

# Monetary Operations and Government Debt Management Under Islamic Banking\*

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**Abstract:** This paper outlines the recent progress in developing Islamic financial instruments for the management of monetary policy and public borrowing requirements and provides details on new instruments currently being developed in the Islamic Republic of Iran and Sudan. The paper also touches on the institutional arrangements for interbank market operations and the design of effective central bank credit facilities that are needed under Islamic banking to support the development and operation of these new instruments.

## Introduction

Significant progress has been achieved over the past two decades in widening the range of financial instruments that are compatible with the principles of Islamic finance. While several financial instruments, suitable for Islamic commercial banking or for funding specific

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\*This paper was originally published as IMF Working Paper, WP/98/144, at the Middle Eastern and Monetary and Exchange Affairs Departments, International Monetary Fund, and this is an updated version. The editor wishes to thank the authors for granting permission to publish it in the *Review of Islamic Economics*.

projects, have been developed, progress in developing instruments for non-inflationary financing of government deficits and for marketbased monetary management, has been less satisfactory. Instruments that are transparent and operationally feasible for general government funding and for overall liquidity management, have yet to be fully developed.

The challenges to implementing market based monetary policy in Islamic banking systems are unique and complex. For effective monetary control under any system, it is usually assumed that central banks have discretionary control over their balance sheets, and hence over the growth of reserve money. Invariably, this would be facilitated through the existence of independent funding markets for the budget and the availability of flexible instruments with which to offset and regulate the flow of liquidity created by autonomous items on the central bank's balance sheet. Moreover, there is also the assumption that there exist responsive money markets and payments systems, through which banks manage their own liquidity positions and through which policy intentions are transmitted. As in many developing countries, the development of these arrangements to facilitate effective monetary policy implementation in countries with full or partial Islamic banking systems, is at various stages of evolution.

The uniqueness of the challenge for Islamic banking systems derives from the complexity of designing market-based instruments for monetary control and government financing, which satisfy the Islamic prohibition on *ex ante* interest payments, and provide for a sharing of profits and losses on underlying transactions. Under the Islamic mode of finance, debt based instruments cannot earn a positive rate of return (through interest, fixed or variable) and cannot be discounted in a secondary market, i.e., can be traded only at par and under strict transfer limitations; on the other hand, equity based securities can be traded in the open market, with trading values reflecting market expectations of economic performance, and hence rates of return. However, designing equity based instruments linked to government or central banking operations poses significant difficulties because of complexities in computing appropriate profits and rates of return. These constraints have also limited the development of efficient mechanisms for money market trading and

central bank credit facilities, which are necessary for the effectiveness of market based monetary policy and for improving banks' management of highly liquid portfolios which could arise, in part, from the portfolio structure of Islamic banks.

Notwithstanding these unique challenges, there is an urgent need to resolve these issues. The absence of efficient instruments for monetary operations and general government funding has perpetuated the reliance on direct controls on credit and high unremunerated reserve requirements, the latter contributing to high intermediation margins. The absence of money markets has also led to large excess reserves (adding to intermediation margins) and a loss of monetary control when central banks continue to provide credit to individual banks while lacking flexible means to absorb excess reserves. The overall consequence of these inefficiencies has been progressive disintermediation and persistent inflationary pressures in many Islamic banking systems.

The purpose of this paper is to outline progress achieved thus far in developing money market and government funding instruments, and to provide details on new instruments currently being developed, drawing on the experience of the Islamic Republic of Iran and Sudan. The paper will also touch on issues relating to institutional arrangements for monetary operations, particularly interbank markets and the design of central bank credit facilities. The organization of this paper is as follows: Section II discusses the existing approaches to designing government funding and monetary instruments under Islamic banking, and their institutional and operational implications. Section III reviews the most recent developments in country practices in market based instruments and proposes new approaches. Section IV discusses possible reforms to institutional arrangements for monetary operations and approaches to money market development consistent with Islamic banking. Finally, concluding remarks are made in Section V.

## **II. Issuance of Government Securities under Islamic Principles**

While a range of Islamic financial products are available to finance specific government projects, or for the government procurement of specific goods, a general funding instrument to support the general government function (or to absorb bank liquidity) has been

conceptually difficult to design under Islamic finance principles. While returns on a specific project or on purchase and resale transactions are easy to define, the definition of an appropriate rate of return on general government services or central bank operations has been difficult to formulate. Nevertheless, some progress has been made recently in overcoming these problems.

### 2.1. Specific funding instruments

Several countries have developed project specific funding instruments applying the principles of *mudārabah* or *ijārah*.<sup>1</sup> For projects that yield an identifiable rate of return (e.g., factory, trading company, etc.), the government would issue a *mudārabah* certificate (restricted *mudārabah*) to investors and would invest the proceeds in specific projects and, in return, investors would claim a share in the profits (see Box 1). This instrument is equity based and hence marketable in the secondary market, with the secondary market price determined by the performance prospect of the underlying project.<sup>2</sup>

For government projects that do not yield a readily identifiable rate of return (e.g., schools), a leasing based instrument (*ijārah*) is sometimes used to raise the needed funds. Under this arrangement, investors would become co-owners of the project with the government (or the sole owner if they provided full funding). Once the project is completed, the investors would lease their share to the government for a certain period of time at a negotiated lease rate. The lease contract often includes an option-to-buy for the government at the end of the lease contract.

Despite the validity of these approaches to developing government funding instruments, there are inherent limitations in their usefulness for flexible monetary management and efficient domestic debt management. Generally, an efficient system of price discovery is essential to developing markets in securities. Where the process lacks transparency or is insufficiently market friendly, in terms of frequency of issue and price setting, and availability of information to assess pricing, investors' participation will be limited. In the case of project specific funding instruments, primary issues may be too infrequent and not widely enough held to form the basis for market development. The specificity of the project and the maturity of funding required by the project may result in particular niche type

investors; the usefulness of the resulting price as a benchmark/reference rate for other issues is then very limited.

Beyond the issue of price discovery, these approaches do not achieve the goal of cost minimization, a core principle of public debt management. This principle is usually applied by ensuring that: (i) market-based methods are used for primary issuance of securities, (ii) markets for securities are liquid and efficient through arrangements like discounting, repurchase agreements, and active secondary markets, and (iii) the distribution of the security is broad-based. To achieve these attributes, instrument design, selling techniques and arrangements to ensure instrument liquidity are important. Some recently used approaches (the restricted *muḍārabah* Participation Papers (PP) in the Islamic Republic of Iran, for example) incorporate special non-price features in instrument design in order to raise the rates of return (see Box 1). But these arrangements also make the instrument relatively illiquid, and inhibit the development of secondary markets. Further, the practice for PPs to be redeemed at face value (as opposed to a negotiated price) imposes risks to the agent bank and may also be against the interest of the seller, insofar as his right to any accumulated additional payment above the minimum return is eliminated. Nuances such as these, in instrument design, result in restricted market participation, and the use of such instruments could result in the government budget paying a premium to raise funds, thereby undermining the cost minimization objective.

