The Future Of The Stock Market Channel In Egypt

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Abstract

The paper attempted to identify the degree of predictability of stock market returns from monetary variables and whether the stock market could be an alternate channel for transmitting monetary policy rather than the traditional money and credit channels. The empirical investigation was conducted using Bayesian VAR models consisting of four endogenous variables with four lags and a constant. Monthly data used in the estimation are the *actively traded stocks* HFI returns to represent market performance and inflation rate, as well as growth in both M1 and M2, and growth of credit to the private sector to represent the monetary stance. Empirical investigation showed, currently, the effectiveness of the credit channel in transmitting the monetary policy as well as the balance sheet channel. Nevertheless, the results provided evidence that in the future the stock market could be an effective channel in transmitting the monetary policy rather than the traditional credit channel.

I. Introduction:

Equities are considered claims on future economy output, so if monetary policy has real economic impact, then shifts in the monetary policy should affect prices. Therefore monetary conditions have impact on the stock market return behavior, as capital markets are playing increasingly important role in the transmission of monetary policy. This has been confirmed by Alan Greenspan in one of his speeches addressed to Fund's Open Market Committee (FOMC) after raising the interest rate stating that Central Bankers should *put an eye* on the stock market behavior as it reflects the macroeconomic conditions. Chami *et al*. (1999) showed that modern day process for transmitting the effect of monetary policy shifts is primarily through assets prices adjustment rather than through the traditional money and credit channel.

The growing globalization of financial markets and adoption of more flexible monetary and exchange rates regimes resulted in increasing evidence of predictability of stock markets performance using monetary variables. The response of the financial markets towards monetary policy depends on market efficiency and the degree of development of both financial institutions and equity culture in the market. This explains the extensive research on the linkages between advanced/mature stock markets behavior and monetary policy, while it remained relatively unexplored area for emerging markets.

Thus, this paper will attempt to explore the possibility of monetary policy innovations to have forecasting power of variations in the Egyptian market returns and to illustrate the role of the stock market as an alternate channel for transmitting monetary policy in the future. The empirical investigation was conducted using Bayesian Vector Autoregressive models (Bayesian-VAR, henceforth) in estimating monthly monetary and stock market data during the period starting June 1992 and ending April 2000.

The paper is organized as follows. Section II reviews the existing theories and literature of linkages between stock market returns and monetary policy. Section III provides background on the monetary policy development in Egypt and recent stock market performance. Section IV discusses the methodology used for empirical investigation. Section V describes the data used and section VI presents the empirical estimation results. Finally, section VII concludes the results.

II. Literature Review:

An extensive amount of research discussed thoroughly the linkages between the monetary policy and asset price movements. Booms in asset prices tend to be associated with relatively long economic expansions boosting investors overconfidence towards economic fundamentals, future companies' productivity and expectations of future profits growth. Consequently, a trend of overborrowing, overinvestment, and overconsumption are realized and transformed into wealth effect. However, in some cases, asset prices may rise without corresponding improvements in the fundamentals during the period of low and stable inflation, especially when monetary and credit aggregates are growing faster than nominal output [2].

In emerging market economies, periods of equity price increases have usually been accompanied by the large capital inflows and increasing of domestic market integration with other world capital markets. However, empirical evidence suggested that reversal in prolonged rises in equity prices is due to monetary conditions has been tightening significantly. This shift in the monetary policy could be intentionally by the central bank due to inflationary pressures or unintentionally due to vulnerable capital flows [3].

[2]Federal Reserve Bank of Cleveland, "Beyond Price Stability: A Reconsideration of Monetary Policy in a period of low inflation", *Annual Report (1998).*
[3]A good example was the case of Mexico in 1994 and Thailand in 1997.

The monetary policy could be considered as one of the precautionary measures that dampen high volatility in asset prices, which has a negative impact on real economy. The important question is that when should monetary policy makers be concerned about the behavior of asset prices? It is very important to highlight that monetary policy should not attempt to stabilize asset prices, as volatility in asset prices generates profits and liquidity. However, the policy makers should determine adequately whether assets are overvalued or not, and most importantly, the levels of volatility at which they should intervene to avoid turbulence in financial markets[4] that results in disrupting the financial sector and real economic activity. History had proven that when monetary policy remained unresponsive towards volatile asset prices, a severe sustained damage would hit the economy.[5]

Expectations regarding monetary policy shifts plays a vital role in the market value of financial instruments. Economists have considered two fundamental hypotheses to identify the role of expectations in financial markets. The first is the adaptive expectations process which is based only on past information to identify the market value of a stock or a bond. The second which was introduced by Muth and Lucas separately in late 1960s, is the rational expectations process which is based on all available information (past and current) and on understanding the market behavior. Ashift to an expansionary monetary policy, according to adaptive expectations, will not have an

[4] Financial markets include currency exchange markets.
[5] See Shiller (2000) for detailed discussion.

immediate impact prices and it will take some time until investors anticipate increase in inflation. On the other hand, according to rational expectations, investors will anticipate higher inflation rate, consequently prices will increase immediately.

Number of monetary indicators had been used to investigate the impact of monetary policy shifts on the behavior of financial markets. Their significance depends on the extent the markets investigated are matured and instruments used by policy makers to cause the shift. Monetarists, led by Milton Friedman, emphasized that changes in the money supply exert a large influence on both prices and output, concluding that best monetary policy characterized by predictability in money supply growth. In the late sixties, James Tobin illustrated the link between the monetary policy and stock prices and the impact on real economy growth using his famous Tobin's *q* theory. He showed that there is a positive relation between *money supply* and stock price. Similarly, Franco Modiliani in the early seventies confirmed these findings showing that expansionary monetary policy, by increasing money supply, could lead to a rise in stock prices. Thus, there is "wealth effect" experienced. Therefore, financial wealth will increase, and consequently consumption will rise[6]. In case of unanticipated positive money supply shock, a tighter monetary policy will be

[6]On the contrary to various studies, Ludvigson and Steindel (1999) provided evidence that, incase of US, there is a weak connection between stock market wealth and consumption. They attributed these findings to stocks owned by households is held mostly in pension accounts and changes in stock values have relatively insignificant direct impact on spendable cash.

perceived as higher interest rate will be expected to compensate for the increase in money supply to avoid inflationary pressures, this is known as "liquidity effect"[7].

In developed markets the discount rate changes – as a proxy of monetary policy stance – capture a widespread attention and have impact on the stock market returns.

Although it is infrequently changed, it provides the market with signals to monetary policy direction whether expansive or restrictive. This is due to discount rate is established by the central bank as a response to the economy's need for liquidity and credit. The rise in discount rate will raise interest rates, which will result in a decline in stock prices and vice versa.[8] [9]

An unanticipated rise in inflation may lead to a decline in stock prices, as expectations of more restrictive monetary policy will increase. In fact, inflation is positively related to interest rates and negatively

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[7]Strongin and Tarhan (1990).

[8]See, Waud (1970), and Jensen *et al* (1996).

