOMIC GOALS

The main purpose of using a monetary aggregate by the monetary authority is that the monetary aggregate must have a reliable and consistent link with ultimate policy objectives. Close identification of the linkage between money stock and ultimate policy goals is a prerequisite for achieving full employment and price level stability. Price stability is viewed as the principal and primary policy goal of the monetary authorities of most countries.

Monetarists believe that there is a long-run relationship between money stock and inflation and that money is neutral in the short run. This paper was also interested in investigating the short-run relationship of money and inflation in Muslim countries. Prior to estimating the long-run relationship between money stock and inflation, it was verified that all the series were integrated of the same order. Non-stationarity was tested in MNI, MI, and P, where P was the price level that was measured by the Consumer Price Index (CPI). Proper lags were selected by using Akaike Information Criterion (AIC). Each of the three variables was non-stationary in log-levels but achieved stationarity in first differences. Accordingly, the presence of a co-integration (long-run) relationship between (a) MNI and P and (b) MI and P was investigated. Co-integration tests of Johansen (1988) were conducted to investigate the presence of long-run relationships between prices and alternatively defined money. Table 7 reports the Johansen test of co-integration through maximum eigenvalue and trace statistics.

Focusing on the λ_{max} and λ_{trace} test result, the null hypothesis of no co-integration ($r = 0$) was rejected in favor of alternative hypothesis of $r = 1$ only for MNI in each group. Both the trace-value and eigenvalue suggest that there was a long-run relationship between MNI and P and that there was no significant long-run relationship between MI and P. Thus the monetary authority of the OIC countries could control the MNI to combat inflation as it had a long-run relationship with P. Since there was no potential long-run relationship between MI and P, the monetary authority of OIC countries could not control MI as a monetary aggregate to tackle inflation.

Like policy controllability issues, the short-run relationship between MNI and P and between MI and P was also investigated. Since there was a co-integration relationship between MNI and P, estimates for the regressions for inflation through error correction model were conducted. The estimated results for ECM are presented in table 8. We use the standard ordinary least squares regression for the MI equation without ECM since we do not find any long-run relationship between MI and P. Since inflation is one of the major policy goals of the monetary authorities of OIC countries, it was assumed that an increase in money supply has an immediate impact on current prices (inflation) and current prices possibly have some effects on current money stocks. So the current growth rate of money stock was excluded as an independent variable from our regression to avoid inconsistent and biased results from simultaneous equation problem. Hence, lag values of the growth of MNI and MI entered in the estimated equations and was theoretically appealing as per rational expectation theory (Barro 1979, McCallum 1980).

The regression results for inflation demonstrated low R^2 for interest-free money compared to the interest-bearing money. The value of R^2 indicated that the growth of MNI paved the way for the monetary authorities of OIC countries to have a short-run linkage between money stocks and price stability. It indicated that the short-run growth rate of inflation (P) was more closely correlated with the lagged growth rate of MNI. The differences between the elasticity of the two monetary aggregates (the degree of responsiveness of Inflation due to changes in money stock) were significant. The coefficients of the independent variables reflect this fact, as most of the coefficients were significant statistically. As expected, the sign of the error correction term was negative and statistically significant for each sample group.

There were both short-run and long-run relationships between the growth rates of MNI and P while no short-run and long-run relationships were found for the growth rates of MI and P. This suggests that the growth of MNI was steady and in tangent with the policymaker's goal of price stability.

VI. CONCLUSION

This paper tested the comparative efficiency and merits of the interest-free banking for selected OIC countries using time series data for 1970-1998 period. The results are deduced from the summery statistics, co-integration analysis and regression analysis for error correction. This study supports the relative effectiveness of interest-free banking in OIC countries in terms of stable and smooth velocity of money, controllability of monetary

aggregates (MNI and MI) and stronger linkage between monetary policy instruments and ultimate policy goals of the economy.

What should the monetary authorities of the OIC countries do in light of our estimated results on two alternatively defined monetary aggregates (MNI and MI) to control the monetary policy and achieve the monetary goals? The monetary authorities of the OIC countries should design their monetary policies in such a way so that they serve the basic socioeconomic objectives of Islam. From the distribution aspect of the monetary policy the objectives of the monetary authority must be to ensure the egalitarian distribution of income. Through the choice management and use of interest-free money, the Islamic banking system can create a practicable economic system with distributive justice. Generation of full employment, low inflation, and reducing welfare costs are other purposes of the monetary authorities to make the economy a stable one. The behavior and growth of inflation will give signal to the monetary authorities whether the money supply will be contractionary or expansionary. Monetary authorities must have full control over monetary aggregates to ensure real growth of the economy by fulfilling their ultimate policy goals. The motivation of Islamic banking coupled with stable currency would influence strong and real economic growth in OIC countries.

