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1. Introduction and Literature Review

The road to a free market economy entails the selling of publicly owned enterprises. It has long been recognized that publicly owned companies suffer from poor management, poor efficiency, and poor performance. Many governments, however, have been reluctant to relinquish economic control by selling public enterprises. Public enterprises have been always regarded as a policy tool available to punish or reward public employees. They were never run to generate profits, but were used to generate political influence (Campos and Esfahani, 1996).

Some governments have been forced or convinced to follow privatization programs. While the lessons derived from the experience of privatization differ considerably from on country to another (White and Bhatia, 1988; Guilain, 1997), there is strong evidence for all countries that privatized companies dramatically improve corporate performance (Frydman, et al., 1997).

1.1 Privatization

Privatization is defined as the transfer of ownership such that a majority of the shares or equity in an enterprise passes from state or public ownership into private hands (Nellis, 1998). The privatization of state-owned enterprises (SOE) in formerly centrally-planned economies is figured as one of the most important components of the transformation to a market economy. Privatization is meant to introduce the profit motive in order to generate large efficiency gains. Thus, the important issue is not privatization, per se, but the improved efficiency that adds up to aggregate growth.

The literature on this topic can be divided into two schools, the first of which de-emphasizes the immediate need for privatization and focuses on the creation of a hard budget competitive environment with market signals leading to reallocation gains. This view, however, does not deny the eventual need to privatize much of the SOE (Frydman, et al., 1997). The second school argues that privatization is certainly necessary, and the sooner the better, although scholars in this tradition admit that other conditions and institutions do have to be put in place eventually (Barberis et al; 1996). Recently, a revisionist trend has modified this second school of thought by saying that while it was not wrong in principle to privatize early and quickly, it was wrong to assume that competitive conditions and market institutions would easily follow, regardless of the method of privatization or government efforts.

Recent empirical evidence from both developing and advanced industrial economies suggests that privatization has improved efficiency gains. For example, Vining and Boardman (1992) and Megginson et al. (1994) present strong evidence that privatized firms do better than state owned enterprises along several performance criteria.

1.2 Methods of Privatization

Privatization has been proven to lead to greater restructuring and better enterprise performance in transition economies. Different methods of privatization, however, result in different degrees of improved efficiency. The main types of different privatization techniques include: (1) restitution, or the return of state assets to their rightful owners; (2) case-by-case direct sales and equity offerings; (3) management buyouts; (4) employee buyouts and (5) mass privatization (EBRD, 1997). The pros and cons of each method are explained well by Havrylyshyn and McGettigan (1999).

In practice, the MENA countries have used a combination of the above techniques with wide ranging outcomes in terms of efficiency and performance. The optimal method of privatization is the one that maximizes efficiency. There is strong evidence that there is no rule for that. Instead, this will partially depend on the appointed management's capability to reflect the owner's interests in maximizing profits. Outside factors also affect the performance of the enterprise in transition economies. For example, external competition, securities markets, boards of directors, and, most importantly, the market for managerial talent are largely ineffective in transition countries and therefore optimal privatization should have direct owner monitoring. While this does not imply that one method is correct, it points to a preference for sales on the stock market (mass privatization) with proper monitoring, or a major investor, possibly foreign, with a good management team. Employee buyouts are the least favorable privatization technique.

While there are many ways of selling publicly owned companies (Goldberg et al., 1996), we focus primarily on the timing of the offering of the stocks of the these companies on the stock exchange, i.e. the timing of the initial public offering (IPO). The pricing of the IPO is another area of interest (Ritter, 1984 and 1991; Rock, 1986; Tinic, 1988), but will not be of our concern in this report.

1.3 Public Offerings and Valuation

There are several different ways a government can dispose of its enterprises. These include the sale of assets, public offerings, block sales, sale to workers, leasing, granting the right to operate, and the establishment of income partnerships. Privatization officials classify firms according to these different categories. Usually, the better performing firms are sold to the public, while the others are sold through a variety of different sale techniques. The choice of the method will depend on the objectives of the privatization (Vernon, 1996).

The sale of state enterprises to the public can itself have different objectives, ranging from obtaining the maximum price or revitalizing the stock market to ensuring the continuity of the company, ensuring the workers rights, or generating social responsibility. These objectives may be weighted differently according to each privatization program.

It could be argued, however, that obtaining the highest price is a prerequisite of successful privatization, as governments badly need finances. Yet this objective can not be attained at the expense other important considerations. When the state disposes of a company through a public offer, the success of the issue and the protection of the rights of small shareholders become more important considerations. If the government prices the issue too high, it may not be fully subscribed and the failure will hurt the government reputation. In addition, if small investors lose money on the issue, they will be deterred from future issues in a way that will negatively impact the demand side of the market. Government officials are expected not only to price the issue fairly, but also to disclose all relevant information that would help investors assess for themselves the future of the firm and compute a value corresponding to discounted future cash flows that takes into account the risk of these cash flows. If markets are efficient, no party will gain at the expense of the other. Failure to disclose such information should be considered an economic crime (Kane, 1998).

1.4 Methods of Setting the Issue Price

Financial theory tells us that if markets are efficient, the price of an issue cannot be higher than the fair value that is computed using estimated future cash flows discounted at the right discount rate. The IPO literature tells us that new issues are usually undervalued for many reasons, including underwriter who may be afraid that the issue will fail, investors who may have less information than the managers and the underwriters, or an underwriter who may be afraid of potential legal liability if investors end up losing money (Ritter, 1984 and 1989; Rock, 1986; Tinic, 1988).

These explanations, however, do not necessarily apply to state companies that are sold to the market, nor do they necessarily apply in countries like Egypt, Turkey, or Tunisia. State and private investors may have different valuations for the firm because of different information sets or because of agency problems. In most cases, governments will give discounts to ensure that the issue will succeed. A failure will be interpreted as the failure of the government itself. Another equally important reason for the discount is that one of the objectives of government is to revitalize stock markets by attracting national as well as foreign investors. If a big issue fails or successive issues fail, then confidence will be lost in that market and the government will not be able to make any further issues. Another explanation for the discount could be that governments, in bad need of cash, may heavily discount future cash flows.

If the government would like to sell at the highest price, however, then foreign investors should be targeted first. Foreign investors may value the issue higher than domestic investors, given market segmentations that may not allow domestic investors to buy securities abroad. Foreign investors are more likely to better diversify their risk and will therefore discount at a lower discount rate. If markets are integrated, there will be no difference in valuation. Unfortunately, this is not the case in most developing countries.

In the context of privatization, it is thus very important that government officials keep in mind the following recommendations (Kane, 1998):

- All information relative to the privatized company or to the potential consequence of privatization should be disclosed to the public to protect investors.
- The government should be fully accountable against opportunistic privatization. This accountability can be further increased by undertaking large-scale reforms of the financial system (Demirgucc-Kunt and Levine, 1994).
- A fair system of incentive compatibility should be in place.
- A fair judicial system must be able to enforce financial contracts.

1.5 The Timing of the Issue

Quite often, the government will sell shares when the market is bullish and investors are optimistic about the future. The issue is more likely to succeed under such conditions than when markets are bearish. It could also be the case that governments have an agenda for firms to be privatized and when a firm is ready the sale just occurs independently of any particular timing.

Obviously, public offerings are only feasible if the government is of the opinion that the companies can be offered as a secure long-term investment. It has been observed that the number of stock market introductions increases with the stock price level (Ellingsen and Rydqvist, 1997; Loughran et al., 1993). Thus, the prediction of the stock market index is an essential element in deciding when to offer the company’s stock on the market.

2. Forecasting

An essential part of this project entails the ability to forecast market performance one month ahead or even 2-6 months ahead. If the forecast is favorable, the government should speed up the process of offering the stocks of public sector companies. Otherwise, the government might choose to intervene in the stock market through the reduction of the interest rate or other measures of market stimulation.