[9] It is important to highlight that in many cases a severe tightening in monetary policy during stock market bubbles was associated with the burst of the bubble and a crash. A good example was the 1929 Crash of New York Stock Exchange, which followed a tight monetary policy by the Federal Reserve at that time by increasing the rediscount rate from 5% to 6%. Also, in Japan, the rise of discount interest rate from 2.5% to 6% -to stabilize the financial market after the peak during 1989 and 1990- played a role in the stock market crash and in the severe recession (Shiller, 2000).

related to stock prices. This is known as "inflation expectation hypothesis".[10] In 1979, Modigliani and Cohn presented the "money illusion" effect, in which markets tend to be depressed when nominal interest rates are high even though the real interest rate is not high. They argued that stock markets react inappropriately to inflation due to investors' ignorance that interest rate rise is to compensate for the rise in inflation.

There has been ample evidence that firm size [11] matters with respect to response towards monetary policy shocks.[12] It has been observed that small firms including tradable ones tend to be more dependent on bank financing compared to large firms. This is because the former has limited access to capital markets. For example interest rate changes will affect the creditworthiness of the small firms. Thus, small firms response to monetary policy shocks is more significant compared to that of large firms, especially in adverse economic conditions[13].

Researches suggested that the effect of asset price changes on the economy is transmitted through the balance sheets of households, firms and financial intermediaries as it affects their ability to borrow

[10]Fama and Schwert (1979).

[11]The size of a firm is defined as the market capitalization and is a proxy for sensitivity to risk factors. The small firms known as “Small Caps” and large firms known as “Large Caps”.

[12]See Fama and French (1993 & 1995)

[13]Chan and Chen (1991)

or lend. This is known as "the balance sheet channel"[14]. The deterioration in balance sheets would be magnified on the long run in the form of declining sales and employment implying further weakening in cash flows and spending. This is known as "financial accelerator" effect.[15] However, recently, the significance of these findings has been declining in few markets. This is due to the continuous financial innovation, which reduce the extent of firms to be bank-dependent. A new financial innovation that is getting to be a known practice is asset securitization techniques in which firm size and asset mix are no longer constraints to access debt markets[16].

Various studies mostly examined developed markets, provided evidence consistent with the above theoretical background. Hess and Lee (1999), based on pre- and postwar periods in USA, UK, Japan, and Germany, showed that the response of stock returns to inflation varies over time and depending on whether it is a money supply or demand shock. Thorbecke (1997) examined the relation between monetary policy and stock returns. He showed that expansionary monetary policy increases stock returns. Booth and Booth (1997) using Federal funds rate and discount rate have confirmed these results. They showed that a restrictive monetary policy stance lowers

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[14]Bernanke and Gertler (1995).

[15]See Gertler and Gilchrist (1994), Chan et al (1985), and Bernanke et al (1996).

[16]Thornton (1994) confirmed these results suggested that this caused, recently, a weakening in the credit channel.

monthly returns of both large and small stock portfolio. They concluded that monetary policy has explanatory power in forecasting stock portfolio returns. Patelis (1998) confirmed these findings by estimating a VAR model to examine the impact of the Federal Reserve monetary policy on US markets.

McQueen and Roley (1993) examined the stock market responses to macroeconomic news across different economic states using unemployment rate and money supply announcements. The authors provided evidence that the stock market's response to macroeconomic news depends on the state of the economy. These results had been confirmed by Li and Hu (1998) showing that stock market responses to macroeconomic shocks varies across different stages of the business cycle. Furthermore, the authors provided evidence that the size of the firm matters. They showed that during restrictive monetary policy periods small caps tend to perform poorer compared to the large caps.
Regarding emerging markets, few studies addressed the predictability of the stock market returns from information available on the monetary policy[17]. For instance, Leigh (1997) examined the relationship of the Singapore Stock Market and the overall economy. The study provided evidence that the semi-strong form of efficiency is

[17] The significance of the argument that monetary policy has explanatory power to emerging market returns relies mainly on the efficient market hypothesis [EMH]. As shown by Fama (1970) in his famous paper on efficient capital markets that a market in which prices reflect available public information is characterized by semi-strong efficiency. Most of studies on emerging markets failed to provide evidence that they are semi-strong efficient. Some of them even failed to satisfy the hypothesis of weak form efficiency.

not rejected for Singapore Stock Market. The analysis shows that there is a significant relationship between stock market returns, consumption, investment, money and inflation. More recently, Mauro (2000) investigated thoroughly the correlation between various macroeconomic and monetary indicators with lagged stock returns in both advanced and emerging economies.

With respect to the Egyptian Stock Market, the existing literature, which is very few, is limited for testing the weak form of the efficient market hypothesis [EMH] and estimating the volatility of stock market returns. For instance, an early paper by El-Erian and Kumar (1995) provided a comparative analysis of equity markets in six Middle Eastern countries (Egypt, Iran, Jordan, Morocco, Tunisia and Turkey). They identified the principle characteristics of these markets and analyzed their informational efficiency. More recently, Shams El-Din (1998) detailed the institutional developments and its impact on the stock market performance and pricing efficiency since the stock market was revitalized in 1992. Fahmy (1998) and Bahaa-El-Din (2000) investigated the regulatory environment and legal aspects that govern the market. Both highlighted the weaknesses and deficiencies of current laws that played a role in hindering the market efficiency.

Empirically, Sourial (1997), using GARCH *(p,q)*-M model, provided evidence that there is volatility clustering in both daily and weekly returns and that there is a positive relation between risk and market

returns, which implies that investors will be compensated with higher returns for bearing a higher level of risk. Morsy (1998), using Volatility-Switching GARCH model provided similar results recommending that excessive return volatility should not pose serious threats to the Egyptian Market. Moreover, Mecagni and Sourial (1999), using GARCH-M model, examined the impact of the +/-5% circuit breaker imposed on individual stock returns. The analysis showed a considerable downward shift in the risk-return parameter appears to have taken place after the introduction of symmetric limits on individual share price changes. Finally, Mohieldin and Sourial (2000) provided a detailed discussion on the institutional developments since the initiation. The evidence showed that the Egyptian Stock Market returns experienced high volatility during the speed-up of the privatization program in 1996 and the establishment of several mutual funds.

III. Monetary and Stock Market developments:

In early 1990s, Egypt embarked on economic reform and structural adjustment program with the technical assistance of the IMF and the World Bank. Early in the stabilization program major reforms were implemented in the financial sector to develop effective monetary instruments to control liquidity. In early 1991, multi-exchange rates were unified, official limits on interest rates were lifted and auctions for the sale of treasury bills were introduced. Lifting direct credit controls to both private and public sector had followed these reforms.

Since 1991, the exchange rate regime is maintained successfully to be pegged to the U.S.Dollar due to the rapid accumulation of foreign reserves. An active sterilization policy was followed to dampen the expansionary impact of capital inflows using treasury bill sales with the proceeds deposited at the Central Bank of Egypt (CBE). In addition, the tight control of liquidity growth yielded to continuous decline in inflation. This generated significant positive real rates of interest on domestic currency deposits (see Figure (1)). In the context of stable nominal exchange rate, dollarization had been reversed (see Table (1)).