## 2.2. General funding instruments

As regards general-purpose funding instruments, the determination of an appropriate method for calculating an overall rate of return on these instruments, which could be used as a proxy for the profits from, or returns on, general government activities, poses difficult issues owing to the conceptual problems in measuring the costs, benefits, and risks in the provision of government services. Over the years, various proposals have been made to resolve these difficulties, including calculating project shadow prices and utilizing social rates of return (see Choudry and Mirakhor, 1996).

At present, general-purpose government funding papers are issued only in Malaysia under the Government Investment Issues (GII) scheme. The purchase of GII by investors is considered as a benevolent

loan (*qard ḥasan*) made by the public to the government to enable it to undertake projects or provide services for the benefit of the nation. The providers of the funds would not expect any return on their loans but would expect the principal amount to be returned at maturity. As a sign of goodwill, however, the government can decide to provide some return in the form of dividends (gifts). The rate of dividends, set by a committee, takes into consideration variables such as inflation, real growth in the economy, and existing yields on other financial instruments.<sup>3</sup> This instrument was designed primarily to allow the Islamic Bank of Malaysia to hold liquid paper in order to comply with the liquidity requirements of the central bank in Malaysia – Bank Negara Malaysia (BNM) – as well as to invest its excess reserves. The GII, however, is not meant to be used as a monetary tool by BNM; moreover, GII is used in parallel with conventional interest-bearing government securities, which are the main instruments of domestic financing of fiscal deficits. This approach of setting the rates of return on the GII by a committee, based on ex-post developments of key macroeconomic variables, may not be sufficiently transparent to foster wide participation.

The limitations of these instruments for efficient management of public sector funding requirements have meant that domestic financing of deficits have come to rely exclusively on central bank credit, for countries operating under fully Islamic banking systems, thereby, exacerbating inflationary pressures.

### **2.3. Money Market Development**

The difficulties in defining rates of return on general funding instruments have also limited the development of money and interbank markets and constrained the efficiency of central bank credit facilities, and hence limited the scope of monetary management. In addition, the unavailability of high frequency accounting data, based on uniformly applied standards, has also limited the development of short-term instruments. While not inherent to the nature of Islamic banking, the liability portfolio of Islamic banks is substantially liquid in practice, and the absence of money markets for short-term liquidity management can impose significant costs on Islamic commercial banks.

Islamic banks normally operate three broad categories of deposits. The current account, as in conventional banking gives no return to depositors. It is essentially a safekeeping (*wadī'ah*) arrangement between depositors and banks which allow depositors to withdraw their money at any time, but permits the banks to use depositors' money. The savings account is also operated on *wadī'ah* basis, but the bank may at its own discretion pay the depositors a positive return periodically, depending on its own profitability. Investment accounts are based on unrestricted *muḍārabah* contract and such accounts are term deposits that cannot be withdrawn prior to maturity without a penalty. In practice, however, investment deposits are of relatively short maturities and demand deposits constitute a significant proportion of total deposits. The high proportion of callable deposits predisposes the system to large holdings of very liquid assets. In the absence of money market instruments and efficient central bank credit facilities to manage these short-term positions, banks typically hold a substantial volume of unremunerated excess reserves at the central bank. This tendency towards accumulating large excess reserves is then priced into profit shares through lower deposit yields/higher loan spreads, thereby inhibiting intermediation and financial deepening.

Table 1. Cross-country comparison of bank liquidity

Country	Demand / total dep. (%)		Reserves / total dep. (%)	
	1993/97	1997	1993/97	1997
Iran <sup>1</sup>	40	40	31	33
Pakistan	38	34	57	59
Sudan	87	87	24	27
Bangladesh <sup>2</sup>	18	16	11	8
Egypt	10	10	20	17
Jordan	19	17	14	16

Source: National authorities and International Financial Statistics (IMF).

NOTES:

1. Iran data is reported based on fiscal years ending March. Data for 1997/98 are preliminary for 5 months.

2. Bangladesh data for 1997 refers to September 1997.

The absence of interbank markets and efficient central bank lending facilities has limited the use of indirect monetary instruments and perpetuated the use of direct controls on credit and rates of returns. Table 1 reviews liquidity indicators in selected countries that suggest the tendency in countries that apply Islamic banking principles (in this case, the Islamic Republic of Iran, Pakistan, and Sudan), to have a relatively higher proportions of callable (demand) deposits and bank reserves in relation to total deposits.

### III. Developments in Monetary Instruments under Islamic Banking

Against this background, several new initiatives to develop general funding instruments for budget financing and monetary management have been launched recently. As noted, the underlying difficulties have been twofold: (1) how to define the range of assets created by the government, measure the cost and benefits of related government services, and how to determine a rate of return that compensates investors in assets created by the government; and (2) in the absence of benchmarks, such as a fixed and predetermined interest rates, how market participants are to make a decision on the price of government paper, as is the case in a conventional financial system (Haque and Mirakhor, 1997).

In this section three new modalities for monetary and public borrowing instruments are examined: (i) the National Participation Paper, (ii) the Central Bank *Mushārah* Certificate, and (iii) the Government *Mudārah* Certificate. The viability of these approaches for evolving broad-based markets in securities, which can be flexibly used for general funding of the budget and for monetary management on a sustained basis, is yet to be proven. Nonetheless, they represent a recognition of the need for such instruments and markets, and should be viewed as positive contributions to evolving approaches to resolving what has been an intractable problem affecting Islamic banking systems.

#### 3.1. National Participation Paper

The National Participation Paper (NPP) (see Haque and Mirakhor, 1997 for more details) refers to a monetary instrument for financing government operations, infrastructure projects in particular – but not



tied to specific projects – which also can be used for the conduct of open market operations. The design of the NPP is based on the presumption that because of the characteristics of government infrastructure and development projects, their social rate of return must be greater than or at least equal to the rate of return in the private sector; otherwise, there is no justification for governments to undertake these projects on economic grounds. Based on this reasoning, a non-interest-based government security can be issued and traded in equity markets, that promise on maturity to pay a rate of return that approximates the average rate of return on the underlying government assets, and is set equal to or above an estimated rate of return in the private sector.