The interest in financial markets and the possibility to forecast their course is linked to the growing recognition among economists and policy makers of the increasing impact of financial variables on the economy and thus on economic policy in general. The Southeast Asian crisis is a good reminder of this fact (Hardy and Pazarbasioglu, 1998).

Not so long ago, the assumption that price changes in financial markets were unpredictable was still one of the pillars of finance. The seminal work of Mandelbrot (1963) underlined the presence of volatility clusters in financial assets. It took econometricians twenty years to formalize these ideas, evidenced in the work of Engle (1982), who introduced the autoregressive conditional Heteroskedastic (ARCH) model. The ARCH model states that the variance of asset returns in any given period directly depends on a constant and the previous period squared random component of the return. The model was later generalized by Bollerslev (1986) and Taylor (1986) to give the generalized autoregressive conditional Heteroskedastic (GARCH) model. In the GARCH model, the variance of the asset returns in any given period directly depends on a constant, the previous period squared random component of the return, and the previous period variance.

Consequently, financial theorists recognized that the variance of asset returns is indeed predictable, and the returns themselves are also predictable. It needed another ten years until the availability of powerful computers made it possible to demonstrate the benefits of technical trading rules, leading to the establishment of GARCH-based forecasting models (Dunis and Feeny, 1989; Neftci, 1991; Brock et. al., 1992; Taylor and Allen, 1992; Levich and Thomas, 1993). This latter research area paved the way for papers whose aim was to demonstrate that price changes themselves could be predictable when adequate models, tailored to financial markets, were employed (Dunis, 1996a; Dunis, 1996b). More recently, there has been a growing recognition that the introduction of nonlinearities and/or time variations in the modeling approach could allow one to explain certain price moves that seemed previously random. At the same time, it enabled the testing of new categories of models, and particularly nonlinear models. Access to higher frequency data banks has made it possible to explore the microstructure of the financial markets.

Combined with extensive data banks, and the greater availability of powerful computers, new forecasting techniques have emerged that rely heavily on the analysis of time-varying models. They are increasingly used by major trading institutions and fund managers (Chow, 1987; Mills, 1993; Banerjee and Hendry, 1995; Abutaleb et. al., 1998; Abutaleb and Papaioannous, 2000). These time-varying models are used for the forecasting of the Egyptian, Tunisian, and Turkish stock market indices.

Futures markets are commonly recognized to serve three purposes: (1) price discovery, (2) risk transfer, and (3) transaction cost reduction (Lien and Tse, 1999). In terms of price discovery, futures price provide signals for the spot price in the future.

A common method employed for stock market forecasting is the vector autoregressive (VAR) model. This model postulates that past prices of stocks affect their current prices. Since there is interaction between the stocks and the stock market index, and since they usually have unit roots (i.e. are integrated of order one or more and are non-stationary), VAR models are usually constructed for the differenced prices, as opposed to the prices levels.

When modeling stock prices, a restricted VAR model is usually preferred. The restrictions arise from the fact that the predictions are, in general, not accurate and one has to continuously correct for this error. Thus, one might consider a model in which the forecast is affected by the past prices and the error correction term. The resulting model is called the error correction model (ECM). Forecasting with ECM is reported in Clements and Hendry (1995) and Engle and Yoo (1987). Better yet is the development of a time-varying model that relates the different exogenous variables to the stock market index. The time-varying parameters of the model are estimated using new concepts borrowed from the theory of optimal control. Details of the forecasting method employed here are given in the following section.

2.1 Forecasting Using Conventional Models

In this section, the description is given for the statistical methods used in the forecasting of the stock market index which was applied to the prediction of the Egyptian, Tunisian, and Turkish stock market indices. Both the conventional methods and the newly developed time-varying methods are described.

Consider the problem of the one-step forecasting of the process y(k) using the time-invariant-parameter model of a linear system:

$$y(k) = \sum_i a_i y(k-i) + \sum_l \sum_{j_l} b_{j_l} u_l (k - j_l) + e(k) \qquad (2.1)$$

where $u_l(k)$ denotes the lth stationary input signal (exogenous variable), y(k) is the stationary output signal (the predicted endogenous variable), and $e(k)$ is the white noise disturbance independent of $u_l(k)$. Notice that the coefficients are time-invariant. For a finite set of data points, assuming that the coefficients are time-invariant, as commonly assumed, several methods exist that yield an accurate estimate of parameters. One popular method is the singular value decomposition, whereby the measure of accuracy is the error. The number of parameters is determined through the minimization of the Akaike information criterion (AIC). The parameter estimates are then used to predict the out of sample or future value of y(k). If the parameters are statistically non-zero, then Granger causality is established between y(k) and $u_l(k)$.

In many applications, however, the dependent and independent variables could be non-stationary. One could transform the variables into stationary processes, through differencing, for example, or the use of the error correction model (ECM). The ECM is related to the notion of co-integration. If a linear combination of two variables which are individually integrated of order one is stationary, the two variables are said to be co-integrated. The stationary linear combination of integrated variables is called the co-integration residual. The Engle-Granger (1987) representation theorem states that if two variables are co-integrated, there exists an ECM.

While earlier research focused on co-integrated residuals that are integrated of order zero, recent research examined the more general case in which the co-integration residuals follow a fractionally integrated process. An important feature of a fractionally integrated process is that its auto-correlation function dies down in a hyperbolic manner which is a characteristic of a long memory process. When the co-integration residual of two integrated series is fractionally integrated, the two series are said to be fractionally co-integrated.

Fractional co-integration has been found empirically in the literature. In examining the purchasing power parity (PPP), the deviation from the parity was found to have a long memory and may be described by a fractionally integrated process (Cheung and Lai, 1993). Similar findings were established for exchange rate data (Baillie and Bollerslev, 1994; Masih and Masih;, 1997) and for the three-month and one-year Treasury bill rates (Dueker and Startz, 1994).

The importance of modeling the co-integration relationship by a fractional process lies in its incorporation of the effects of long memory. For example, in the stock market forecast, ECM models allow only the first-order lag of the co-integration residual to affect the futures prices. In contrast, the fractionally integrated ECM incorporates a long history of past co-integration residuals.

Let us assume that we have two variables, s(k) and f(k), where s(k) is the stock price index and f(k) is an important stock that affects s(k). The fractionally integrated ECM model may be specified by:

$$\Delta s(k) = a_0 + \sum_{i=1}^{i=I} a_i \Delta s(k-i) + \sum_{j=1}^{j=J} b_j \Delta f(k-j) + \sum_{l=1}^{l=L} g_l z(k-l) + e(k) \qquad (2.1a)$$

where z(k) = the error correction term = s(k)-f(k), Δ s(k) = s(k)-s(k-1), and Δ f(k) = f(k)-f(k-1).

For the GARCH model, the variance, $s^2(k)$, of the error term, $e(k)$, is defined as:

$$s^2(k) = a_0 + \sum_{i=1}^{i=I} a_i s^2(k-i) + \sum_{j=1}^{j=J} b_j e^2(k-j) \qquad (2.1b)$$

Equation 2.1a could be cast in the general form of equation 2.1. Thus, we will be dealing with the format of equation 2.1 in the sequel.

2.2 Time-Varying Methods

The accuracy of the prediction could be improved if one realizes that the relation between the exogenous variables, $u_l(k)$, and the endogenous variable, y(k), could be better presented by a time-varying parameter model as follows:

$$y(k) = \sum_i a_i(k) y(k-i) + \sum_l \sum_{j_l} b_{j_l}(k) u_l(k-j_l) + e(k) \qquad (2.2)$$

If one were able to accurately estimate the time-varying parameters, $a_i(k)$ and $b_{j_l}(k)$ using the available data, then the forecasting would be much better than the time-invariant case, as we demonstrated in the results section for each country under study.