During the period 1992/93 –1996/97 monetary growth slowed down and velocity declined significantly by 3 percent to stand at –0.5 percent resulting in sharp decline in inflation[18] by about 10 percentage points to a single digit record of 8.6 percent (see Figure (2)).[19] In addition to fiscal and structural policy reforms, the high interest rates differential, which was due to the reduction of interest rates in industrial countries[20] avoid expansionary impact, the CBE adopted sterilization policy. During 1994/95 –1995/96 capital inflows slowed remarkably, due to the decline in interest differential and slow down in the reform program. In this period, the stock market has been revitalized as a means of promoting for savings and investments. Market capitalization as percent of GDP was insignificant averaged 8 percent. The market activity was low during the 1992-93 recording turnover ratio of about 5 percent, followed by upsurge in activity to record on average 15 percent in 1994-95. In 1995, trading volume and value was more than doubled compared to 1992 trading activity to reach 72 million shares with value of LE 11 billion (see Table (2)).

[18] According to the IMF (1998), using Fisher identity $MV=PQ$ which was decomposed to the following equation to identify the effect of money supply (M), real activity (Q), and velocity (V) on change in price levels (P) i.e. inflation $\boldsymbol{\pi = M^{*}+V^{*}-Q^{*}+\varepsilon}$, provided evidence that monetary growth has historically been closely correlated with inflation.

[19] IMF (1998) showed that Egypt experienced four distinguished stages of monetary growth since the early seventies, which had direct impact on inflation..

[20] See Calvo, Leiderman and Reinhart (1993).

However, capital inflows picked up again in 1996/97 with the speed up of the privatization program which played a significant role to activate the Egyptian Stock Market. Unlike 1991/92 –1993/94, portfolio investments and privatization were the main vehicle for this surge during 1996/97. Subsequently, Egypt faced the challenge to keep the currency from appreciating and the CBE had to absorb the flood of capital inflows. During this period, the market experienced a significant upsurge in its performance and most market indices recorded new high levels to achieve return of about 52 percent in 1996-97 (see Figure (3)). Market capitalization more than doubled to record 25 percent of GDP as at end of 1997. Total traded volume during the period 1996-97 increased by threefold to reach 579 million shares compared to total traded volume during the period 1992-95. Similarly, total traded value during 1996-97 recorded LE 45 billion equivalent to about six times the total traded value during the period 1992-95. Thus, market activity reached the peak to record turnover ratio of 423 and 34 percent for 1996 and 1997 respectively (see Table (2)).

Despite the strong fundamentals the situation has been reversed in the second half of 1997 due to two exogenous shocks - the South East Asia emerging market crisis and a significant fall in oil prices - and Luxor attack. These factors had resulted in the deterioration in the external position and capital account shifted to a deficit[21]. During this period, Egypt's exchange rate had shifted from below the equilibrium level to above the equilibrium level[22]. The CBE became a net provider of hard currency to the forex market by filling the supply gap out of its reserves.

With a slow down in the economy, in addition to CBE transactions aimed at supporting the foreign currency market, the growth rates in money supply have been declining since mid-1999, and money in circulation has been contracted by 2.6 percent during the period December 1999 – January 2000[23] (see Figure (2)). This has been reflected in a tighter liquidity putting upward pressure on interbank overnight rates to record high levels in the range of 16 to 17 percent[24]. These developments didn't have any effect on both the discount rate and the 3-month t-bills rate, and held stable at 12 and about 9 on average, respectively, for more than a year. All these unfavorable

[21] See Handy (2000) for detailed diagnosis.
[22] Mongardini (1998) stated that the real effective exchange rate was close to equilibrium till end of 1996, followed by recording high levels compared to equilibrium levels.
[23] The largest drop since March 1997.
[24] In April 2000, overnight interbank rates dropped due to the implementation of "CAIBOR" mechanism in which 32 local institutions established the mechanism similar to LIBOR.

developments raised concerns regarding government's ability to maintain the current exchange regime and uncertainties regarding the measures that monetary policy makers are planning to implement to overcome this period.

In this tight monetary stance, interest expenses on borrowers increased resulting in weakening the borrower's financial position. Also, customers' spending declined with delays in debt repayments, which resulted in eroding the corporations' net worth and credit worthiness overtime. In response, the banks started to reduce their lending activity putting further pressures on the real activity growth. This deterioration had negative impact on the Stock market such that, in the first half of year 2000, the stock market was too volatile. The market started year 2000 with an aggressive upsurge. Most indices (including HFI) achieved high levels similar to 1997, while CMAI achieved new record on February 14th, 2000 of 695.4 points. This surge was followed by continuous decline in all Egypt's indices to drop by almost 30 percent[25] (see Figure (3)). Total market capitalization dropped to record LE 120 billion[26] (40 percent of GDP) after reaching the highest level LE 139 billion (46 percent of GDP) during January 2000 (see Table (2)).

[25] EFGI declined by 28%, HFI by 19%, PIPO by 37%, CIBC by 22%, GDRI-8 by 31%, IFCI- and IFCG-Egypt by 30%, and MSCI-Egypt by 29%.

[26] If the Egyptian Telecom – which is listed since the beginning of 2000 as a closed company with market cap. of LE 19.5 billion – is excluded, then the total market cap. recorded the lowest level since the last quarter of 1999.

The trading value and volume recorded LE 27 billion and 507 million securities respectively, which is equivalent to 81 and 60 percent respectively of total value and volume of traded securities in 1999. This reflects the high activity that the market experienced during this period, however, it was coupled with an oversold[27] trend throughout most of the period pushing all indices downwards.

IV. Methodology:

A popular approach to identify the linkages between monetary policy and stock returns behavior is to estimate the vector-autoregressive (VAR) model of various monetary indicators and stock returns. This methodology first developed by Sims (1980), after he criticized the methodological concepts of large-scale structural simulations models which failed to forecast for unprecedented events[28]. Followed by LeRoy and Porter (1981) in the context of variance-bounds literature, and most recently several researchers among which Campbell and Shiller (1988a,b) applied this methodology. The main advantage of the VAR models is that long-horizon properties can be imputed from short-run model rather than estimated directly. The VAR approach models every endogenous variable in the system as a function of the lagged values of all other endogenous variables in the system. The

[27] Ministry of Economy's report on the Stock Market performance during 2000/H1 shows that according to the Arms and Diffusion indices the market was characterized by oversold trend.
[28] Such as the collapse of the Bretton Woods and Oil prices shocks.

model is a generalization of the following univariate Autoregressive (AR) presentation but in a matrix form,

$$y_t = \sum_{q=1}^{\infty} \alpha_q y_{t-q} + \varepsilon_t \qquad \varepsilon_t \sim IID\left(0, \sigma^2\right) \qquad (1.a)$$

such that VAR model can be represented in the following form

$$Y_t = AY_{t-q} + u_t \qquad u_t \sim IMN(0, \sum) \qquad (1.b)$$

where Y_t is a (m x 1) vector, A is the AR parameters of order (m x m) matrix and u_t is a stochastic error vector of order (m x 1) - which referred to impulses or innovations in the VAR approach- independent multivariate normally distributed (IMN) with zero mean and of variances and contemporaneous covariances matrix Σ of order (m x m) for the individual elements of ε_t .

Number of researchers conducted their estimation using either ordinary least square (OLS) or maximum likelihood (ML) estimators, as VAR parameters asymptotically coincide in both estimation methodologies[29]. However, various literatures showed that VAR models suffer from over-parameterization, and many different approaches have been proposed in order to obtain more efficient

[29] See Amisano and Giannini (1997) for further details.

estimates. The most successful approach was introduced by Litterman (1979, 1986) and Doan *et al* (1984) using Bayesian estimation techniques known as Bayesian-VAR.