REFERENCES

Abu Saud, M. "Money, Interest, and Qirad" in Ahmad, Khurshid (ed.). Studies in Islamic Economics: A Selection of Papers Presented to the First International Conference on Islamic Economics. 1976.

Ahmed, Z., M. Iqbal and M.F. Khan (eds.). Money and Banking in Islam. Islamabad: Pakistan Institute of Policy Studies, 1983.

Barro, R.J. The Equilibrium Approach to Business Cycles. Unpublished working paper, University of Rochester, 1979.

Batten, D.S. and D.L. Thornton. "M_1 or M_2: Which is the Better Monetary Target?" Federal Reserve Bank of St. Louis Review 65 (1983). pp.36-42.

Blanchard, O.J. and S. Fischer. Lectures on Macroeconomics. Cambridge: MIT Press, 1989.

Chapra, M.U. Towards a Just Monetary System. Leicester: The Islamic Foundation, 1985.

Chapra, M.U. Islam and the Economic Challenge. Leicester: The Islamic Foundation, 1992.

Darrat, A.F. "The Demand for Money in Some Major OPEC Members: Regression Estimates and Stability Results." Applied Economics 18 (1986). pp. 127-42.

Darrat, A.F. "The Islamic Interest-Free Banking System: Some Empirical Evidence." Applied Economics 20 (1988). pp. 417-25.

Darrat, A.F. "On Monetary Efficiency under Interest-Free Banking: Some Empirical Evidence." 2000.

Darrat, A.F. and M.O. Salaaming. "Islamic Banking: An Outline of Some Conceptual and Empirical Aspects." Savings and Development 19 (1990). pp. 185-92.

Dickey, D.A. and W.A. Fuller. "Likelihood Ratio Statistics for Autoregressive Time Series with a Unit Root." Journal of the American Statistical Association 74 (1981). pp. 1057-72.

Engle, R.F. and C.W.J. Granger. "Co-integration and Error-Correction: Representation, Estimation and Testing." Econometrica 55 (1987). pp. 251-76.

Friedman, M. and A.J. Schwartz. A Monetary History of the United States 1867-1960. Princeton: Princeton University Press, 1963.

Friedman, M. and A.J. Schwartz. Monetary Trends in the United States and the United Kingdom. Chicago: University of Chicago Press, 1982.

Granger, C.W.J. "Developments in the Study of Co-integrated Economic Variables." Oxford Bulletin of Economics and Statistics 48 (1986). pp. 213-28.

Gujarati, D.N. Basic Econometrics. 3rd ed. New York: McGraw-Hill, 1995. pp. 709-54.

Harris, R. Using Co-integration Analysis in Econometric Modelling. London: Prentice Hall, 1995.

Hassan, M. Kabir and A.Q. Al-Dayel. "Stability of Money Demand Under Interest-Free Versus Interest-Based Banking System." Humanomics 14(4) (1998) and Humanomics 15(1) (1999).

Hassan, M. Kabir. "Islamic Banking in Theory and Practice: The Experience of Bangladesh." Managerial Finance 25(5) (1999). pp. 60-113.

Havrilesky T.M. and J.T. Boorman (eds.). Current Issues in Monetary Theory and Policy. 2nd ed. Arlington Heights: AHM Publishing, 1980.

Johansen, S. "Statistical Analysis of Co-integration Vectors." Journal of Economic Dynamic and Control 12 (1988). pp. 231-54.

Keynes, J.M. The General Theory of Employment, Interest and Money. New York: HBJ, 1936.

Khan, M.S. and A. Mirakhor. "The Financial Systems and Monetary Policy in an Islamic Economy." Research Paper. Washington: The International Monetary Fund, 1985.

Khan, M.S. and A. Mirakhor (eds.). Theoretical Studies in Islamic Banking and Finance. Houston: The Institute of Research and Islamic Studies, 1987.

Khan, M.S. "Islamic Interest-Free Banking: A Theoretical Analysis." International Monetary Fund Staff Papers 33(1) (March 1986). pp. 1-27.

Kindleberger, C.P. "Bank Failures: The 1930s and 1980s." Paper Presented at the Conference on the Search for Financial Stability: The Past 50 Years. Federal Reserve Bank of San Francisco, 1985.