Equation 2.2 could also be cast in the familiar regression format:

$$y(k) = \underline{x}(k)\underline{b}(k) + e(k) \qquad (2.3)$$

where the row vector $\underline{x}(k)$ has the lagged values of y(k), the exogenous variables, $u_l(k)$, and their lagged values. $\underline{b}(k)$ is a vector of the unknown time-varying coefficients.

There are, generally speaking, four principal means of solving the problem of estimating time-varying coefficients:

- Assuming that the system coefficients are varying sufficiently slowly, track them using the localized (weighted or windowed) versions of the least squares or maximum likelihood estimators (Niedzwiecki, 1984, 1990 and 2000).
- Try to approximate the time-varying coefficients by a weighted combination of a certain number of known functions (basis functions). If the unknown weights are assumed to be constants, a number of the well known identification techniques could be used (Grenier, 1983; Van Trees, 1968).
- Assume that the time-varying coefficients evolve in a Markovian way. In such case, the Kalman filter technique and its modification could be used for their estimation (Chow, 1987).
- Treat the time-varying coefficients as unknown controllers that should be estimated to track the observed data. The method of the Pontryagin maximum principle could be used to find the desired values (Abutaleb, 1986; Chen et al, 1998).

2.2a. Chow's Method using the Markov Model for the Time-Varying Parameters

Since the proposed approach is a modification to the Chow method, and is a maximum likelihood approach, the Chow method will first be presented in some detail. As mentioned above in equation 2.3, the observed data, y(k), could be modeled as a linear combination of known exogenous (independent) variables, $\underline{x}(k)$, plus noise, $e(k)$, as follows:

$$y(k) = \underline{x}(k)\underline{b}(k) + e(k)$$

where the row vector, $\underline{x}(k)$, has the lagged values of y(k), the exogenous variables, $u_l(k)$, and their lagged values. $\underline{b}(k)$ is a column vector of the unknown time-varying coefficients, and $e(k)$ is normally and independently distributed with zero mean and variance s_e^2. The key for the Chow method is to assume a Markov model for the time-varying parameters. That is, the set of unknown parameters, $\underline{b}(k)$, could be modeled as a vector autoregressive (VAR) process as follows (Chow, 1987):

$$\underline{b}(k) = M\,\underline{b}(k-1) + \underline{h}(k) \tag{2.4}$$

where $\underline{b}(k)$ is a column vector of m unknown values, M is an unknown matrix of dimensions m x m, and $\underline{h}(k)$ is an m-variate column vector normally distributed with zero mean and covariance matrix V= $s_e^2 P$.

Note that when M=I and V=0, this model is reduced to the standard constant coefficient model. When M=0 and V$\neq$0, we have a pure random model. When M=I, and V$\neq$0, we have what is called the random walk model.

If the matrix M is assumed to be time-varying, i.e. M(k), then the estimation problem becomes more complicated. Thus, we end up with the following model:

$$\underline{b}(k) = M(k)\,\underline{b}(k-1) + \underline{h}(k) \tag{2.5}$$

This model is more flexible, and could give accurate estimates of the unknown coefficients, $\underline{b}(k)$. It is obvious that the aforementioned models are special cases of the time-varying model of equation 2.5.

Chow's method starts by assuming that M is diagonal and by assuming some initial guess for its entries. The initial estimate of $\underline{b}(0)$ is taken to be the time-invariant estimate. Thus, an estimate for the sequence $\{\underline{b}(1), \underline{b}(2), ..., \underline{b}(k)\}$, and consequently an estimate for the sequence {y(0), y(1), …, y(k)} are obtained through the equations:

$$\hat{\underline{b}}(k) = \hat{M}\,\hat{\underline{b}}(k-1) \tag{2.6}$$

$$\hat{y}(k) = \underline{x}(k)\hat{\underline{b}}(k) \tag{2.7}$$

The values of $\hat{M}$ are updated, through the gradient method, for example, where one tries to minimize the squared difference between the estimated observations, $\hat{y}(k)$, and the measured observations, y(k).

2.2b. The Proposed Time-Varying Prediction Algorithm

In this study, we derive an explicit equation relating the observations, y(1), y(2), … y(k), to the current, $\underline{b}(k)$. This can be achieved by expressing the previous values, $\underline{b}(1)$, $\underline{b}(2)$, … $\underline{b}(k-1)$ as functions of $\underline{b}(k)$. This equation has the form of a regression equation with colored noise. The likelihood function can, then, be easily derived (Chow, 1987), and maximized with respect to the unknowns.

Specifically, using the recursive equation given above (2.5):

$$\underline{b}(k) = M(k)\,\underline{b}(k-1) + \underline{h}(k)$$

And assuming the existence of $M^{-1}(k)$ for all k, one could obtain an expression for each $\underline{b}(k-1)$,…, $\underline{b}(1)$ as a function of $\underline{b}(k)$ as follows:

$$\underline{b}(k-1) = M^{-1}(k)\underline{b}(k) - M^{-1}(k)\underline{h}(k) \qquad (2.8)$$

$$\underline{b}(k-2) = M^{-1}(k-1)\underline{b}(k-1) - M^{-1}(k-1)\underline{h}(k-1) \qquad (2.9)$$

$$= M^{-1}(k-1)M^{-1}(k)\underline{b}(k) - M^{-1}(k-1)M^{-1}(k)\underline{h}(k) - M^{-1}(k-1)\underline{h}(k-1)$$

Following the same procedure, we continue until we get to $\underline{b}(1)$ as a function of $\underline{b}(k)$. Combining these expressions with equation 2.3, we get:

Equation 2.10

Which has the form:

$$\begin{bmatrix} y(1) \\ y(2) \\ . \\ . \\ . \\ y(k-1) \\ y(k) \end{bmatrix} = \begin{bmatrix} \underline{x}(1)M^{-1}(2)\ldots M^{-1}(k) \\ \underline{x}(2)M^{-1}(3)\ldots M^{-1}(k) \\ . \\ . \\ . \\ \underline{x}(k-1)M^{-1}(k) \\ \underline{x}(k) \end{bmatrix} \underline{b}(k) + \left[\begin{bmatrix} e(1) \\ e(2) \\ . \\ . \\ . \\ e(k-1) \\ e(k) \end{bmatrix}\right]$$

$$\left[- \begin{bmatrix} \underline{x}(1)M^{-1}(2) & \underline{x}(1)M^{-1}(2)M^{-1}(3) & \ldots & \underline{x}(1)M^{-1}(2)\ldots M^{-1}(k) \\ 0 & \underline{x}(2)M^{-1}(3) & \ldots & \underline{x}(2)M^{-1}(3)\ldots M^{-1}(k) \\ . & . & . & . \\ . & . & . & . \\ . & . & . & . \\ 0 & 0 & \ldots & \underline{x}(k-1)M^{-1}(k) \\ 0 & 0 & \ldots & 0 \end{bmatrix} \begin{bmatrix} \underline{h}(2) \\ \underline{h}(3) \\ . \\ . \\ . \\ \underline{h}(k-1) \\ \underline{h}(k) \end{bmatrix} \right]$$

$$\underline{Y}(k) = \underline{Z}(k)\underline{b}(k) + \underline{e}(k) + A(k)\underline{n}(k) \qquad 2.11$$