A variety of methods have been proposed for approximating the rate of return on private sector activities and, hence, the rate of return on the NPP. An index based on stock market transactions could be developed to proxy private sector rate of return.<sup>4</sup> The efficient implementation of this approach would require: (i) a relatively developed and efficient stock market to capture a sufficiently large segment of private sector activities in the economy, and (ii) the use of a filtering formula to eliminate signals emanating from expectations of future earnings, speculative fervour, and seasonal variations. It might also be reasonable to construct an index of return on capital based on past movements of nominal GDP and its components, given that GNP growth closely proxies the expected growth of private sector's output. Other possibilities for measuring private sector rate of return (particularly where markets are insufficiently developed) include constructing an index based on the ratio of market price of capital to its replacement cost (Tobin's  $q$ ), or an index using information such as earnings per share and price earnings ratio, or a composite general index that uses elements from all of the above. The operational effectiveness of such indices would depend upon the stability and transparency of the estimates.

The proposal for a NPP, with its return linked to an index of stock market and other measures of private sector returns, is being considered at present by the Central Bank of the Islamic Republic of Iran. Technical issues in constructing a sufficiently transparent index, for use in determining the rate of return on the NPPs, are being examined.<sup>5</sup>

### 3.2. Central Bank *Mushāraka* Certificates

Central Bank *Mushārakah* Certificate (CMC)<sup>6</sup> refers to an equity-based instrument that is issued against the government (or central bank) ownership in commercial banks. Such a security was recently introduced in Sudan in order to enable the central bank to regulate domestic liquidity through open market operations, and thereby facilitate exchange market unification.

In principle, central bank's profits can constitute a basis for issuing securities that can yield an identifiable rate of return to investors in these securities, and can be used in open market operations to regulate liquidity, since these securities can be traded in a secondary market. Central bank's profits are derived from fees charged on accounts clearance, foreign exchange operations, profit transfers from the commercial banks that are owned by the central bank, profits from credit to banks and non-bank public and other sources.

Under a *mushārakah*-based security (i.e. CMC) the central bank becomes a partner with the investors in its profits. The distribution of profits between the central bank and the investor is negotiable and the contract can be traded in the secondary market (to another bank or to the central bank). The return on CMCs could be derived from central bank's total profits, or from the profits of a subset of identifiable assets of the central bank, or from a set of government assets (i.e. government's ownership in commercial bank) administered by (or transferred to) the central bank.

There are two factors, however, that would make the CMCs that are issued against all of central bank's profits impractical to use. First, it is difficult to make central bank's operations, and hence profits, transparent for investors to evaluate performance, while keeping the minimum secrecy needed for central bank's operations. Second, profits are not usually a principal motive for central bank's operations; the central bank could willingly accrue losses to serve monetary policy purposes.

The problems associated with the use of central bank's profits as a basis for CMC could be avoided by issuing the CMCs against a special fund composed of government (or central bank) ownership in commercial banks. Such a fund will have an identifiable value and

identifiable rate of return, providing ideal conditions for issuing a well-structured CMC. (Appendix I outlines some of the issues regarding the operational modalities of designing CMCs).

The design of CMC should be based on the following general principles that underlie any instrument of market-based monetary operations: (i) the instrument should have the potential to be widely held so that monetary signals can be transmitted efficiently through the market; (ii) the instrument should be attractive to banks as an instrument of managing excess reserves, so that monetary policy can quickly influence the marginal cost of funds to banks; (iii) the instrument should carry the lowest possible price and investment risk so that it can serve as a benchmark for other more risky securities and financial instruments; and finally (iv) the instrument should be 'rediscountable' (i.e. be eligible for repurchase at a price) at the central bank in order to provide liquidity to the instrument, particularly in the initial stages when the secondary markets are in the process of being developed.

In designing the operational modalities of the fund against which the CMCs will be issued, there will be technical issues involving accounting, asset valuation, and calculation of yields, especially for non-listed commercial banks. Some of the design issues include: (i) valuing the net worth of non-listed banks and assessing the value of central bank's holdings; (ii) valuing the CMC fund (given the existence of traded and non-traded stocks in the fund's portfolio); (iii) determining a transparent measure of returns/dividends for non-traded banks; and (iv) establishing transparent periodicity of fund valuation and the information disclosure needed by the market to assess the fund's performance.

Beyond these technical issues, the central bank will need to develop the techniques for primary issuance of the CMCs, including pre and post auction procedures and information, and accounting and settlement procedures for primary and secondary transactions. With respect to further development of the market, and to provide liquidity to the CMCs, the central bank will need to foster an appropriate micro-structure for secondary markets. Liquidity of the instrument will be important, especially in the initial stages when the central bank will be seeking to establish credibility in its operations. The central bank will need to establish a mechanism through which it will be

willing to repurchase CMCs owned by investors.<sup>7</sup> The setting of the repurchase price should be market related and such as to encourage secondary trading outside the central bank. Finally, the central bank will need to set up its liquidity forecasting and monitoring procedures in the central bank to guide placements and modify existing instruments, including central bank credit facilities, as needed, in order to ensure effective use of the CMC to influence bank liquidity and exchange market conditions.

The principle underlying the CMC was approved in November 1997 by the High *Shari'ah* Supervisory Council (HSSC) of the Bank of Sudan (BOS)—the central bank of Sudan. Subsequently, a financial company (Sudan Financial Services Co.) was established to hold the shares of the government and BOS in banks, and the CMCs were issued against their value (3940 CMCs were issued for a nominal value of LSd 10 million (about US\$5000) for each CMC). A uniform-price type auction<sup>8</sup> was used for the first primary issue of CMCs on June 3, 1998. The auction was successful and a total of 200 CMCs were sold against market demand of 559 CMCs. The cut-off price (i.e. the auction price) cleared at a small premium of LSd 1,000 over the pre-announced nominal value.<sup>9</sup>

Notwithstanding its successful introduction in Sudan, the scope for expanded operations in CMCs and its cross country applicability may be constrained by the underlying institutional arrangement – of central bank ownership of equity positions – in banks. Moreover, as the fund is finite (without undermining other objectives of privatization) there is a limit on the volume of transactions possible that may or may not be compatible with the requirements for monetary stability. The fund can be augmented (as it has been in Sudan) by the transfer to the fund of the government's equity positions in banks, but this too is finite.<sup>10</sup> This constraint can be loosened somewhat by expanding the concept of the CMC to a Government *Musharakah* Certificate (GMshC) where the equity instrument issued would be against the public sector's ownership of income yielding assets in general. A GMshC would then be issued by the Government and would constitute an independent funding source for the budget and could replace the CMC as a monetary instrument as markets develop.