In a Bayesian setting, data are not the only sources of information, but they are combined with *prior*[30] beliefs in order to produce a posterior probability density function (pdf) for parameters. Although the Bayesian approach has been applied in several finance literature, it has been criticized that the choice of the prior tends to be arbitrary. In a study on estimating mutual funds returns, Atiya and Magdon-Ismail (1999) proposed an approach to obtaining the prior by using the density of general market returns as the priors. Thus, in our case the HFI used in the model are considered to be a subset of the whole market, and consequently the index will inherit some of the statistical properties of the market. However, the suggested approach by Atiya and Magdon-Ismail will not be very suitable in our case as the general market is represented by the Capital Market Authority Index (CMAI) which had proven by practice that it has significant deficiencies and it doesn't reflect efficiently the market performance[31]. Thus, the distribution of the index that will be used as a prior will be biased resulting in biased estimation.

[30] The *prior* has been termed *Minnesota prior* because this approach was developed when both Sims and Litterman were at the University of Minnesota.

[31] The CMA realized this fact and currently, with the assistance of the Financial Times, is establishing a new index for the market. The index includes 30 companies, which have more than 10 percent of its shares as free-float.

In the classical Bayesian-VAR literature, the prior is specified taking into consideration that most observed economic time series have long-run behavior similar to the random walk process. This can be accommodated into a prior distribution framework by requiring that in every equation the parameter on the first lag of dependent variable is equal to one, and all the other parameters are given zero prior mean[32]. In other words, the Bayesian approach to the over-parameterization is to specify "fuzzy" restrictions on the coefficients, rather than exclusion restriction or assigning lag coefficient to zero. This is implemented by placing on the long lags normal prior distributions with zero mean and small standard deviation. Thus, the standard deviation of prior distribution for lag *l* of variable *j* in equation *i* for all *i, j and l* will be as follows,

$$S(i,\ j,l) = \frac{\{\gamma g(l)\, f(i,\ j)\} s_i}{s_j} \qquad (2)$$
$$f(i,i) = g(1) = 1.0$$

where s_i is the standard error of univariate autoregression on equation *i.* The part in the right hand side between brackets is the product of various options of control and represents the tightness or weight of the prior on coefficient *i ,j and l.* The first option is the overall tightness [γ], which represents the standard deviation on the first own lag. Second option is the tightness on the lag L relative to lag 1 [g(*l*)].

[32] See Amisano and Giannini (1997), Doan *et al* (1984) and Doan (1996).

Finally, the tightness on variable *j* in equation *i* relative to variable *i* [*f(i,j)*] which is specified as *f(i,j) = 1.0* if *i = j* or ϖ otherwise. The bracket is multiplied by s_i/s_j to correct for different scales of the variables.

The critical issue is to determine the appropriate lag length to avoid model misspecification and/or waste in the degrees of freedom. A number of criteria have been proposed to determine the length of the distributed lags, among which is the Likelihood Ratio (LR) which was recommended by Sims (1980), the Akaike Information Criterion (AIC)[33] and the Schwarz Criterion (SC)[34]. The Likelihood Ratio (LR) will be conducted using the following test statistic,

$$(T - c)(\log|\Sigma_r| - \log|\Sigma_u|) \qquad (3)$$

where T is the number of usable observations, *c* (correction multiplier) is the number of parameters estimated in each equation in the unrestricted system[35], and Σ_r and Σ_u are the variance/covariance matrix of residuals estimated from the restricted and unrestricted VAR models respectively. The suggested statistic has the asymptotic χ^2 distribution with degrees of freedom equal to the number of

[33] Introduced by Akaike (1973)
[34] Introduced by Schwarz (1978)
[35] $C = p^* n + 1 + x$ where *p* is the number of lags in the unrestricted model and n is the number of equations in the system. Their multiplication result is added to one since each equation of the unrestricted model has an intercept and to x which represents number of dummies and/or exogenous variables if they exist.

restrictions in the system[36] [37]. The alternative test criteria are the multivariate generalizations of AIC and SC using the following statistics,

$$AIC = T\log|\Sigma| + 2N$$
$$SC = T\log|\Sigma| + N\log(T) \qquad (4)$$

where $|\Sigma|$ is the determinant of variance/covariance matrix of residuals and N is the total number of parameters estimated in the system[38].

To analyze the dynamic interrelationships among variables in a VAR model, a vector moving-average (VMA) representation is used. This kind of representation allows decomposing the variance of series into the parts attributable to each of a set of innovation (shock) process. This is known as decomposition of variance[39], which is conducted using factorization process of a positive definite Σ. There are many ways of factorization among them Choleski factorization[40], eigen

[36] $df = p^r * n * v$ where p^r is the number of lags were restricted and v is the number of variables in the system.
[37] If the resulted test statistic is significant, the null hypothesis for p^r is rejected in favor of the alternative hypothesis of p. In case of the resulted test statistic is insignificant, the null hypothesis would not be rejected.
[38] Computed as follows $N = n^2p + n$.
[39] In some literature called "Orthogonalization".
[40] See Doan (1996) for further details.

decompositions, and structural decomposition[41]. The latter is considered the most acceptable way compared to the other two, as it doesn't suffer from the problem of imposing a "semi-structural" interpretation on a mechanical procedure. In other words, ordering of variables in a decomposition process does, incase of significant correlation, matters and results could be distinct radically if variables order was changed. Thus, in structural decomposition models the non-orthogonal innovations process u_t (from eq. 1.b) as follows,

$$\begin{aligned} u_{1t} &= v_{1t} \\ u_{2t} &= \gamma u_{1t} + v_{2t} \\ u_{3t} &= \delta u_{1t} + v_{3t} \end{aligned} \qquad (5)$$

It is clear that the above model relates innovations u_{2t} and u_{3t} to u_{1t}. Hence, ordering problem will be overcame.

[41] Suggested separately by Bernanke (1986) and Sims (1986), known as Bernanke-Sims Decomposition.

V. Data description:

V.(1): Egyptian Stock Market Data:

The market index used to represent the Egyptian Stock Market performance[42] is the Hermes Financial Index (HFI). It is a broad index started on January 2nd, 1993[43], and represents the *most liquid stocks.* The index includes companies' stocks that have been actively traded during a quarter with a minimum trading value of LE 7 million, a minimum of 200 transactions and a minimum of 20 days traded. As at end-June 2000, there were about 36 companies included in the index represent almost 37 percent of total market capitalization. Monthly returns are calculated as continuously compounded returns at time t, r_{it} . In other words, as the natural log difference in the closing market index P_t between two months as shown below[44]:

$$r_t = \ln\left|\frac{P_t}{P_{t-1}}\right| = \ln(P_t) - \ln(P_{t-1})$$

[42] The Egyptian Stock Market performance has been monitored by six well-known indices – MSCI-Egypt, IFCI- and IFCG-Egypt, CIBC-100, EFGI and PIPO – other than the used index, however, they were not used due to their short historical time span or to their small share in total market capitalization. The official *all-stocks* CMA index is not used as it proved its inefficiency in reflecting market performance.

[43] The HFI index was subsequently extended backward to mid-1992.

[44] Dividends were not included in the returns calculation due to lack of data.