Where $\underline{Y}(k) = \begin{bmatrix} y(1) \\ y(2) \\ . \\ . \\ . \\ y(k-1) \\ y(k) \end{bmatrix}$, $\underline{Z}(k) = \begin{bmatrix} \underline{x}(1)M^{-1}(2)...M^{-1}(k) \\ \underline{x}(2)M^{-1}(3)...M^{-1}(k) \\ . \\ . \\ . \\ \underline{x}(k-1)M^{-1}(k) \\ \underline{x}(k) \end{bmatrix}$, $\underline{e}(k) = \begin{bmatrix} e(1) \\ e(2) \\ . \\ . \\ . \\ e(k-1) \\ e(k) \end{bmatrix}$

$$A(k) = \begin{bmatrix} \underline{x}(1)M^{-1}(2) & \underline{x}(1)M^{-1}(2)M^{-1}(3) & ... & \underline{x}(1)M^{-1}(2)...M^{-1}(k) \\ 0 & \underline{x}(2)M^{-1}(3) & ... & \underline{x}(2)M^{-1}(3)...M^{-1}(k) \\ . & . & . & . \\ . & . & . & . \\ . & . & . & . \\ 0 & 0 & ... & \underline{x}(k-1)M^{-1}(k) \\ 0 & 0 & ... & 0 \end{bmatrix},$$

$$\underline{n}(k) = \begin{bmatrix} \underline{h}(2) \\ \underline{h}(3) \\ . \\ . \\ . \\ \underline{h}(k-1) \\ \underline{h}(k) \end{bmatrix}$$

Since both $\underline{e}(k)$ and $\underline{n}(k)$ are independent, then the log likelihood function of the observations given M(1), … M(k), V= S_e^2 P i.e. the Covariance matrix of $\underline{h}(k)$, and S_e^2 could be expressed as:

$$\log L = constant - \frac{1}{2}\log\left|S_e^2 I_k\right| - \frac{1}{2}\log\left|Q\right| - \frac{1}{2}\frac{[\underline{Y}(k) - \underline{Z}(k)\underline{b}(k)]^T Q^{-1}[\underline{Y}(k) - \underline{Z}(k)\underline{b}(k)]}{S_e^2} \qquad (2.12)$$

where I_k is the unit diagonal matrix of dimensions kxk, and:

$$Q = I_k + A(k)[I_{k-1} \otimes P]A^T(k) \qquad (2.13)$$

with $\otimes$ being the Kronecker product.

As is clear from equation 2.12, the maximum likelihood estimate of M(k) can not be obtained analytically, and only numerical methods can be used to find the maximum. The maximization with respect to the other parameters, however, is straightforward and is given below. The maximization of 2.12 with respect to s_e^2 yields:

$$\hat{s}_e^2 = \frac{1}{k}[\underline{Y}(k) - \underline{Z}(k)\underline{b}(k)]^T Q^{-1}[\underline{Y}(k) - \underline{Z}(k)\underline{b}(k)] \qquad (2.14)$$

The maximization of 2.12 with respect to $\underline{b}(k)$ yields:

$$\hat{\underline{b}}(k) = [\underline{Z}^T(k)Q^{-1}\underline{Z}(k)]^{-1}\underline{Z}^T(k)Q^{-1}\underline{Y}(k) \qquad (2.15)$$

In summary, the proposed algorithm for estimating the time-varying parameters is as follows:

1) Assuming a constant coefficient model, estimate the unknown parameters using conventional methods, such as ordinary least squares. This should give an initial guess of the parameters, i.e. the coefficients and the variances.

2) Use Chow's method (Chow, 1987), which assumes an AR model for the time-varying coefficients, as in equation. 2.4, to get a second guess of the coefficients, $\underline{b}(k)$, M, and the variances.

3) Use the proposed approach, equation. 2.5, with the guessed $\underline{b}(k)$ to get a refined estimate of $\underline{b}(k)$ by maximizing equation 2.15.

4) Test if any of the estimated parameters is constant, remove any such parameters from the time-varying list of parameters, and repeat the previous step.

5) Substitute the estimated values of $\underline{b}(k)$ in equation 2.7 to find the predicted value of y(k).

3. Results

In this section, the methods outlined in the forecasting section are used with data from Turkey, Tunisia, and Egypt. The forecast of the stock market index is developed through a time-varying equation. When the forecast of the stock market is high and then starts to go down, this is the best time to offer the stocks of the public companies. This is true if the objective of the country under study is to get the maximum price. If, on the other hand, the objective is to stimulate the market, then the government should offer the stocks when the forecast of stock market is low for several months. It seems that Turkey offers its stocks when the market is low and both Egypt and Tunisia offer their stocks when the market is high.

Whatever policy is used, a minimum one-month forecast of the stock market index is needed. In the following subsections, we show the predictions, and what would have happened if the government had waited until just before the upswing cycle was over and then offered the public companies stocks. The difference between the stock price when offered and the stock price when it should have been offered is thus considered an opportunity loss.

3.1. Turkey

The privatization program in Turkey started with liberalization reforms initiated in 1980. As is the case in other developing countries, a consensus had emerged on the necessity of the state to withdraw from certain sectors of the economy in favor of the private sector. The state would then limit its role to sectors such as large infrastructure, health, education, social security, and national defense.

The privatization program has seen ups and downs under successive governments that did not necessarily share the same views regarding the priority of the program. Overall, even though the program has achieved some successes, it has been criticized for its slow progress.

Recent years have witnessed a stepping up of the privatization program. The latest 1999 talks with the IMF regarding a new standby agreement put privatization in the forefront. It now appears to one of the main conditions for the implementation of the agreement.

3.1a. Legal Framework and Implementation

The privatization program was initiated in 1983, according to the following legal procedures:

1. In 1984, the first regulation, Law No. 2983, was enacted.
2. In 1986, Law No. 3291 was enacted, authorizing the Council of Ministers to issue decisions on the transfer of SOEs (State-Owned Enterprises) to the PPA (Public Participation Administration), and the High Planing Council (HPC) was authorized to decide on the transfer of partially state-owned companies and subsidiaries to the PPA for privatization.

3. In 1992, statutory decree No. 473 authorized the Public Participation High Council (PPHC) to approve privatization transactions.
4. In 1994, a new privatization law, No. 4046, was been enacted, transforming Public Participation High Council (PPHC) into the Privatization High Council (PHC), which is chaired by the Prime Minister, and changing the Public Participation Administration into the Privatization Administration (PA.)

3.1b. The Objectives of Privatization in Turkey

The major objectives of the privatization program in Turkey are:

1. To minimize state involvement in the industrial and commercial activities of the economy.
2. To provide legal and structural environment in which free enterprise can operate.
3. To decrease the financial burden of state-owned economic enterprises on the national budget.
4. To transfer privatization revenues to major infrastructure projects.
5. To expand and deepen the existing capital market by promoting wider share-ownership.
6. To provide efficient allocation of resources.

The public offerings made within the framework of the privatization program bolstered the securities markets from the angle of supply, and have ensured the development of the market, giving it greater depth. It has been sporadically faced with explosive demand. Public offerings were popular and successful in the late 1980s. Because of the rising market, the administration thought it was the right time to sell SOE shares. However, the offerings were mainly minority shares held by the in private enterprises, rather than fully state-owned enterprises (Gultekin,1996).

Teletas, first offered to the public by the state in 1988, set a convincing example for all subsequent public offerings. The success of the Teletas sale helped to gauge the potential of the market. It also helped attract foreigner investors. It seems that in certain issues, however, small investors were never given priority in attractively priced issues.[1]

The market performance of publicly-owned companies in their first three weeks of trading was positive for private sector firms, but negative for public sector shares. However, after three months, private sector shares had lost 10 percent of their value, whereas shares sold within the scope of privatization

[1]This problem is also present in initial public offerings of private companies.

had made a 30 percent premium (Yildirim,1996). This suggests that obtaining a maximum price is not necessarily the main objective of the government. The success of the issue, as well the confidence of the potential investors, may be more important considerations. In certain instances, however, the government did issue shares when the market was rising to benefit from the bullish market (Yildirim, 1996).