Laidler, D. The Demand for Money: Theories, Evidence, and Problems. 4th ed. New York: HarperCollins College Publishers, 1993.

McCallum, B.T. "Rational Expectations and Macroeconomic Stabilization Policy: An Overview." Journal of Money, Credit, and Banking 12 (1980). pp.716-46.

Mannan, M.A. Islamic Economics: Theory and Practice. Lahore: Ashraf Press, 1970.

Maysami, R.C. "Islamic Banking: Current Developments." Asia Business Law Review 16 (April 1997). pp. 66-72.

Mawdudi, Sayyid Abul Ala. Interest. Lahore: Islamic Publications, 1961.

McCallum, B.T. Monetary Economics: Theory and Policy. New York: Macmillan Publishing Company, 1989.

Muscatelli, V.A. and F. Spinelli. "The Long-Run Stability of the Demand for Money: Italy 1861-1996." Journal of Monetary Economics 45 (2000). pp. 717-39.

Phillips, P. "Understanding Spurious Regressions in Econometrics." Journal of Econometrics 33 (1986). pp. 3111-40.

Phillips, P. and P. Perron. "Testing for a Unit Root in Time Series Regression." Biometrika 75 (1988). pp. 335-46.

Pryor, D.H. "The Islamic Economic System." Journal of Comparative Economics 9 (1985). pp. 197-223.

Simon, Henry. Economic Policy for a Free Society. Chicago: University of Chicago Press, 1948.

Stock, J. and M. Watson. "Testing for Common Trends." Journal of the American Statistical Association 83 (1988). pp. 1097-1107.

Thornton, D.L. "Why Does Velocity Matter?" Federal Reserve Bank of Saint Louis Review (1983).

Uzair, M. "Some Conceptual and Practical Aspects of Interest-Free Banking" in Studies in Islamic Economics, *supra*.

Weitzman, M. L. The Share Economy. Cambridge: Harvard University Press, 1984.

Zaki, M.Y. "Forecasting the Money Multiplier and the Control of Money Supply in Egypt." Journal of Development Studies 32 (1995). pp. 97-111.

TABLE 1. SAMPLE OF COUNTRIES

Group	Country
Africa	Algeria, Egypt, Morocco, Nigeria, Sudan, Tunisia
East and South Asia	Indonesia, Malaysia, Pakistan
GCC	Bahrain, Kuwait, Qatar, Saudi Arabia
Other	Iran, Jordan, Syria, Turkey

TABLE 2. DEFINITION OF DATA

Abbreviation	Definition	Description
MNI	Currency + demand deposits	Money that does not earn interest
MI	Time deposits + savings deposits	Money that earns interest
CPI, P	Measures of price and inflation	Consumer price index
MB	Currency + reserves	Monetary base
VMNI		Velocity of non-interest-bearing money (MNI)
VMI		Velocity of interest-earning money (MI)
GDP		gross domestic product

TABLE 3. SUMMARY STATISTICS AND TESTS OF VARIANCES IN THE VELOCITY OF MONEY

Country	Variance of VMNI	Variance of VMI	F-Test	Number of Observations
Egypt	1.0289 (m = 3.56, s.d. = 1.01)	14.4767 (m = 4.505, s.d. = 3.804)	0.0710*	29
Indonesia	1.2251 (m = 10.09, s.d. = 1.1)	88.1453 (m = 11.84, s.d. = 9.39)	0.0139*	29
Iran	1.2960 (m = 4.70, s.d. = 1.14)	4.9976 (m = 5.54, s.d. = 2.24)	0.2593*	29
Jordan	0.1578 (m = 2.19, s.d. = 0.40)	5.9643 (m = 3.33, s.d. = 2.44)	0.0265*	29
Kuwait	2.9069 (m = 2.65, s.d. = 1.70)	9.5705 (m = 8.04, s.d. = 3.09)	0.3037*	29
Malaysia	0.5075 (m = 5.15, s.d. = 0.71)	1.6139 (m = 2.95, s.d. = 1.27)	0.3145*	29
Morocco	0.3020 (m = 3.00, s.d. = 0.55)	179.7088 (m = 16.13, s.d. = 13.41)	0.0017*	29
Pakistan	0.1056 (m = 3.63, s.d. = 0.33)	2.4244 (m = 7.35, s.d. = 1.56)	0.0436*	29
Qatar	4.2869 (m = 7.47, s.d. = 2.07)	16.2648 (m = 5.62, s.d. = 4.03)	0.2636*	29
Saudi Arabia	18.3861 (m = 6.35, s.d. = 4.29)	396.6102 (m = 22.00, s.d. = 19.92)	0.0464*	29
Sudan	11.4946 (m = 6.72, s.d. = 3.39)	82.8717 (m = 22.84, s.d. = 9.10)	0.1387*	29
Syria	0.1977 (m = 2.52, s.d. = 0.44)	186.7845 (m = 20.07, s.d. = 13.67)	0.0011*	29
Tunisia	0.2765 (m = 4.13, s.d. = 0.53)	10.2881 (m = 6.74, s.d. = 3.21)	0.0268*	29
Africa	0.1364 (m = 3.49, s.d. = 0.37)	30.1974 (m = 6.76, s.d. = 5.50)	0.0045*	116
Asia	0.2485 (m = 6.22, s.d. = 0.50)	8.3510 (m = 6.04, s.d. = 2.89)	0.0298*	87
Gulf Asia	8.7291 (m = 4.93, s.d. = 2.95)	96.4756 (m = 13.81, s.d. = 9.82)	0.0904*	87
Other	0.9186 (m = 4.17, s.d. = 0.96)	5.9835 (m = 5.92, s.d. = 2.45)	0.1535*	87
Whole sample	2.3609 (m = 4.51, s.d. = 0.87)	19.6701 (m = 6.85, s.d. = 3.83)	0.12*	377