The sample consists of 94 observations for HFI returns (rhfi) starting July 1992. The distributional statistics for Hermes Financial Index returns (Table (3)) reflect the following:

a) According to the t-statistics, mean returns of the index are significant from zero at 5 percent significance level with a negative median.

b) It is evident that HFI returns exhibits volatility clustering and that there is a tendency for large (small) asset price changes to be followed by other large (small) price changes of either sign (see Figure (4)). This has been confirmed by ARCH test, where the null hypothesis for HFI returns are homoscedastistic is rejected at 5 percent level, using χ^2_1 statistic, in favor of that there is evidence of heteroscedasticity.

c) The index returns display positive skewness and excess kurtosis. The null hypothesis of skewness coefficients conforming to the normal distribution value of zero is rejected at 5 percent significance level. In addition, the null hypothesis of kurtosis coefficients conforming to the normal distribution value of three is rejected at 5 percent significance level. Thus, the returns are leptokurtic and their distributions have thicker (fatter) tails than that of a normal distribution. These results have been confirmed by rejecting the null hypothesis of the bivariate Jarque-Bera test for unconditional normally distributed of the index returns.

d) The index returns exhibit positive first-order autocorrelation (ρ_1), however, they are significant at 15 percent significance level. The autocorrelation coefficient of returns implies that only 2.4 percent of the variation in the monthly HFI returns is predictable using the preceding month's index returns[45].

e) With respect to Dickey-Fuller[46] and Phillips-Perron[47] unit root statistics, the null hypothesis that index returns have unit root is rejected in favor of the alternative that the two series are trend stationary process with a degree of predictability.

In sum, the results are consistent with several other empirical studies. Mandelbort (1963) and Fama (1965) showed that unconditional distribution of security price changes to be leptokurtic, skewed and volatility clustered. Bekaert *et al* (1998) provided evidence that 17 out of the 20 emerging markets examined their monthly returns had positive skewness and 19 out of 20 had excess kurtosis, so that normality was rejected for more

[45] The R^2 of a regression of returns on a constant and its first lag is the square of the slope coefficient, which is the first-order autocorrelation (Campbell *et al*, 1997).

[46] Dickey and Fuller (1979) devised a procedure to formally test for the presence of unit root using three different regressions. In our case, the following regressions with constant (a_0) and trend (t) (3rd regression presented by Dickey-Fuller) is used to test for nonstationarity: $\Delta y_t = a_0 + \gamma y_{t-1} + a_2 t + \sum_{i=2}^{P} \beta_i \Delta y_{t-i+1} + \varepsilon_t$, the null hypothesis is that $\gamma = 0$ for stochastic nonstationary process.

[47] Phillips-Perron nonparametric unit root tests were used because they allow for a general class of dependent and heterogeneously distributed innovations, contrary to other unit root tests (see Phillips and Perron, 1998).

than half of the countries. Moreover, the results are consistent with other empirical studies on the Egyptian Stock Market[48], noting that the results in most cases are more significant compared to the above due to the use of higher data frequency in the empirical investigation.

V.(2): Monetary Data:

The monetary data are represented by the following variables:

a) **Credit to the private sector (cps):** it includes both private business and household borrowings. The monthly growth in credit to the private sector (*gcps*) is calculated as follows: $gcps_t = \log(cps)_t - \log(cps)_{t-1}$. The source of data is the monthly bulletin of CBE.

b) **Discount rate (dr):** the rate is decided by CBE and is announced on monthly basis. The data source is the IFS starting June 1992 through April 2000.[49]

c) **Inflation rate (inf):** inflation rate has been always announced within one to two months lag. The source of the data is CAPMAS, using year-on-year data starting June 1992 thought April 2000.

d) **Money Supply (M1) & Broad Money (M2):** M1 (Money Supply/Narrow Money) represents the summation of

[48] See Sourial (1997), Mecagni and Sourial (1999), Mohieldin and Sourial (2000) and Morsi (2000).

[49] There are no discrepancies between the figures of the IFS and the CBE. IFS data is used due to its longer historical time span.

domestic currency in circulation and Egyptian Pounds demand deposits. M2 (Broad Money) represents the summation of M1 and time & current deposits in both domestic and foreign currency. The monthly growth rate of M1 and M2 has been calculated as follows: $gm(q)_t = \log(m(q))_t - \log(m(q))_{t-1}$ where q = 1 & 2. Data are from the CBE monthly bulletin.

Although exchange rate variable is widely used in similar studies, it was ignored in our case due to: (i) the insignificant changes in the exchange rate in most of the period under investigation; and (ii) the short historical span of real effective exchange rate of Egypt.

The descriptive statistics of the log difference of the monetary data shows that the series are normally distributed according to bi-variate Jarque-Bera normality test and trend stationary according to Dickey-Fuller/Phillips-Perron unit root tests.

VI. Empirical Investigation:

Number of studies commonly investigated the presence of stationarity and cointegration prior the estimation of VAR models. However, it has been argued by Sims(1980) and others that the goal of a VAR analysis is to determine the interrelationships among the variables and not to determine the parameter estimates. Furthermore, Fuller(1976) confirmed, according to Theorem 8.5.1, that differencing produces no gain in asymptotic efficiency in an autoregression, and that differencing "throws information away".

Hence, the empirical investigation is conducted using number of different specifications of VAR models. The estimation was conducted using HFI returns (*rhfi*), inflation rate (*inf*), monthly growth in money supply (*gm1*) and monthly growth in broad money (*gm2*). Since money supply and broad money are linearly dependent, they were estimated separately to avoid collinearity problems between the two series that could results in singular matrix.

VI.(1): Identifying the models:

First step was to determine the appropriate lag length of the models in the two groups using Likelihood Ratio (LR), Akaike Information Criterion (AIC) and Schwarz Criterion (SC). The test was initiated using 12 lags and restricting the models till they reached 3 lags. No further restrictions have been imposed since the monetary data are released with lag of two months and that the impact of any change in the monetary variables on the stock market will not be realized before one-month announcement i.e. not less than three lags.

It is observed from table (4), according LR test, that the difference between the two log determinants and the value of the calculated χ^2_{df} statistic are insignificant, at 5 percent significance level, for different lag-length of the two models. However, the LR test from 4 to 3 lags model recorded the highest significance levels 10 and 11 percent, respectively, for models I.a and I.b. Hence, it is possible to reject the null hypothesis, at 15 percent significance value, in favor of that a model of 3 lags is binding and that a model of 4 lags should be considered. This has been confirmed by AIC selection, although, as expected, SC selection was the most parsimonious model[50].

[50] The ambiguity of both criteria in selecting the proper lag length is due to *ln(T)>2* in the SC statistic, which result in SC criterion will choose always the most parsimonious model than the AIC.

Addition of two more variables – growth in the credit to the private sector (gcps) and discount rate (dr) – have been tested. With respect to growth in credit to the private sector, Granger Causality test showed that there could be an interrelation among gcps and other endogenous variables in the models. With respect to inclusion of discount rate using Block Exogeneity test[51]., as expected, the variable is insignificant and that any shock in it will not contribute in the variations of the endogenous variables.