3.1c. The Turkish Stock Market in Context

As a result of the public offerings made under the privatization project, on the one hand, and by private companies on the other, the number of companies traded on the ISE increased threefold between 1985 and 1998. As a secondary market, the performance and dynamism shown by the ISE since 1986 have given momentum to initial public offerings (IPOs). When the market has been active, public offerings have increased.

The major problem in the offerings made under the privatization program lies in the ownership structure of the privatized companies. A large proportion were composed of the sale of government minority shares in private sector companies. Thus it is difficult to characterize these issues as "proper" privatizations. Some of these shares belong to private sector companies that are already traded in the ISE. Even in the case of Teletas, it is difficult to attribute the success to the privatization program, as the company has been part of a successful partnership with a foreign company.

The value of a company that is eligible for privatization is determined by one or more of the following methods: discounted cash flow (net present value), dividend yield, book value, net asset value, depreciation substitution value, liquidation value, price/earnings ratio, market capitalization value, expertise value, price/cash flow ratio etc. The determination of the value is made either by a special valuation committee or by native and/or foreign consultants. The final decision defers to the privatization administration for the final price that is communicated to the public. The performance of privatized firms suggests that the success of the issue is more important than obtaining the highest price.

3.1d. Forecasting the Turkish Stock Market Index

A time-varying AR model was used to predict the Turkish stock market index one month ahead. Many companies were studied and the results of three companies are presented below. The companies are NIGDE, TURCAS and TOFAS. According to our criterion, only one of them was offered at the right time (TOFAS). The details of the forecasting algorithm are given above in Section 2.

The Turkish Stock Market Index and the prices of the different companies were tested and turned out to be integrated of order 1, i.e. I(1). Differencing was performed on the prices and the resultant differenced variables were tested and turned out to be stationary. Stepwise regression was then performed to find the relation between the one-month prediction of the Index and the different stocks. It was expected that some companies would have a dominant effect on the forecast. Surprisingly, though, the lags of the index were the ones that showed more influence. The one-month-prediction model for the difference in the Index was then set as:

$$D\_Index(k) = constant + a_1(k) D\_Index(k-1) + a_2(k) D\_Index(k-2) + e(k)$$

where $a_1(k)$ and $a_2(k)$ are two unknown time-varying coefficients to be estimated as shown in the appendix. Their estimates are shown in the following figure 1. The one month ahead prediction (out of sample) in the change in the Turkish Stock Market Index is shown in figure 2.

The index was predicted to go down in May of 1991 and July 1991, and it was down in the previous months. Thus both companies, NIGDE and TURCAS, were offered when the index was predicted to continue declining. If the objective is maximize profit, the stocks were offered at the wrong timing. The index was predicted to go up in June of 1992 and it was down in the previous month. Thus, TOFAS stocks were offered at the right time. The previous conclusions are valid only if the Turkish government's objective is to sell when the stock market is high. It seems that the Turkish government has a mixed strategy. It is selling the stocks when the stock market index is down, but also when it is up. This might be to stimulate the stock market or for other reasons beyond the scope of this discussion.

3.2 Tunisia

The privatization program in Tunisia is part of a wider liberalization and deregulation program begun in the early 1970s which aims to promote an open market economy by encouraging private initiative and decreasing the role of the government in sectors that should be delegated to the private sector. The ultimate goal of the program is to achieve a high growth rate, a low unemployment rate, and an improved level of general welfare for the Tunisian people. The program was limited by a lack of critical impetus up until the late 1980s, but since that point, the government has shown a stronger commitment to the privatization program.

3.2a. Legal Framework and Implementation

The privatization program was initiated according to the following legal procedures:

1. The first law, No 85-72, was promulgated in July 1985, reforming the public sector and redefining a public establishment as one in which the state holds 34 percent of shares, compared to the previous 10 percent threshold. This law was followed by law No 87-47 of August 1987.
2. Law No. 89-9 of February 1, 1989, amended and complemented by law No. 94-102 of August 1, 1994 and law No 96-74 of July 29, 1996, further regulated state ownership and public enterprises.
3. Law No. 89-115 of December 30, 1989 enacted the Fund for the Restructuring of State Owner Enterprises (FREP) to cover the cost of restructuring state-owned enterprises.

The Ministry of Economic Development is responsible for designing and implementing the privatization strategy. The Commission for the Restructuring of State-owned Enterprises (CAREPP), created in 1989, coordinates the efforts of all of the ministers concerned with the task of privatizating and restructuring SOEs. The Technical Committee for Privatization, created in 1997, is responsible of the technical aspects of privatization. Receipts from privatization go to a special fund that finances the restructuring of SOEs, the FREP mentioned above.

3.2b. The Objectives of Privatization in Tunisia

The main objectives of the privatization program in Tunisia include:

1. Ensuring a company's durability.
2. Strengthening the equilibrium of the government budget.
3. Transferring responsibility for certain services traditionally provided by the state to the private sector.
4. Revitalizing the financial market.

Beyond these specific objectives, the privatization process is also governed by the general principles of the preservation of public interest and full procedural transparency.

According to the Bourse des Valuers Mobilières de Tunis, no publicly-owned companies were sold on the Tunisian stock market prior to the late 1980s. During the 1990s, the government began trying to invigorate the stock market through different incentive schemes, principally by offering tax advantages for investors and companies issuing or selling shares. The number of privatizations through public offering reached 11 by the end of the decade in 1999.

The major challenges facing public offerings in Tunisia are the depth and breadth of the market, as well as the savings/investment mentality. The market is relatively small compared to the size of the economy and is not particularly liquid. Investors prefer other, less risky forms of investment. Further, between 1994 and 1996, the market experienced a period of overvaluation that did not help the investor confidence.

3.2c. The Tunisian Stock Market in Context

The Tunis Stock Market (Bourse des Valeurs Mobilières de Tunis) opened in 1969, but its activity was rather limited. The market was reformed in 1988 under the terms of a structural adjustment program, with a subsequent reform in 1994 to ensure compliance with international standards. The market is currently trying to attract foreign investors through different schemes relating to currency convertibility, as the Tunisian Dinar is not yet convertible in the foreign exchange market, and to tax advantages, mainly offered in the form of tax exemptions on dividends and capital gains.

New regulations have been enacted which aim at increasing both the supply and the demand for shares via incentive plans. Profit tax has been cut from 35 percent to 20 percent over 5 years for companies listing their shares on the exchange and for those selling at least 30 percent of their equity to the public. On the demand side, tax incentives are offered to investors through new saving plans managed by brokers.

In Tunisia, issues are priced by banks and/or consultants using a range of different methods, including book value, liquidation value, discounted cash flows, price-to-earning ratio etc. An average price is computed and generally a discount is given on this price. Obtaining the maximum price on an issue has never been the primary concern in public offerings. Instead, the Tunisian government has been more focused on the success of the issue and on the revitalization of the stock market.

3.2d. Forecasting the Tunisian Stock Market Index

A time-varying model AR was used to predict the Tunisian stock market index one month ahead of time. Many companies were studied, and the results of three companies are presented below. The companies are ICF, BH, and AMS. According to our criterion, two of them, ICF and BH, were offered at the right time. The details of the forecasting algorithm are given in the appendix.

The Tunisian Stock Market Index and the prices of the different companies were tested and turned out to be integrated of order 1, i.e. I(1). Differencing was performed on the prices and the resultant differenced variables were tested and turned out to be stationary. Stepwise regression was then performed to find the relation between the one-month prediction of the index and the different stocks. The lags of the index were again the ones of interest.