### 3.3. Government *Muḍārabah* Certificate

The Government *Muḍārabah* Certificate (GMC) refers to an instrument that enables the government to raise funds, through the issuance of securities that promise investors a negotiable return that is linked to the developments in government revenue (a share in government revenue, for example) in return for their investment in the provision of general government services. A proposal for issuing GMCs is currently under consideration by BOS's HSSC and no decision has yet been made on the suitability of this instrument.

This instrument attempts to accommodate the fact that government activities involve mostly the production of intangible services, and hence moves beyond the literature's emphasis on designing government funding instruments based solely on the government's production of tangibles. Most of these intangible services (security, foreign relations, legal arbitration, etc.) could, in principle, be produced by the private sector, which, in this case, would have collected rents/fees on them. Furthermore, the private sector would have been allowed to enter into *Mushārahah/Muḍārabah* contracts against the production of these services, with investors being remunerated from the generated revenue. It is argued, however, that these services are best provided by the government (viewed as a cooperative entity representing the public interest rather than being motivated by profits) which would in lieu of rents/fees collect taxes to cover the expenses of providing the services. The GMC would allow the public to assist the government in the creation of these services by providing funds to cover some of the expenses to produce them, and to share, in return, the collected rents/fees, i.e., revenue.

The overall benefits generated by government services facilitate economic growth by raising revenue for the government. Better government services contribute to higher economic growth, and higher income for tax payers, and hence higher revenue. Investors, whose funds enabled the government to produce the services that benefit the economy and facilitate the expansion of the revenue base have a legitimate claim on the government revenue. Such revenue can also be perceived as a measure of the value or benefits of government services. Hence, investors who fund the provision of such services are

entitled to a share of the benefits of these services. It is important to keep in mind that all government funding instruments, under any financial system, Islamic or otherwise, give holders/investors a claim on future government revenue (mostly taxes in a market economy); the key issue under Islamic banking is how to specify the claim.

One might argue, however, that government revenue also depends on the tax structure, and not necessarily on the benefits of government services. However, it cannot be argued that the tax structure is an involuntary contract (*‘aqd īdhān*) that is imposed on tax payers, since the tax structure and the budget are both subject to the approval of the representatives of the tax payers (i.e., the parliament or other consultative bodies). Therefore, the tax structure can be viewed as a negotiated formula between the government and the public on the price (cost) of producing government services.

Investors in the provision of government services would need, as when investing in any other economic activity, to evaluate the factors that affect the revenue performance. These factors could include, inter alia, the projected economic growth, expected rate of inflation, projected government expenditures, projected revenue performance over the maturity period of the GMC, changes in the tax regime, information on past revenue performance, and other necessary information. In addition, the actual rate of return received by the bidder would vary according to revenue performance. Based on the disclosed information and investors' evaluation of them, including projected revenue and the effectiveness of government services, investors would bid an appropriate rate of return on their investment in the provision of government services, taking also into account the rates of return of alternative investments in the economy.<sup>11</sup> Investors would receive ex post a larger or smaller return depending on actual revenue performance. This can be achieved operationally either by allowing bids that are specified as a share of tax revenue, or equivalently by adjusting the actual rate of returns ex post based on actual revenue outcome in relation to initial revenue target (see Appendix II).

The GMC would be an equity-like instrument in the sense that it can be transformed into assets (services). Hence, the GMC can be traded in a secondary market like any *muḍārabah* in private assets (commodities or services), with the secondary market value (lower,

higher, or at par of the face value) reflecting changing expectations regarding future revenue performance, in a manner not much different from secondary market trading in private *muḍārabah* securities. The government will not guarantee the investors either the principal or the return on the investment. Investors will make a profit or incur a loss depending on whether the actual revenue performance during the holding period of the GMC is higher or lower than the initial expectations.

The success of the GMC would crucially depend on applying proper fairness criteria to protect the interests of investors. The fairness criteria could include: (i) the application of general Islamic rules that protect investors in *muḍārabah* contracts against moral hazards, (ii) establishing a proper disclosure criterion to inform the public, inter alia, about actual tax revenue performance, past and present; projections of tax revenue performance over the duration of the GMC period; and changes in the tax regime.

### 3.3.1. Historical precedence: The *Qabālah* System

In its essence, the GMC is a modern and more refined and sophisticated version of a system of public finance that was practiced by various Islamic states for centuries – namely the *qabālah* system of raising funds for general government purposes.

In the former *qabālah* (acceptance) system, an investor agreed (*taqabbul*) to pay the state a fixed sum of money and, in return, made claim on the tax revenue of a certain tax locality; the investor was often allowed to collect the taxes himself to ensure that the state would not default, or as a matter of convenience. The investor paid the state mostly up-front, but sometimes in installments, or at a determined time in the future (usually around tax collection time). This method, however, was disliked by most Islamic scholars for two reasons. First, the system was often abused, particularly when investors realized that they could incur a loss due to lower than expected revenue and, hence, attempted to extract more revenue by over taxing the tax payer, using in many instances excessive force, in the absence of proper government supervision. Second, scholars feared that the *qabālah* contract could degenerate into a *ribā* contract (i.e., interest-based contract) in cases where investors or investors' funds were not re-invested in the tax base. Both concerns are

addressed under the GMC scheme. The government will not delegate the tax collection to investors and the funds raised from issuing the GMCs are re-invested in the tax base (i.e., the economy) through the provision of government services.<sup>12</sup>

#### **IV. Issues in Institutional Arrangements for Monetary Operations**

The active use of these instruments (described above) for market based monetary management can contribute to the development of money markets. The deepening of such markets would, however, require the monetary authorities to foster proper institutional arrangements. An active money market, through which banks can manage their short-term portfolio positions, underpins central bank operations to regulate liquidity, and facilitates the efficient transmission of monetary policy signals. The institutional arrangements for interbank and secondary markets need to be supported by efficient payment and settlement systems and an appropriate design of central bank credit facilities, and these three elements are also crucial to ensure effective monetary control.

##### **4.2. Fostering interbank markets**

###### **4.2.1. Market information**

The effective operation of interbank markets requires adequate provision of information to the market, as well as the adoption of proper disclosure standards. Instruments such as interbank lending and deposit placements, which are used to recycle liquidity among participants, are easily affected by the perceived credit risk of the borrower bank and the timeliness of information from the clearing and settlement system for payments. Even if mechanisms existed to facilitate trading, market segmentation may continue and concerns about credit risk can arise if banks do not have adequate information on counterparts. In addition, timely information on bank balances in their settlement accounts and on net amounts due following cheque-clearing, are crucial in facilitating interbank trading.