The discount rate has been tested as an exogenous variable that might contribute in the variation of the endogenous variables

VI.(2): Granger Causality tests:

The two identified models has been tested using Granger Causality tests. The test of the models was run three times. First, the model was tested for the whole sample period starting 1992 and ending April 2000. Second, a test was conducted for sub-sample period starting 1992 and ending December 1997 i.e. prior the impact of the three major shocks. Third, a test was conducted for the period starting January 1998 and ending April 2000 to detect the impact of the shocks (Table (5)). The results show that for the first model (includes *gm1*) there is significant causality post Dec-97 as F-*statistics* were significant at 5 percent significance level. These results implies that

[51] This is a multivariate generalization of Granger-Sims causality tests. The null hypothesis for block exogeneity test is that the lags of one set of variables do not enter the equations for the remaining variables.

there is a degree of predictability of market returns from inflation rate, growth in M1, and growth in credit to the private sector. Prior Jan-98, the tests are insignificant providing evidence that there was a weak correlation between stock market behavior and monetary policy.

As for the second model (includes *gm2*), results show that there is one direction causality from *gm2* to *rhfi* in the period prior Jan-98. Post Dec-97, there was a shift in the direction of causality showing that variations in *rhfi* contributes, to an extent, to the variations of *gm2*.

Thus, Granger Causality tests provide evidence that monetary policy contributed to the behavior of the Stock Market post Dec-97. Moreover, the shift in the one-direction causality between *rhfi* and *gm2* could imply the following: (i) that growth in M2 wasn't due to rise in the rate of growth of the money supply - it is clear in Figure (2) that M1 was growing at declining rates since 1999 – and the results are consistent with the tight monetary policy to support the domestic currency; (ii) growth in M2 was due to increasing rate of growth in Quasi Money[52]; (iii) re-allocation of investments into US-dollar dominated investments, an argument could be supported by the increase in dollarization since mid-1999 till 2000.

[52] Quasi Money = Time deposits in both domestic and foreign currencies.

VI.(3) Baysian VAR model illustration:

Empirical investigation has been conducted using Bayesian VAR methodology. The tightness of the standard deviation of the prior distribution has been assigned as follows: (i) Overall tightness [γ] will be equal to 0.1; (ii) the tightness on g(l) using harmonic lag decay will be equal to 1; and (iii) the tightness on variable j in equation i relative to variable [$f(i,j)$] = 1 where $i = j$ and $\varpi = 0.5$ otherwise. The decomposition of variance is conducted using the structural decomposition (Sims-Bernanke Decomposition) model such that the non-orthogonal innovation process u_{it} will be as follows:

$$\begin{bmatrix} u_{ir,t} \\ u_{\inf,t} \\ u_{gm(q),t} \\ u_{gcps,t} \end{bmatrix} = \begin{bmatrix} \mathbf{1111} \\ \mathbf{0100} \\ \mathbf{0010} \\ \mathbf{0001} \end{bmatrix} * \begin{bmatrix} v_{ir,t} \\ v_{\inf,t} \\ v_{gm(q),t} \\ v_{gcps,t} \end{bmatrix}$$

where u_{it} and v_{it} are the regression residuals and innovations, respectively, of the corresponding variables. Thus, the ordering assigned will show the contemporaneous response of the index return (ir) to shocks in the whole system's variables. In other words, the estimation will investigate one direction interrelationship from shocks in the monetary variables and its impact on market returns.

Similarly to Granger Causality tests procedure, the estimation of the models was run three times. First, the model was estimated for the

whole sample period starting 1992 and ending April 2000. Second, estimation was conducted for sub-sample period starting 1992 and ending December 1997. Third, estimation was conducted for the period starting January 1998 and ending April 2000 to detect the impact of the shocks.

VI.(4): Empirical Results:

The empirical results show the following (see Table (6) & Figure (5)). First, the index returns responded positively by 0.5376 percent to a positive shock in inflation rate (0.9 percent) in the whole sample period. The same results occurred for the two sub-periods implying the anticipation of the shock. The positive relation between inflation rate and asset returns in domestic currency is in line with Tobin's *q* and Fisher effect hypotheses that suggest that nominal asset returns should move in the same direction with inflation rate, and in contrast with the inflation expectation hypothesis introduced by Fama and Schwert (1979).

Therefore, there are three intuitive analyses for the positive relation between Egypt's stock market returns and inflation rate: (i) money illusion effect doesn't exist as inflation rate is low in an environment of considerable high real interest rates (Modigliani and Cohen, 1979); (ii) the anticipation of declining trend of inflation rate was due to the government commitment to lower inflation rate as part of it's

economic reform program adopted since 1991; and (iii) positive relationship could be derived due to money demand shock rather than money supply shock.

Second, the whole sample results show that *rhfi* responded negatively (by –0.0196 percent) to a positive shock in *gm1* (1.6575), however, the coefficient is insignificant. By dividing the sample into two sub-sample periods, a shift in the correlation coefficient is realized between the two periods. During 1992-97, *rhfi* responded negatively (-0.7039) to a positive shock in *gm1* implying the unanticipation of the shock, consistent with the liquidity effect hypothesis. During 1998:1-2000:4, *rhfi* responded positively (2.7183) to a shock in *gm1* implying the anticipation of the shock. This could be due to the shift in monetary policy after unintentional vulnerability of capital inflows as a result of the three shocks which impacted negatively liquidity levels of foreign currency. This result is consistent with the wealth effect.

Third, the HFI returns responded negatively to shocks in growth of broad money, of which the sub period post January 1998 exhibited significant coefficients compared to the period prior 1998. The results are consistent with Mauro (2000), implying that the shock might be due to a demand shock in money rather than a supply shock. Intuitively, the demand shock could be experienced due to reallocation of investments from the stock market to demand deposits in local and / or foreign deposits. This could be interpreted from the increasing

trend in dollarization since early 1999[53], implying that rigidity in policy response towards squeezed liquidity and scarcity of foreign currency resulted in a demand shock for money and reallocate investments in foreign currency. The result is in confirmation with the positive response towards a positive shock in inflation rate, and also with the one direction causality from *rhfi* to *gm2* post Dec-97 showed in the previous section.

The unanticipation of shocks in growth in money supply prior January 1998 – known as *liquidity effect hypothesis* – is consistent with the tight monetary policy adopted by the government to control liquidity. The shift of responses, post December 1997, in anticipation of the shock confirms the impact of the unintentional vulnerability of capital inflows as a result of the three shocks and policy measures implemented towards these shocks. Thus, positive shock in money supply had its positive impact on the financial wealth – known as *wealth effect hypothesis*, subsequently on the balance sheets.

Finally, in emerging markets, positive growth in credit to the private sector is one of the vehicles to boost investments which contributes in economic growth. Subsequently, a surge in stock prices will be realized reflecting this growth. However, in contrast, *rhfi* responded negatively by –2.3087 percent to a positive shock in *gcps* (0.5 percent). The results are in line with Mauro (2000) findings which

[53] Dollarization reached it lowest levels in July 1999 recording 16.8 percent followed by a continuous rise to reach 18.5 percent as at end-June 2000.

showed 2 out of 6 emerging markets and 4 out of 18 advanced markets exhibited negative response to a positive shock in growth in credit to the private sector. It is also in line with Bernanke and Gertler (1995) empirical results. The interpretation of this phenomenon might be as follows: (i) the growth in credit is not directed to productive investments, a phenomenon known as excess credit; (ii) credit is directed to finance consumption habits; and/or (iii) concentration of credit in specific or non-performing sectors due to informational inefficiency in the credit market.