The one-month-prediction model for the difference in the Index was then set as:

$$D\_Index(k) = constant + a_1(k)D\_Index(k-1) + a_2(k)D\_Index(k-2) + e(k)$$

where $a_1(k)$ and $a_2(k)$ are two unknown time-varying coefficients to be estimated as shown in the appendix. Their estimates are shown in the following Figure 3. The one-month-ahead prediction (out of sample) in the change in the Tunisian Stock Market Index is shown in Figure 4.

The Index was predicted to go down in May 1993, while it was up in April 1993. Thus, the ICF stock should have been offered in April 1993. Similarly, the index was high in June 1993, and was predicted to go up in July of the same year. Thus, offering the stocks of BH should have delayed. The index was low in November 1994, and it was predicted to go lower in December. Thus, the AMS offering should have been delayed until the market went up again.

3.3 Egypt

The Egyptian economy has been dominated by the state since the nationalization of privately owned companies in 1961. Private sector activities began to return again around 1975. As of 1995, however, more than half total GDP two thirds of non-agricultural GDP, and three quarters of formal manufacturing production were still generated by the public sector.

3.3a. Legal Framework and Implementation

The following is a summary of the principal steps in the process of Egyptian privatization:

1. The Government of Egypt (GOE) privatization program has singled out 314 firms as the target of reform. Law 213 for the year 1991 granted autonomy to parastatal managers, transformed state-owned enterprises into joint stock companies, removed ministerial control through the creation of 27 holding companies, legalized bankruptcy, liquidation, and privatization, and hardened budget constraints by phasing out access to budget subsidies and restrictions on state guarantees of parastatal bank loans.
2. In 1992, a new Minister of Public Enterprise was appointed and a Technical Secretariat was created.

The Ministry of Public Enterprises is responsible for designing and implementing the privatization strategy. Receipts from privatization go to a special fund that finances the restructuring of state-owned enterprises (SOEs).

3.3b. The Objectives of Privatization in Egypt

The main objectives of the privatization program in Egypt are:

1. Ensuring a company's durability.
2. Ensuring labor rights.
3. Generating income for the government to help reduce the budget deficit.
4. Transferring responsibility for certain services traditionally provided by the state to the private sector.
5. Revitalizing the financial market.

As in Tunisia, the privatization process is also governed by the general principles of the preservation of public interest and full procedural transparency. Under the economic restructuring program planned by the

World Bank and the IMF, the GOE agreed to sell state-owned enterprises in batches, such that by the end of 1996, all the SOEs would be sold. According to the terms of the privatization program agreed to by the government, the GOE should:

- By 31 December 1993, complete sale of the 22 assets/companies brought to the point of sale as of March 1993 and bring to the point of sale 25 percent more. In addition, the GOE should complete sales of 10 percent of the book value of the companies included in the 1993-1994 privatization program.
- By 30 June 1994, bring to the point of sale the remaining 75 percent and complete sale of an additional 30 percent of the assets included in the 1993-1994 program.
- By 31 December 1994, complete sale of an additional 30 percent of the 1993-1994 program and bring to point of sale 50 percent of the entities in the 1994-94 program, as well as complete the sale of 20 percent of the 1994-95 entities.
- By 30 June 1995, complete the sale of the remaining 30 percent of the 1993-1994 program and bring to point of sale the remaining 50 percent, in addition to completing the sale of an additional 40 percent of the 1994-1995 program. The GOE should also bring 50 percent of the 1994-95 program to point of sale 50 percent, and complete the sale of an additional 40 percent. Finally, the GOE should bring to point of sale 50 percent and complete the sale of 20 percent of entities in 1995-1996 program.

This World Bank/IMF schedule was unrealistic and it was never met. By September 1998, the GOE offered international tender requesting investment consortia to help in underwriting and promoting the sale of the remaining

Law 203 firms. By 2001, more than 60 percent of the identified SOE are still state-owned. The major challenges inhibiting public offerings in Egypt are political and social pressures to prevent the sale of SOE to foreign investors.

3.3c. The Egyptian Stock Market in Context

If share prices in the Egyptian Stock Exchange (ESE) are efficient, then the market would anticipate the future direction of the Egyptian economy, or any other economy for that matter. As of January 2001, more than 50 companies were privatized via the stock market. Since privatization through the stock market began in 1996, the majority of Law 203 firms saw their market prices initially climb to high levels. After February 1997, however, prices started to stabilize, major corrections to the market were observed, and stock prices started to go down. Some shares of previously state-owned enterprises tumbled to more than 50 percent of their initial values. This, in part, has led to the deceleration of privatization in Egypt.

3.3d. Forecasting the Egyptian Stock Market Index

A time-varying AR model was used to predict the Egyptian stock market index one month ahead of time. Many companies were studied and the results of four companies are presented below. The companies are Abu-Keer, Amirya, Al-Ahram, and Eastern Tobacco. According to our criterion, none of them was offered at the right time.

The Egyptian index and the prices of the different companies were tested and turned out to be integrated of order 1, i.e. I(1). Differencing was performed on the prices and the resultant differenced variables were tested and turned out to be stationary. Stepwise regression was then performed to find the relation between the one-month prediction of the index and the different stocks. Surprisingly, Abu-Keer proved to have a high predictive power for the index. The one-month-prediction model for the difference in the index was found to be:

$$D\_Index(k) = constant + a_2(k) D\_Index(k-2) + b_1(k) Abu(k-1) \\ + b_2(k) Abu(k-2) + e(k)$$

where $a_2(k)$, $b_1(k)$, and $b_2(k)$ are three unknown time-varying coefficients to be estimated as shown in the appendix. Their estimates are shown in the following Figure 5. The one-month-ahead prediction (out of sample) in the change in the Egyptian stock market index is shown in Figure 6.

As one can see from the table, Amirya Cement was offered in February 1995. At that time, the monthly prediction of the change in the stock was negative, and the actual previous month change in index, January 1995, was negative. Thus, this was the wrong time for a public offering. Eastern Tobacco Company for was offered in October 1995. A negative change in the index was forecast. Thus, the offering should have been delayed until the next predicted positive change in the index. Again, we identify a missed opportunity. Al-Ahram Beverages was offered at the right time, as the forecast for August 1996 predicted a positive change in the index.

4. Summary and Conclusions

This report addressed the forecasting of the stock market index and its application in the timing of the initial public offering of stock in state-owned enterprises. We posed the question of whether a good forecasting algorithm can be used to determine the best time of for offering shares of SOEs. We applied a new forecasting algorithm that is a modification for Chow's method in order to estimate time-varying parameters. The new approach is elaborated in Abutaleb and Papaioannou (2000). The algorithm was used in forecasting of the change in the stock market indices of Turkey, Tunisia, and Egypt. The forecasts were used as bench marks in order to identify the strategy employed by the government when selling the SOEs on the stock market.

Some governments show an interest in maximizing their profit from the sale of SOEs. In such cases, they sell when the market is forecast to be high. Other governments are more interested in stimulating the stock market. Thus, they offer shares of the SOEs when the market is forecast to be low.

Sometimes, offering shares in the stock market might not be related to the stock market itself but to other political issues. Judging from our forecasts for Egypt, Tunisia, and Turkey, it seems that both Egypt and Tunisia offer shares of SOEs when the market is forecast to be high. Turkey, on the other hand, seems to offer shares when the market is low. In all three countries, however, the timing was sometimes wrong. In Turkey, some shares where offered when the stock market was forecast to be high. In Egypt and Tunisia, some shares were offered when the stock market forecast was low. This might be due to the respective governments' application of inadequate forecasting methods, but may also be explained by political reasons.