While market segmentation due to perceived credit risks is normal, the market segmentation can be substantially reduced by promoting common accounting standards and adequate reporting and disclosure. Until accounting practices are standardized to the



point where meaningful analysis and comparisons can be made, financial reporting, such as it exists, will not be reliable. Certified statements with standard methods for calculating and reporting income recognition, non-performing loans, interim recognition of rates of return, which are subsequently adjusted at the conclusion of the contract, are crucial not only for prudential supervision, but also as a basis for assessing counter-party risks. Any strategy towards improving the basis for interbank activity must, therefore, include reporting and publishing of good quality information on the state of the financial institutions, which should take place on a frequent and reliable basis.<sup>13</sup>

A deepening of interbank markets under Islamic banking requires a widening of the range of instruments beyond interbank deposit placements. Interbank transactions in instruments such as bankers' acceptances, which are based on self-liquidating third party commercial paper – where the primary source of repayment is the payment by the issuer, and the endorsing bank (borrowing banks) is only the secondary source of repayment – would seem to have significant potential under Islamic banking. Interbank transactions in central bank and government instruments (e.g., CMCs, NPPs, and GMCs) can develop rapidly, since the purchaser (surplus banks) can assess risks, depending mainly on the issuer of the underlying security (government or central bank) and less on the seller of the security (borrowing bank). Moreover, a further possibility for developing self-liquidating third party paper could be through securitizing *muḍārabah* contracts, where the underlying asset would be the performance of the project funded.

#### 4.2.2. Trading arrangements

Trading arrangements for interbank transactions, based on Islamic finance principles, have not been addressed sufficiently in the literature. The model, designed by BNM in Malaysia, remains, at present, the only working model. In its guidelines on Islamic Interbank Money Market (1993) that became effective on January 1994, the Bank Negara Malaysia outlined arrangements to facilitate interbank investments under the Skim Perbankan Tanpa Faedah scheme (SPTF) – interest-free banking. The guidelines refer to the

system, whereby a surplus SPTF bank can invest in another SPTF bank which has a deficit in cheque clearing or is simply experiencing a short-term need for liquidity, on the basis of *muḍārabah* (profit sharing).

#### 4.2.3. Modalities of arrangement

The features of the mechanism are as follows:

- (i) The period of investment can be from overnight to 12 months.
- (ii) The minimum amount of investment is RM 50,000 (ringgit million).
- (iii) The rate of return shall be based on the rate of gross profit before distribution for investments of one year of the receiving bank.
- (iv) The profit sharing ratio is based on the period of investment as follows: (a) for periods of less than or equal to one month, the profit sharing ratio shall be 70:30 (i.e., 70 percent to the provider of funds); (b) for periods exceeding one month and less than or equal to three months, the profit sharing ratio shall be 80:20; and (c) for periods exceeding three months, the profit sharing ratio shall be 90:10.

The formula for calculating the profit element to be paid to the provider of funds is as follows:

$$X = \frac{(P)(R)(T)(K)}{(365)(100)}$$

where

$X$  = Amount of profit (in ringgit) to be paid to the provider of funds

$P$  = Principal investment

$R$  = Rate of gross profit (in percent p.a.) before distribution for investments for one year of the receiving bank

$T$  = Number of days invested

$K$  = Profit sharing ratio

While these trading arrangements work well in Malaysia, it presumes a scheme where there is uniformity in the reporting of rates of return and where banks continuously post their gross profit before distribution for investments of one year. Without some reference rate against which a lending bank can calculate its profit share, lending

banks would have difficulty determining the basis of their short-term participation in the borrowing banks' profits.

#### 4.3. Design of Central Bank credit facilities

Central bank lending can be classified into standing and discretionary facilities. Standing facilities are accessed at the initiative of banks, subject to their meeting criteria established by the central bank; while discretionary facilities are operated at the discretion of the central bank to achieve its objectives. The issues in designing central bank credit facilities generally – whether these are exclusively focused on supporting payment and settlement arrangements (lombard-type facilities), or facilities to supply longer-term liquidity needs of banks – revolve around collateral, pricing, and other access rules of these facilities.

Under conventional banking, requiring collateral for central bank lending is vital to insulating the institution from potential losses. An additional benefit from collateralization is that it will promote the use of assets accepted by the central bank. As noted, this will help develop the collateralization of interbank transactions, which in turn will help enhance financial discipline in the system, particularly where there is limited reliable information about the solvency of potential interbank counterparts. To be eligible for central bank operations, underlying assets should fulfill the following criteria: (i) they should be instruments issued or guaranteed by financially sound entities, (ii) they should not be issued by the counter party of the central bank, and (iii) they should not fall due before the maturity date of the operation they collateralize. To avoid losses due to settlement risk, the assets should be easily accessible, i.e. transferable in book-entry form or pledged to the central bank.

Currently, central banks in Islamic banking systems provide medium-term refinancing to commercial banks on a *muḍārabah* basis which, while in part addressing the issue of price and returns to the central bank, does not constitute collateralized lending. Unless the central bank is providing a loan, which in this case can not earn interest (i.e., *qarḍ ḥasan*), users of central bank funds can not be asked to post collateral against these funds under existing facilities in Islamic finance (e.g., *muḍārabah*, *mushārahah*, etc.). This feature gives

particular importance to defining the rules governing access to central bank funds. These rules must be uniform and transparent, and should include compliance with all mandatory prudential ratios, including: foreign exchange exposure limits, compliance with reserve requirements, satisfactory repayment records for previous credits, compliance with reporting requirements, and satisfactory performance in clearing and settling payments. In addition to access rules, credit limits as a ratio (or multiple) of each bank's capital or deposits could be set.<sup>14</sup>

As regards facilities supporting the payments system, the typical arrangement in Islamic banking systems is for the central bank to provide uncollateralized overdraft access to banks. The central bank therefore assumes the risk of default and, where unpenalized, these operations convert the central bank into being the preferred lender in the system, thereby, undermining the development of interbank and secondary markets. When a bank borrows to facilitate clearing and settlement, the assumption should be that the bank is inviting the central bank to participate in its profits in the same way that the central bank participates in profits derived from longer-term *mudārabah* lending. The profit share of the central bank should be set above that which would have applied in the interbank market or offered to investors in the bank. Access to central bank credit needs to be priced carefully to ensure that arbitrage opportunities are not created by mis-pricing and also to ensure that the central bank retains its last-resort status in the system. If priced below market, the central bank could unwittingly impede the development of interbank and secondary markets. If priced too high above market, the central bank could run the risk of its lending facility becoming irrelevant and its ability to influence market rates of return diminished, as banks find it too prohibitive to borrow and seek, instead to maintain a large cushion of excess reserves.