Structural decomposition of variance of *rhfi* provide evidence that growth in credit to the private sector has the most forecasting power to market returns compared to other variables in the system (Table (7), Figure (6)). In the period prior January 1998, innovations in gcps contributed in the variation of rhfi by about 6 percent on average for 12-month. Post January 1998, innovations in gcps contributed in returns variation by 11 percent in the first month and start decaying to reach about 7 percent at the 12^{th} month. A significant shift was observed in the forecasting power in growth of money supply to variations in returns. Post December 1997, innovations in gm1 have a forecasting power in variations of returns in contrast to that of prior January 1998. The innovation in gm1 contributed of about 7.5 percent in the variation of rhfi with a slight increase of 25 basis points by the 12^{th} month.

With the inclusion of gm2 instead of gm1 in the estimated models, results are almost similar for other variables in all periods except for gcps. During the period from January 1998 till April 2000, gcps forecasting power declined significantly compared the corresponding period in the other models and to the period prior 1998. The gm2 forecasting power ranged from 2 to 3 percent with a tendency of decaying.

VII. Conclusion:

The study attempted to identify the degree of predictability of stock market returns from monetary variables and whether the stock market could be an alternate channel for transmitting monetary policy rather than the traditional money and credit channels. The empirical investigation was conducted using Bayesian VAR models consisting of four endogenous variables with four lags and a constant. Data used are the *actively traded stocks* HFI returns to represent market performance and inflation rate, as well as growth in both M1 and M2, and growth of credit to the private sector to represent the monetary stance.

The estimation results provided evidence that monetary aggregates didn't have a significant impact on the stock market performance prior January 1998. However, post December 1997, the estimation results provided new evidence of interrelation between stock market returns

and monetary policy in Egypt. Generally, the insignificance of some of the estimated parameters is not of surprise and is similar to several studies addressing the same issue on emerging markets such as Erb *et al* (1995) and Mauro (2000). The price adjustment to monetary shocks occurs after a lag of time.

The estimation results provided evidence that both the balance sheet and bank lending channels - composing *the credit channel* - are well established and effective in transmitting the monetary policy in Egypt. The transmission is consistent with *the "financial accelerator" hypothesis*, as it was evident that the country experienced a severe tightening resulting in increased interest expenses on borrowers. Consequently, borrowers' financial position deteriorated and customers' spending declined affecting firm's revenues eroding the firm's net worth and credit worthiness overtime. Thus, the supply of banks to credit was reduced putting further pressure on the real activity growth. This series of deteriorations exhibited downward pressure on stock market prices, specially, after the announcement of listed companies' financial statements in early 2000. The tight monetary policy undergone was to support the Egyptian pound and prevents it from depreciating. However, the scarcity of US Dollar in the market resulted in further downward pressure on stock prices as investors re-allocating their investments in dollar dominated assets speculating depreciation of the Egyptian pound in the short run.

Finally, it is evident that the discount rate failed to explain any variation in the four endogenous variables used in the VAR models. This implies that discount rate movements have little practical meaning as a monetary instrument, and have no impact on stock market performance. This was evident after the reduction of the Central Bank to the discount rate twice in a two-weeks period.

Nevertheless, empirical investigation provided new evidence that, recently, *the "stock market channel*" is in its early stages of development. This has been shown by the variance decomposition implying that monetary indicators could have forecasting power to stock market performance. The magnitude of responses to shocks in monetary variables experienced a significant shift post December 1997, as responses were significant compared to those prior to the January 1998 period. Consequently, in an environment of fair equity culture and more efficient market, the "stock market channel" could play a vital role in the future for transmitting monetary policy

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Table (1):
Selected Economic and Monetary Indicators
1993/94-1999/00

	1993/1994	1994/95	1995/96	1996/97	1997/98	1998/99	1999/00
Average Annual Inflation	9.1%	9.4%	7.3%	6.2%	3.8%	3.8%	2.8%
End of Period yr./yr. Inflation Rate	6.4%	9.9%	8.3%	4.8%	4.1%	2.9%	2.5%
Nominal Interest Rate	12.0%	10.1%	9.5%	9.8%	8.8%	8.8%	9.1%
			(End of Period Stock In LE Million)				
Broad Money (M2)	137,445	152,577	168,532	193,902	210,487	234,569	255,276
Narrow Money (M1)	28,264	31,634	35,056	39,052	43,590	48,844	49,750
Credit To the Private Sector (in LE Million)	49,918	66,434	84,503	107,746	135,232	168,511	191,023
Net International Reserves (In US$ Millions)	25,768	27,535	26,742	27,746	24,040	19,529	17,435
Liquidity	12.9%	11.0%	10.5%	15.1%	8.6%	11.4%	8.8%
M1 Annual Growth	6.2%	11.9%	10.8%	11.4%	11.6%	12.1%	1.9%
Annual Growth In Credit to The Private Sector	22.9%	33.1%	27.2%	27.5%	25.5%	24.6%	13.4%
Dollarization (% of Total Liquidity)	23.4	25.1	22.9	19.4	17.9	17	18.5

Source: Central Bank of Egypt and Ministry of Economy Monthly Digest various issues.

Table (2):
Selected Indicators of Development for
the Egyptian Stock Exchange
1990-2000*

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000/H1
Annual Returns											
CMAI	--	--	8.5%	22.0%	56.4%	-11.2%	33.0%	19.3%	6.2%	49.0%	-1.8%
HFI	--	--	--	47.0%	92.2%	-21.3%	30.3%	19.5%	-30.5%	35.4%	-37.2%
Number of Companies Listed \1	573	627	656	674	700	746	646	650	870	1033	1036
New equity issues (L.E. Million) \2	N/A	N/A	N/A	N/A	4,879	11,251	20,378	19,485	35,303	55,573	13,501
Market Capitalization (In L.E. Million)	5,071	8,845	10,845	12,807	14,480	27,420	48,086	70,873	83,140	112,331	119,734
In percent of GDP	3.8%	6.7%	8.2%	7.4%	7.2%	12.2%	18.8%	25.4%	30.5%	36.8%	39.2%
Value of trading (LE Million)	341.5	427.8	596.7	568.6	2,557.2	3,849.4	10,967.5	24,219.8	23,364.0	39,086.1	29,347.5
Listed shares and bonds	206.2	233.9	371.4	274.9	1,214.0	2,294.2	8,769.2	20,282.4	18,500.6	32,851.0	26,918.3
Unlisted shares & bonds (OTC)	135.3	193.9	225.3	293.7	1,343.2	1,555.2	2,198.3	3,937.4	4,863.4	6,235.1	2,429.2
Volume of trading (Million) \2	17.0	22.7	29.6	17.7	59.8	72.2	207.7	372.5	570.8	1,074.1	562.3
Listed shares and bonds	14.3	19.2	20.7	13.7	29.3	43.7	170.4	286.7	440.3	841.1	506.3
Unlisted shares & bonds (OTC)	2.7	3.5	8.9	4.0	30.5	28.5	37.3	85.8	130.5	233.0	56.0
Number of Companies traded	199	218	239	264	300	352	354	416	551	663	545
Turnover Ratio[3]	6.7	4.8	5.5	4.4	17.7	14.0	22.8	34.2	22.3	29.2	22.5
Memo Item: Nominal GDP \4	79,300	98,664	118,288	132,900	173,117	200,408	225,300	251,145	272,405	305,242	305,242

Source: Capital Market Authority, Annual Report, various issues.
1\ At year end.
2\ Shares and bonds.
3\ Value of trading listed securties as a share (in percent) of market capitalization.
4\ Data from Ministry of Planning ; In Million L.E.
* As at end of June 2000.