* Significant at 5% level.
m = mean; s.d. = standard deviation.

TABLE 4. UNIT ROOT TESTS

Group	Variables		ADF*		Phillips-Perron*	
Africa	Log Level	MNI	–3.19459	(2)	–2.24218	(2)
		MI	–1.98645	(2)	–1.48247	(3)
		MB	–0.70074	(3)	–1.70920	(4)
	First Difference	MNI	–0.17902	(4)	–16.14591	(4)
		MI	–3.38649	(4)	–18.44320	(4)
		MB	–2.24468	(2)	–11.61115	(4)
Asia	Log Level	MNI	–0.63107	(3)	–1.37374	(4)
		MI	–1.39549	(4)	1.61063	(2)
		MB	–2.00103	(2)	–5.24719	(4)
	First Difference	MNI	–0.68590	(4)	–10.10504	(4)
		MI	–2.24100	(4)	–6.17246	(4)
		MB	–1.20239	(2)	–15.20085	(4)
Gulf	Log Level	MNI	–3.40680	(3)	–2.03386	(4)
		MI	–5.47478	(3)	–1.93677	(3)
		MB	–2.76879	(3)	–2.29949	(4)
	First Difference	MNI	–2.05968	(3)	–14.19765	(3)
		MI	–2.13738	(3)	–10.45309	(3)
		MB	–2.49291	(2)	–16.79851	(4)
Other	Log Level	MNI	–1.45141	(2)	–3.39745	(2)
		MI	–0.86652	(2)	–2.76481	(3)
		MB	0.87381	(2)	–1.65198	(2)
	First Difference	MNI	–3.05117	(2)	–15.18364	(2)
		MI	–2.04927	(2)	–16.37414	(3)
		MB	–1.47924	(3)	–16.25472	(3)
World	Log Level	MNI	–1.31206	(3)	–0.63200	(3)
		MI	–0.53261	(2)	–0.009629	(2)
		MB	–0.00821	(2)	–0.62863	(2)
	First Difference	MNI	–3.88639	(2)	–24.17911	(2)
		MI	–2.78327	(2)	–17.20366	(2)
		MB	–3.61800	(3)	–15.61139	(3)

*The 5% and 10% critical values for the ADF and Phillips-Perron tests are –3.50 and –3.18.

TABLE 5. JOHANSEN TEST FOR POLICY CONTROLLABILITY

Group	Null Hypothesis	Alternative Hypothesis	Maximum Eigenvalue (λ_{max})		Alternative Hypothesis	Trace Statistics (λ_{trace})	
			MNI, MB	MI, MB		MNI, MB	MI, MB
Africa	r = 0	r = 1	36.21*	22.46	r ≥1	28.34*	19.72
	r ≤ 1	r = 2	6.23	7.29	r = 2	6.23	7.29
Asia	r = 0	r = 1	37.48*	25.23	r ≥1	33.46*	21.24
	r ≤ 1	r = 2	13.72	10.65	r = 2	13.72	10.65
Gulf	r = 0	r = 1	35.71*	24.67	r ≥1	28.06*	20.13
	r ≤ 1	r = 2	6.92	7.64	r = 2	6.92	7.64
Other	r = 0	r = 1	41.48*	21.09	r ≥1	29.62*	17.89
	r ≤ 1	r = 2	8.52	9.43	r = 2	8.52	9.43
World	r = 0	r = 1	38.63*	23.36	r ≥1	30.31*	19.96
	r ≤ 1	r = 2	10.72	9.46	r = 2	10.72	9.46

*Significant at 5% level.