## V. Concluding Remarks

Central bank monetary operations play a crucial and catalytic role in stimulating money and interbank markets, and measures to foster these markets are essential for successful adoption of market-based instruments. The weakness of central bank monetary operations in

Islamic banking systems has been a major factor in the ensuing financial repression, and overcoming this weakness is therefore crucial for financial deepening. The success in developing market-based instruments to regulate liquidity and meet general government borrowing needs would greatly enhance the discretionary control of central banks over the growth of their balance sheets, and strengthen monetary control.

### A Postscript

By taking account the recent developments, since the original time of writing this paper, the design and development of *Shari'ah* compatible money market instruments, suitable for monetary and government debt operations, has continued to remain a key challenge for Islamic Finance. The absence of Islamic money markets continues to raise the liquidity risks of Islamic banks and weaken their profitability. The *Musharakah* certificates – pioneered by the central Bank of Sudan, based on securitization of government's equity claims described in the paper, helped restore monetary stability in Sudan, but proved to carry very high cost reflecting the underlying equity risk premium. It is being phased out in favour of alternative instruments. The government *muḍārabah* certificates discussed in the paper were never issued. The government and Central Bank Participation Papers, issued in Iran, had only limited effectiveness, as their yields were fixed and were tradable only at par. This constrained both market development and monetary operations. Other money market instruments, such as interbank *muḍārabah* investments linked to bank profits (Malaysia and Indonesia), and commodity *muḍārabah* contracts (Bahrain), were also not tradable and not suitable for monetary operations.

However, recent developments in Islamic asset securitization have opened up new avenues. New instruments based on securitization of appropriately structured government finance contracts, and government cash flows have been developed. These can be suitably adapted to design tradable instruments for government debt and monetary management. Efforts to develop and harmonize standards and best practices in this area are under way in various international forums.

## NOTES

1. *Muḍārabah* is a contract where one party provides funds and the other provides work. Profits are distributed according to a negotiated percentage (the party providing the work can not claim wage, salary or any compensation other than a share in profits) while losses are borne by the fund provider. *Ijārah* is a leasing type contract. For more detailed discussions of Islamic financial contracts, see Kazarian (1993) and Iqbal and Mirakhor (1987).
2. The scope of this instrument could be widened to cover a pool of projects (i.e., an unrestricted *muḍārabah*) instead of specific projects, with the rate of return being determined by the average yield of all the projects. It is also possible to issue and float the two types (the restricted and the unrestricted *muḍārabah*) simultaneously.
3. The formula for determining the purchase or sales price of the GII at the discount window of BNM is as follows: Price =  $[1 + (a)(b)] / (365)(100)$ , where a = number of days after issue date for certificates of one year of original maturity or number of days after last dividend payment date for certificates with more than one year of original maturity; and b = expected dividend rate in percent.
4. Haque and Mirakhor (1997) have discussed the possibility that an international or regional element could be included in the index.
5. A decree was issued in early 1997 by Ayatollah Gholamreza Rezvani allowing the authorities in the Islamic Republic of Iran to issue NPP representing a set value as a proportion of a portfolio of assets (composed of completed development projects) with an expected rate of return. Financial resources, thus mobilized, are to be used to repay government debt to the central bank and as a monetary control instrument. The central bank will calculate and guarantee a minimum rate of return.
6. *Mushārahah* is a partnership contract (usually in capital) with profits distributed according to contribution or on a negotiated basis.
7. See detailed description of issues related to CMC design in Appendix I.
8. See Appendix I for definition.
9. In line with a pre-set timetable subsequent auctions of CMC have taken place. Moreover, a repurchase auction has also been conducted and the net liquidity effect of these operations (up to July 22, 1998) has been an absorption of LSd 9 billion.
10. In principle, central banks could acquire shares in the open market up to any limit, and build up a balanced equity portfolio against which CMC could be issued.
11. The issuance of GMCs would, therefore, require a significant disclosure of budgetary performance and revenue objectives.
12. For more discussions of the historical *qabālah* system, see Cizakca (1989) and Morimoto (1981).
13. Significant progress has been achieved in preparing standardized accounting and reporting methodology by the Bahrain-based accounting and auditing organization for Islamic financial institutions.
14. For discussion of issues pertaining to prudential regulations and supervision in Islamic banking, see Errico and Farahbaksh (1998 and 2001).

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**APPENDICES**

**Box 1. Participation Papers (PP) in the Islamic Republic of Iran (restricted muḍārabah) issued since 1993.**

In this framework, commercial banks act as agents to raise funds to finance a specific investment project. The borrower provides market and financial analyses of the project including an expected return which it is prepared to share with lenders.<sup>1</sup> The commercial bank undertakes an initial economic review of the proposal and its terms to determine its accuracy and reasonableness. With due diligence completed, the commercial bank and the borrower forward the proposal to the Credit Committee within BMI, which conducts its own independent review of the proposal. No fee is applied. If approved, the Credit Committee also sets a guaranteed minimum return that will be paid to investors. It is expected that the actual rate will be higher than the minimum and that it will be paid as it is realized during the course of the project.<sup>2</sup> In addition, the principal is also guaranteed by the commercial bank.

To ensure payment of the guarantees, the following steps are taken:

a. The proceeds of the PP are placed with the agent-bank and a monitoring process for their withdrawal as well as use is put in place.

b. Additional collateral, including a claim on the project's real assets, is obtained in addition to cash deposits.

c. The central bank appoints an auditor and trustee. The trustee protects the interests of the investors by overseeing the implementation of the project, utilization of the proceeds from PP sales, and ensuring that correct payments of return and principal are made as specified to all bond holders.

#### **PP offerings**

Iranian governmental bodies, religious foundations and private sector enterprises have issued five PPs between 1995–1997. PPs combine features of debt and equity in that they have specific terms ranging from 2 to 5 years and set a minimum return, but may provide an actual return higher than the minimum if warranted by the ultimate profitability of the underlying investment.

#### **Pricing and the method of distribution**

Individuals and legal entities (incorporated bodies) may purchase participation bonds. Banks are not eligible purchasers at the primary distribution. PPs are sold at face value on a first come, first served basis. If an issue is not well received, issuers would extend the sales period. They have also raised the return to investors by non-price means, an approach presumably meant to avoid further regulatory review. For example, the Hazrat Imam Reza PP improved the attractiveness of its bonds by offering bond holders on maturity a discount of 10 percent to 15 percent on the price of the homes incorporated into its project.<sup>3</sup>

#### **Repurchases**

After sale, a purchaser may re-sell a PP to the agent bank at face value plus accrued return. The bank is expected to re-sell the bond at face value less accrued return to the public on demand. No fee is charged for these secondary market transactions.