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Figure 1: Estimated Time -Varying Coefficients of the Turkish Stock Market Index

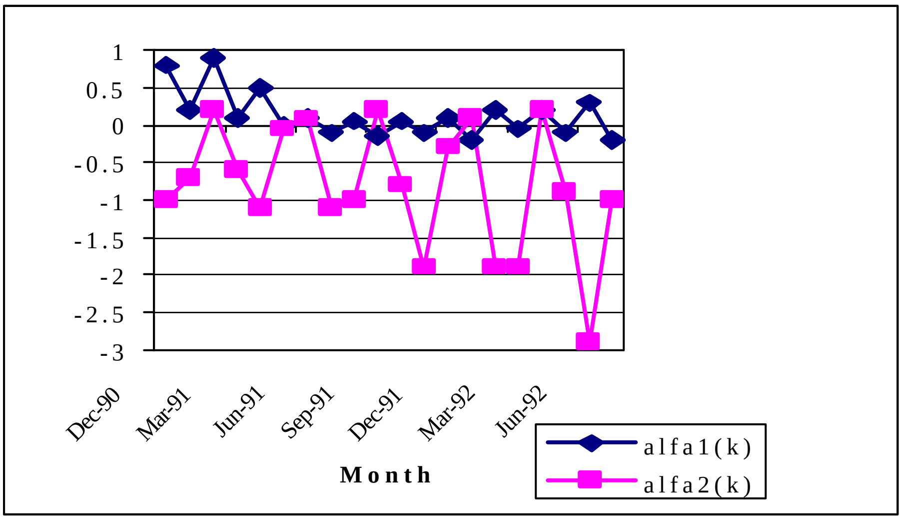


Figure 2: Actual and Predicted Change in the Turkish Stock Market Index

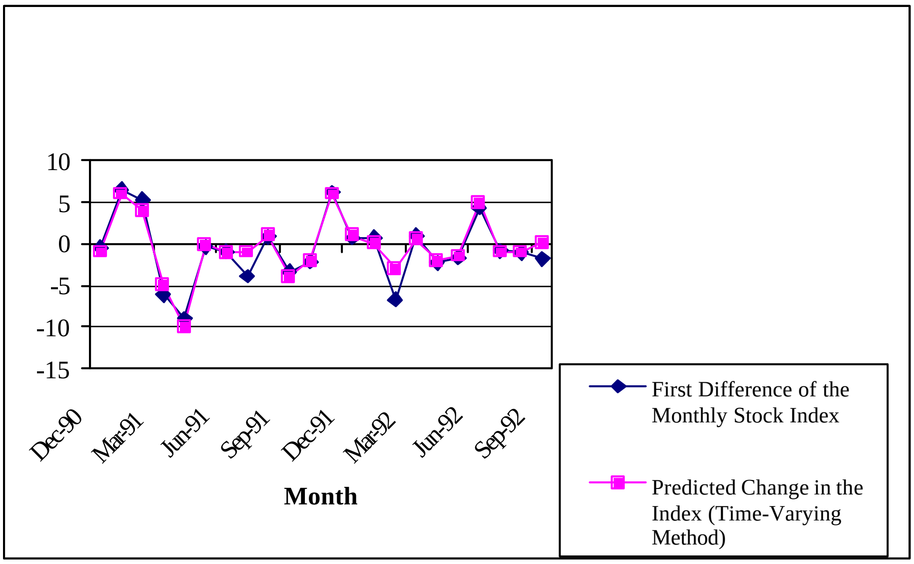


Figure 3: Estimated Time -Varying Coefficients of the Tunisian Stock Market Index

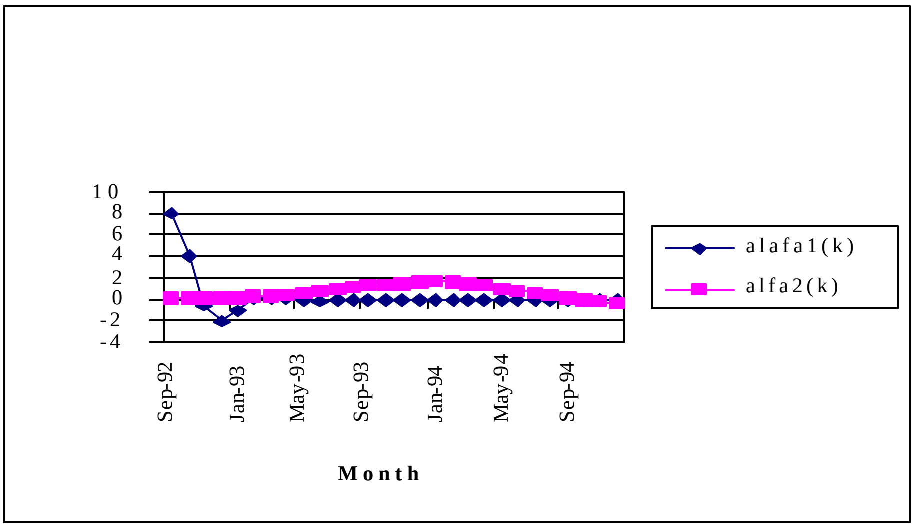


Figure 4: Actual and Predicted Change in the Tunisian Stock Market Index

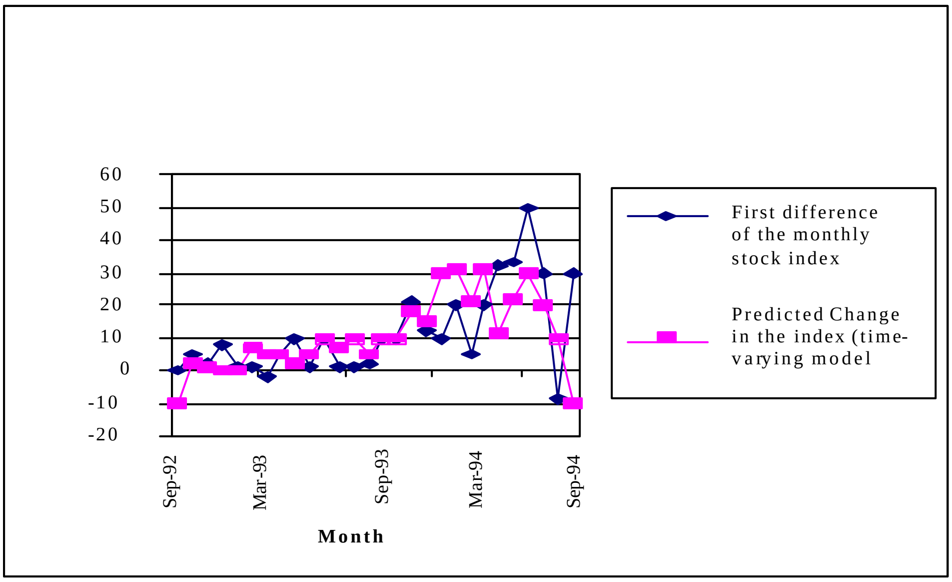
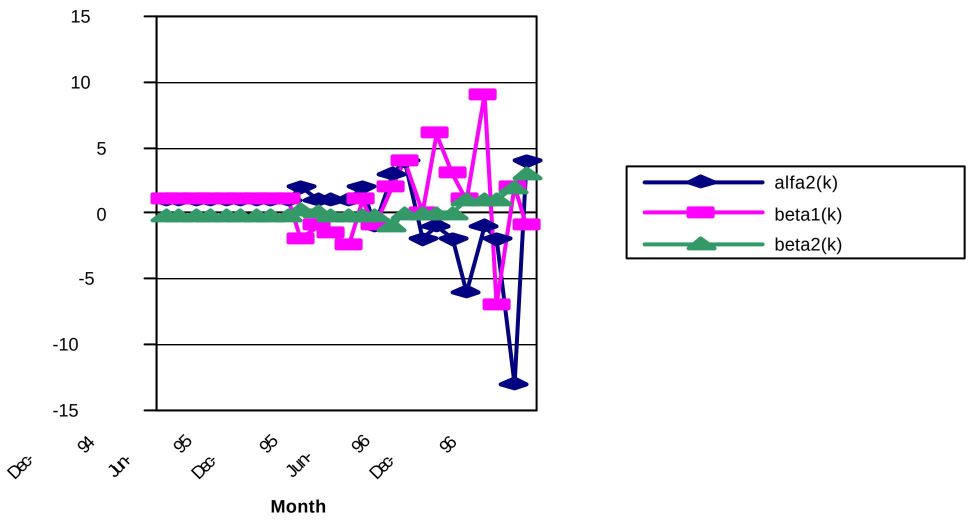