TABLE 6. ESTIMATION OF ERROR-CORRECTION MODEL FOR POLICY CONTROLLABILITY

Group	Dependent Variable (Log level)	Constant	Independent Variable (MB) (Log level)	Error Correction Term (ECM_{T-1})	R^2
Africa	ΔMNI	–0.0128**	0.6724**	–0.0096*	0.6887
	ΔMI	–0.0662*	0.2831*	——	0.2475
Asia	ΔMNI	–0.0251**	0.6528*	–0.0031*	0.7779
	ΔMI	0.0891	–0.3967	——	0.3304
Gulf	ΔMNI	–0.0404*	0.7984*	–0.0178	0.5308
	ΔMI	0.1031	0.3336	——	0.0487
Other	ΔMNI	–0.0553**	0.7421*	–0.0051*	0.7862
	ΔMI	–0.1476*	0.4847	——	0.3211
World	ΔMNI	–0.0248**	0.5903**	–0.0073*	0.5612
	ΔMI	0.0677	0.2290**	——	0.1672

** 10% significance level for *t*-statistics
* 5% significance level for *t*-statistics

TABLE 7. JOHANSEN TEST FOR POLICY LINKAGE

Group	Null Hypothesis	Alternative Hypothesis	Maximum Eigenvalue (λ_{max})		Alternative Hypothesis	Trace Statistics (λ_{trace})	
			P, MNI	P, MI		P, MNI	P, MI
Africa	r = 0	r = 1	46.93*	27.63	r ≥1	35.08*	22.27
	r ≤ 1	r = 2	9.03	10.31	r = 2	9.03	10.31
Asia	r = 0	r = 1	53.97*	31.07	r ≥1	41.36*	24.03
	r ≤ 1	r = 2	15.24	12.42	r = 2	15.24	12.42
Gulf	r = 0	r = 1	41.14*	23.06	r ≥1	34.03*	21.56
	r ≤ 1	r = 2	8.42	9.85	r = 2	8.42	9.85
Other	r = 0	r = 1	49.37*	28.36	r ≥1	35.67*	22.73
	r ≤ 1	r = 2	10.11	10.29	r = 2	10.11	10.11
World	r = 0	r = 1	50.81*	28.96	r ≥1	36.94*	24.03
	r ≤ 1	r = 2	11.57	10.46	r = 2	11.57	10.46

*Significant at 5% level.

TABLE 8. ESTIMATION OF ERROR-CORRECTION MODEL FOR POLICY LINKAGE

Group	Monetary Aggregate	Dep. Var. (Log level)	Constant	Ind.Var. (ΔM_{T-1})	Ind. Var. (Log level) (ΔP_{T-1})	Ind. Var. (Log level) (ΔP_{T-2})	Error Corr. Term (ECM_{T-1})	R^2
Africa	Interest-free	ΔP_T	–0.0326**	0.1163*	0.2143**	0.3071	–0.0031**	0.4721
	Interest-bearing	ΔP_T	–0.0132	0.0921	–0.0521**	–0.1710	——	0.0312
Asia	Interest-free	ΔP_T	–0.0421*	0.1681**	0.2937*	0. 4811	–0.0073*	0.5237
	Interest-bearing	ΔP_T	0.0019**	0.0092	–0.0739	–0.1036**	——	0.2163
Gulf	Interest-free	ΔP_T	–0.0263**	0.0918	0.1037**	0.0522	–0.0041*	0.3822
	Interest-bearing	ΔP_T	–0.0094*	–0.2734	0.0956	0.0773	——	0.0264
Other	Interest-free	ΔP_T	–0.0519*	0.0915**	0.1031	0.0392**	–0.0057*	0.6429
	Interest-bearing	ΔP_T	–0.0236	0.0429	–0.0107	0.0217**	——	0.3408
World	Interest-free	ΔP_T	–0.0427**	0.2491*	0.1623**	0.0791	–0.0051*	0.5371
	Interest-bearing	ΔP_T	–0.0117**	–0.1928	0.0861	0.1834	——	0.2381

** 10% significance level for *t*-statistics
* 5% significance level for *t*-statistics