#### **Rates of return**

The minimum return so far has been set by the Credit Committee.<sup>4</sup> As determined by the trustee, a balloon payment is expected to be paid on maturity. To date, PPs have only paid the guaranteed minimum rate.



## NOTES:

1. Presumably, the borrower deducts fees and other payments from projected financial flows to reward his own entrepreneurship and management acumen.
2. The rationale for the guaranteed minimum rate is that the commercial bank and BMI's due diligence should have screened projects below that minimum rate.
3. Similarly, the Tehran project and the car project are considering tie-in sales.
4. It has been kept above bank deposits with similar terms to ensure marketability and to compensate for a 5 percent tax applied to the return from PPs, but which is not applied to earnings from bank deposits.

## APPENDIX 1

**Designing Central bank *Mushāraka* Certificate (CMC)****Establishing the open market operation fund**

Issuance of CMCs requires the establishment of an Open Market Operations Fund (OMOF) that would hold the shares in commercial banks that the government and/or the central bank owns, and which form the base for issuing the CMCs. This section assumes that it is the central bank's share partnership in commercial banks that is included in the OMOF. If these shares are originally owned by the government, they will either be transferred to the central bank (probably against outstanding central bank's claim on government), or the ownership will remain with the government but the management of the OMOF will be delegated to the central bank to pursue the desired monetary policy.

The central bank establishes the OMOF as a separate entity (in the accounting sense) and transfers to it all of its holding of commercial banks' shares. The value of the fund would be equal to the sum of all shares' values. If the central bank has holdings in two types of banks, listed in the stock market and not listed, the fund's value would be a composite of market values of the listed stocks and the book values of the nonlisted stocks.

In the case of Sudan, a financial company (Sudan Financial Services Co. (SFS)) was established to serve the function of OMOF, and the shares of the government and the BOS in banks were transferred to SFS, and CMCs issued against their values. The SFS is 99 percent owned by the BOS and 1 percent owned by the Ministry of Finance.

### Accounting issues in establishing the open market operation fund

The transfer of the central bank's shares to the OMOF could be financed by an advance from the central bank of an equal value. As a result, the capital account (in 'other items, net') of the central bank would decline by the value of the shares, while its claims on the OMOF account (under 'net domestic credit') would increase by the same amount, as follows (assume fund value of 1000):

Central Bank (flow)

Assets		Liabilities
Net domestic assets	+0	Reserve money +0
Net domestic credit	+1000	
Claims on OMOF	+1000	
Other items, net	1000	
Capital	1000	

Open Market Operations Fund (flow)

Assets		Liabilities
Shares in commercial banks	+1000	To Central bank +1000

### Recording the open market operations in CMCs

The OMOF could be divided into equal-value units (or shares) that could be sold and bought by the OMOF at the instruction of the central bank (in our example, 100 shares with a share value of 10). The shares, or the CMCs, would become a monetary instrument for the central bank since trading in CMCs would directly impact banks' liquidity positions. To contract liquidity by 200, for example, the central bank would instruct the OMOF to sell 20 CMCs to banks. Banks could finance the purchase from their reserves at the central bank, resulting in a decline in banks' reserve balance at the central bank by 200 (20 shares times 10, assuming no change in market value), and hence a decline in reserve money by 200. The assets of the OMOF would not change, although its ownership composition would change (reducing central bank's ownership from 100 percent to 80

percent while increasing the banks' ownership to 20 percent). On the liability side, the OMOF would transfer the sale's proceeds to the central bank resulting in a decline in the central bank's claims on the OMOF by 200, while banks' claims on the OMOF would increase by 200. The asset position of commercial banks would not change, only its composition; banks' claims on the central bank (i.e., banks' reserve position) would decline by 200 while their claims on the OMOF would increase by 200. The net monetary effect is a decline by 200 in the central bank's net domestic credit (NDC) and reserve money. The following tables illustrate these transactions:

Central Bank (flow)

Assets		Liabilities	
Net domestic assets	-200	Reserve money	-200
Net domestic credit	-200	Banks' reserves	-200
Claims on OMOF	-200		
Other items, net	+0		
Capital	+0		

Open Market Operations Fund (stock)

Assets		Liabilities	
Shares in commercial banks	+1000	To central bank	+800
		To banks	+200

Commercial Banks (flow)

Assets		Liabilities	
Deposits at the central bank (reserves)	-200		
Claims on OMOF	+200		

### Valuation of the CMC

The nominal value of the CMC would reflect the fair (accounting) value of the CMC at the time of its inception, and is determined as the sum total of each bank's paid in capital, retained earnings, and foreign exchange revaluation reserve (all based on balance sheet data)

multiplied by the percentage of total shares outstanding that are held by the OMOF. Thereafter, the fair value would include the total amount of dividends accumulated in the OMOF since its inception. The calculation of the fair value of the CMC is intended for information purposes, only to assist in the determining market values of the CMC. In the case of Sudan, the fair value is calculated using monthly bank balance sheet data.

The market value of the CMC would be based on the auction price for primary issues and secondary market price. The market price would be different from the calculated fair value, to the extent that market valuation of the current and future performance of the underlying assets is different from their net worth position as reflected in the balance sheet, which would primarily reflect past performance.

#### **Treatment of dividends paid to the fund**

The dividend earned by the OMOF could be distributed to holders of CMCs. However, given that the targeted investors in the CMCs are the banks, which would use the CMCs primarily as a tool for managing liquidity, it would be more efficient (in the sense of improving the liquidity of the CMC) if dividends were retained by the OMOF and were not paid to holders of CMCs (as done in the case of Sudan). Instead, income would be earned by CMC holders only through capital gains (increases in CMC market values which in part reflects retained earnings) when CMCs are sold. It is also possible that the retained earnings could be used by the central bank as partial payment of purchases of CMCs made from time to time in the secondary market, allowing, therefore, for the distribution of dividends to CMC holders.

#### **Term of CMC**

The CMC could be issued as a term paper (in the sense that the *mushārah* contract, as represented by the CMC, would expire at a certain future date) or without maturity date. A CMC without maturity could improve its liquidity, in the sense that banks would not need to factor the term of the paper in their pricing decision when trading in the secondary market. In the case of Sudan the CMC was issued without maturity date.