Fig. 5 , Estimated Time-Varying Coefficients of the Egyptian Stock Market Index



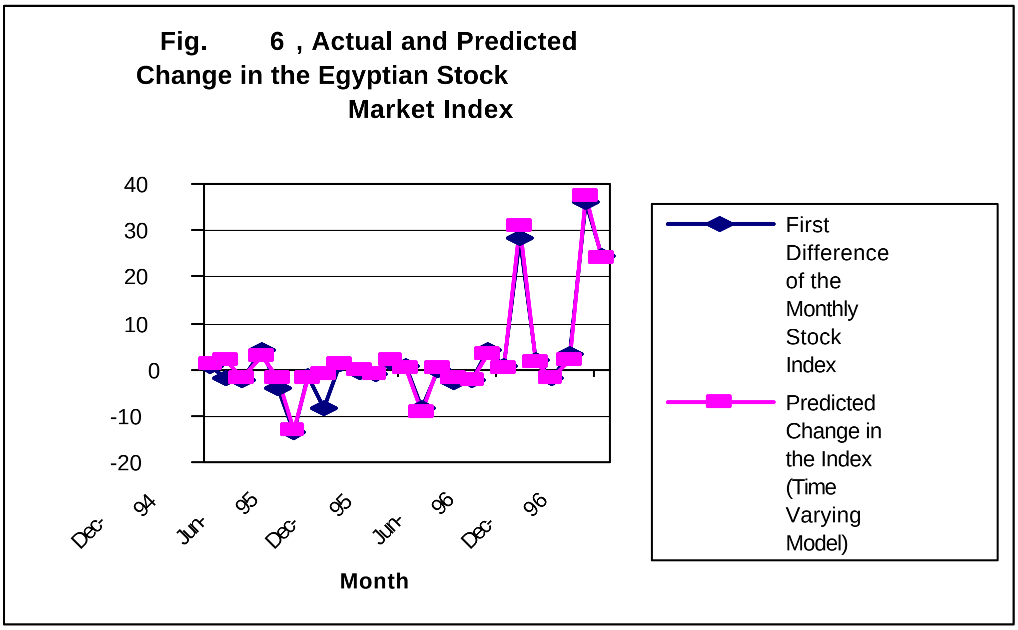


Fig. 6 , Actual and Predicted Change in the Egyptian Stock Market Index
40
30
20
10
0
-10
-20
Dec-94
Jun-95
Dec-95
Jun-96
Dec-96
Month
First Difference of the Monthly Stock Index
Predicted Change in the Index (Time Varying Model)

Table 1: Actual Stock Prices and Predicted Values for the Change in the Turkish Stock Market Index (Adjusted for Inflation)

Month	Actual Change in Index	Predicted Change in Index	***NIGDE***	*TURCAS*	***TOFAS***
Dec-90	-0.509794				
Jan-91	6.594433				
Feb-91	5.3146701				
Mar-91	-6.111076				
Apr-91	-8.995177				
May-91	-0.319845	-0.21	318.51		
Jun-91	-0.97918		325.35		
Jul-91	-3.907837	-4.01	306.20		449.43
Aug-91	0.8720597		**310.98**		**457.77**
Sep-91	-3.387758		**305.51**		**366.51**
Oct-91	-2.162847		**306.65**		**407.72**
Nov-91	6.2397944		**310.76**		**532.83**
Dec-91	0.685901		**312.12**		**840.47**
Jan-92	0.6950048		**348.37**		**907.19**
Feb-92	-6.733421		**348.37**		**640.78**
Mar-92	0.993054		**326.94**		**740.87**
Apr-92	-2.224185		**343.81**		**707.50**
May-92	-1.710631		**343.81**		**599.07**
Jun-92	4.4193608	4.01	**334.01**	199.51	**937.61**
Jul-92	-0.802076		**334.01**	250.14	**1520.49**
Aug-92	-1.036153		**329.45**	252.75	**1951.27**
Sep-92	-1.753759		**324.66**	242.17	**2584.69**

Table 2: Actual Stock Prices and Predicted values for the Change in the Tunisian Stock Market Index.

Month	Actual Change in Index	Predicted Change in Index	ICF	BH	Ams
Sep-92	-0.37		.	.	.
Oct-92	3.65		.	.	.
Nov-92	2.57		.	.	.
Dec-92	6.46		.	.	.
Jan-93	-0.55		.	.	.
Feb-93	2.37		.	.	.
Mar-93	-3.3		.	.	.
Apr-93	4.98		.	.	.
May-93	8.17	-1.03938	33.6	.	.
Jun-93	2		34.86	.	.
Jul-93	9.67	10.78513	37.53	7.4	.
Aug-93	1.97		37.91	7.75	.
Sep-93	4.12		37.9	7.48	.
Oct-93	3.63		37.84	7.6	.
Nov-93	10.5		37.78	7.54	.
Dec-93	8.09		37.4	7.63	.
Jan-94	20.1		38.68	7.84	.
Feb-94	12.53		38	9.31	.
Mar-94	12.48		40	11.5	.
Apr-94	20.72		46	14.4	.
May-94	5.68		46	13.74	.
Jun-94	18.11		53.7	13.9	.
Jul-94	32.64		63.95	14.83	.
Aug-94	34.11		69.67	15.16	.
Sep-94	48.57		77.08	17.6	.
Oct-94	30.19		70.1	21.46	.
Nov-94	-5.21		70	21.58	.
Dec-94	26.28	-9.94118	68	27.9	12.54

Table 3: Actual Stock Prices and Predicted Values for the Egyptian Stock Market Index.

Month	Actual Change in Stock Index	Predicted Change in Index	Abu-Keer	Amirya Cement	Al-Ahram Beverages	Eastern Tobacco Company
Dec-94	0.9	1.2	94			
Jan-95	-2	2.2	80.75			
Feb-95	-2.15	-1.8	72.5	50.2		
Mar-95	4.17	3	74	54.5		
Apr-95	-3.89	-2	72	53.85		
May-95	-13.52	-13	47.98	52		
Jun-95	-1.3	-2	51.55	50		
Jul-95	-8.43	-1	50	48.8		
Aug-95	1.36	1	48.4	48		
Sep-95	-0.68	0	48.01	51.5		
Oct-95	-1.01	-1.01	46	52.35		43.75
Nov-95	1.74	2	44.5	48.4		45.6
Dec-95	0.55	0.2	43.25	50.5		44.95
Jan-96	-8.3	-9	38	45		39.5
Feb-96	0.06	0.1	35.95	47.76		41.5
Mar-96	-2.54	-2	33.8	44.91		37.75
Apr-96	-2.4	-2.4	32.95	44		34.16
May-96	4.1	3.5	34.8	46		35.5
Jun-96	0.52	0.1	35	46.4		36.8
Jul-96	28.4	31.1	49	53.25		43.26
Aug-96	1.92	1.4	42	53.5	62	42.51
Sep-96	-1.81	-1.7	48.01	57.25	67	46.5
Oct-96	3.11	2.1	48	58.56	66.5	48
Nov-96	36.1	37.2	61.5	64	70	59
Dec-96	24.41	24.1	80	64	61	52.6