### **Form of issue**

The CMCs could be issued in fully registered form or as a book entry, with fully transferable ownership. A book entry system has the advantage of requiring less administrative work and more efficient registration – when issuing the CMCs or when they are traded in secondary markets. In the case of Sudan, the CMC is a fully registered form in the name of the owner, and recorded in the CMC register.

### **Primary issuance of the CMCs**

Primary issues of CMCs could be sold to investors (banks) through a competitive auction process. A differentiated-price auction or a uniform-price auction could also be used. Differentiated-price auction mechanism bids would be classified according to the highest price, and winning bids would be awarded in descending order to the lowest price to the point, where the accumulated winning bids absorb the total amount offered for sale. The lowest price would be the cut-off price. All winning bids would be allocated to bidders on the basis of their offered prices, and the auction price would be the weighted average price of all bids. Under a uniform-price auction mechanism, the cut-off price would be applied to all winning bids, thus representing the auction price.

A uniform-price type of auction might have an advantage over the differentiated-price type, particularly in early stages of issuing CMC, because of the complete lack of market experience in the CMC, and the absence of any representative benchmark price (as in the case of Sudan). A wide dispersion of prices might occur in the early auctions if a differentiated-price auction is used, and some investors may perceive the results as inequitable, thus undermining confidence in the CMC.

### **Secondary market trading and repurchase facility**

The CMC holders may trade their certificates in the secondary market for a variety of reasons: (i) the nonbank public (particularly nonbank financial institutions) may find the instrument attractive (albeit it was designed for banks) and purchase it from banks in the secondary market, (ii) the CMC can be used by banks to circulate excess funds, in the absence (thus far) of Islamically acceptable short-term interbank

lending facility, and (iii) banks may use the CMC as a tool to cover overdraft positions either by selling them to the central bank or to other investors.

To improve the function of the CMC as a liquidity management tool for banks, it is recommended that the central bank establish a re-purchase-on-demand window. However, the re-purchase price should be set at a price lower than the secondary market price to encourage the development of secondary market trading. The discount reflected in the re-purchase price should, on the other hand, be set at a level lower than the penalty rate on overdraft, to encourage banks to use their CMC holding to generate the needed funds rather than going for overdraft.

## APPENDIX 2

### Determining the Rate of Return on the Government *Muḍārabah* Certificate (GMC)

Investors can bid for the GMC in two ways: (i) investors can bid for a share in future government revenue (e.g. 20 percent of revenue) that will generate an expected income commensurate with what they consider as an appropriate rate of return on their investment, or (ii) investors can bid what the investors consider as an appropriate rate of return on their investment (e.g., 10 percent rate of return). The two methods are basically similar. The second method, however, has the advantage of giving investors a clearer way of comparing the expected rate of return, on their investment in the government, to other investments in the economy.

In the first case, the rate of return to investors at maturity is calculated as:

$$r = s \left( \frac{T}{I} \right) - 1 \quad (1)$$

where

$r$ : is the actual rate of return to investors;

$s$ : is the share in tax revenue that investors bid for;

$T$ : is the actual tax revenue;

$I$ : is the amount invested in the government;

In the second case, the return to investors at maturity is calculated as:

$$r = (1 = r^*) \left[ 1 + \left( \frac{T - T^*}{T^*} \right) \right] - 1 \quad (2)$$

where

$T^*$ : is the government's projection at the time of the auction ( $t$ ) of tax revenue for the relevant period.

$r^*$ : is the rate of return that the investor bids for after the government communicates  $T^*$ .

The following example illustrates how the two methods apply:

At the time of the auction, the government will announce the amount of funds it intends to raise, the maturity period, and the expected tax revenue  $T^*$  for the period. This information will be supported by the disclosure of the relevant macroeconomic projections and other information needed for investors to assess the value of the investment (as outlined above). Assume that:  $I = 1,000$ ,  $T^* = 5,000$ , and bidders' expectation of tax revenues is also 5,000. Suppose further that investors find it profitable to invest in GMCs if they offer an expected rate of return of at least 10 percent. In the first case, they would bid for a share in government  $T$  revenue  $s = 22$  percent. In the second, they would directly bid for  $r^* = 10\%$ . Suppose now that tax revenues are  $T = 6,000$ . It is easy to check that in both cases the actual rate of return paid to investors is 32%. From formulas (1) and (2) we have:

$$r = 0.22 \left( \frac{6,000}{1,000} \right) - 1 = 0.32$$

and

$$r = (1 + 0.1) \left[ 1 + \left( \frac{6,000 - 5,000}{5,000} \right) \right] - 1 = 0.32$$

It is also clear from the example that investors could lose some of their principal if the actual revenue collection was below initial expectation (if  $T = 4,000$ ,  $r = -12\%$ ).

### Volatility of tax revenue

1. The monthly volatility of tax revenue could be a cause for concern for both the government and investors. High volatility would increase the uncertainty regarding future returns to investors, resulting in higher risk premiums. In addition, it will be difficult for the government, with high tax revenue volatility, to efficiently manage its budget, while taking into account future payments to investors.

2. Tax revenue volatility could be reduced by introducing a smoothing factor to reduce the spread between the highs and lows of returns to investors, as caused by higher or lower than expected tax revenue. In this case, equations (1) and (2) above will be modified as follow:

$$r = s \left[ \frac{T^* + \alpha(T - T^*)}{I} \right] - 1 \quad (3)$$

$$r = (1 + r^*) \left[ 1 + \alpha \left( \frac{T - T^*}{T^*} \right) \right] - 1 \quad (4)$$

where  $\alpha$ : is the smoothing factor with value  $0 < \alpha \leq 1$ .

Note that  $\alpha$  in effect determines the distribution of profit/losses arising from an over or under performance of revenues in relation to the initial projections of the government.

3. In the earlier example,  $T = 6,000$  or  $T = 4,000$  would have generated rates of return of 32 and 12% respectively. If, however,  $\alpha = 0.5$ , then  $r = 21\%$  (instead of 32%) if  $T = 6,000$  and  $r = 1$  percent (instead of 12%) if  $T = 4,000$ .

4. If a smoothing factor is used in determining the return to investors, it is essential that the value of ( $\alpha$ ) is announced at the time of the auction, as it would constitute to investors an important piece of information for investors.

5. In order to simplify the management of the GMCs the term  $T - T^*/T^* = k$  in equation 4 may be rounded to the closest decimal. In doing so, the rate of return would be, for instance:

$$\begin{aligned} r, & \text{ if } 0.05 > k > -0.05 \\ r + .1, & \text{ if } 0.15 > k > 0.05 \\ r - .1, & \text{ if } -0.05 > k > -0.15 \end{aligned}$$