Table (3):

Unconditional Distribution Statistics for the Selected Egyptian Stock Market Monthly Returns and Monetary Variables

	rhfi	*inf*	*gm1*	*gm2*	*gcps*
Mean(%)	1.73	6.85	0.7715	0.9152	1.8379
t-statistics	1.96337	21.017	5.13259	16.51091	25.4481
Median(%)	-0.62	6.80	0.6304	0.92000	1.18747
Standard Deviation(%)	8.546	3.162	1.4572	0.537464	0.700223
Kurtosis	4.777	2.34754	4.4346	2.91512	2.66152
Excess Kurtosis	1.777	-0.65246	1.4346	-0.08488	-0.33848
t-statistics \1	27.260	-10.009	22.007	-1.302	-5.192
Skewness	1.071	0.493	-0.405	0.238	-0.105
t-statistics \2	262.784	120.918	-99.473	58.330	-25.728
Jarque-Bera test for normality \3	36.101	5.470	10.634	0.91304	0.62088
First-order autocorrelation coefficient (returns)	0.156	0.950	0.213-	0.237	0.304
t-statistics	1.502	30.806	(2.02)	2.38	3.00
R-Squared	2.4%	91.0%	4.6%	5.1%	0.1%
Dickey-Fuller Test	-5.450	-3.190	11.853-	7.93963-	6.91821-
Phillips-Perron unit root test	-8.179	-1.273	11.989-	7.74307-	6.90912-
ARCH-Test	10.455	21.102	0.691	0.01475	0.02436
Minimum(%)	-11.130	2.300	-4.80%	-0.29%	0.26%
Maximum(%)	30.280	15.000	4.17%	2.27%	3.64%
Sample Period	1992:7	1992:7	1992:7	1992:7	1992:7
Count	94	94	94	94	94

1\ t=(K'-3)/se(K') where se(K')=square root(24/n).

2\ t=(S'-0)/se(S') where se(S')=square root(6/n).

3\ The Jarque-bera test for normality distributed as chi-square with 2 degrees of freedom. The critical value for the null hypothesis of normal distribution is 5.99 at the 5 percnet significance level. Higher test values reject the null hypothesis.

Table (4):
Granger Cuasality Test for Four Variables and Four Lags

Model (1.a): *rhfi/ inf/ gm 1 / gcps*

		Full Sample F-*statistics*				1992:7-1997:12 F-*statistics*				1998:1-2000:4 F-*statistics*			
		Independent Variable				Independent Variable				Independent Variable			
		rhfi	***inf***	***gm1***	***gcps***	***rhfi***	***inf***	***gm1***	***gcps***	***rhfi***	***inf***	***gm1***	***gcps***
Dependent Variable	***rhfi***	1.2915	1.1748	1.7315	0.6046	1.3007	1.1293	1.7154	0.5387	2.0636	20.0535	190809	38.5237
		0.2794522	*0.3273934*	*0.1500706*	*0.6602937*	*0.2758337*	*0.3477968*	*0.1534829*	*0.7076843*	*0.1187114*	*0*	*0*	*0*
	inf	1.6253	259.5023	2.2076	0.4239	1.5079	264.1036	2.2388	0.463	2.0185	14.4451	2.139	1.665
		0.1748538	*0*	*0.0745031*	*0.7910224*	*0.2065732*	*0*	*0.0710208*	*0.7627265*	*0.125332*	*0*	*0.1084179*	*0.1923403*
	gm1	0.5953	0.5647	2.5804	1.8633	0.5915	0.5673	2.7004	1.8994	4.1899	1.1027	4.1616	2.0582
		0.6669374	*0.6888948*	*0.0426082*	*0.12387*	*0.6696406*	*0.6870206*	*0.354793*	*0.1173989*	*0.0107962*	*0.3790439*	*0.0111198*	*0.1194784*
	gcps	1.6388	1.6058	1.131	5.3267	1.811	1.5536	1.0897	5.7301	2.9681	6.1655	2.1985	15.3857
		0.1714987	*0.1798122*	*0.3471011*	*0.0006825*	*0.1335941*	*0.193593*	*0.3664979*	*0.0003732*	*0.0410094*	*0.0015955*	*0.100967*	*0*

Model (I.b): *rhfi/ inf/ gm 2 /gcps with 4 lags*

		rhfi	***inf***	***gm2***	***gcps***	***rhfi***	***inf***	***gm2***	***gcps***	***rhfi***	***inf***	***gm2***	***gcps***
Dependent Variable	***rhfi***	1.2097	0.783	3.0566	0.6575	1.2112	0.7232	2.6343	0.515	1.9026	1.1239	0.9155	4.5949
		0.3123716	*0.5391674*	*0.0207387*	*0.6231456*	*0.3116281*	*0.5783648*	*0.0392027*	*0.7248794*	*0.1441619*	*0.3696177*	*0.4716569*	*0.0071242*
	inf	1.0963	213.9864	0.1542	0.7303	1.0457	213.6991	0.1158	0.8089	7.5663	35.1485	7.8964	8.0798
		0.363408	*0*	*0.9606474*	*0.573607*	*0.3882572*	*0*	*0.976635*	*0.5226996*	*0.0004817*	*0*	*0.0003693*	*0.0003194*
	gm2	1.7497	1.5038	1.3098	1.2485	1.7647	1.5214	1.3443	1.2572	14.2549	5.8279	6.963	10.2102
		0.1461553	*0.2078686*	*0.2725041*	*0.2963384*	*0.1429114*	*0.2026551*	*0.2597415*	*0.2927606*	*0*	*0.0021687*	*0.0007954*	*0*
	gcps	1.4303	1.9201	0.6822	4.4335	1.4804	18786	0.7821	4.6341	3.1383	5.8933	2.1172	12.9817
		0.2305288	*0.1139956*	*0.6060785*	*0.0025844*	*0.2147439*	*0.1210289*	*0.5397154*	*0.0019003*	*0.0338024*	*0.0020425*	*0.1112992*	*0*

*numbers in *italics* represent the significance level.

Table (5):
The Distributional Lag Tests Results

Lags Span	Exogenous Variable	Degrees of Freedom	Log | u |	Log | r |	chi-square statistic	Significance Level	No. of Lags	AIC	SC
Group I:									
Model (I.a): *rhfi/inf/gm 1*									
12-6	--	54	2.92478	3.904321	44.079385		6	479.33561	620.54381
6-5	--	9	4.151541	4.324459	11.931356	0.21720685	5	482.43945	601.894
5-4	--	9	4.342016	4.392993	3.721313	0.92877947	4	471.61454 *	569.10712
4-3	--	9	4.373495	4.562366	14.543106	0.10427507 *	3	475.72943	551.05522 *
The model with "gcps" variable									
6-5	--	16	2.515676	2.910097	24.84853	0.0725406 *	6	421.37952	669.1132
5-4	--	16	2.987211	3.095546	7.366779	0.96552707	5	433.86181	642.90727
4-3	--	16	3.079762	3.471869	28.623811	0.02659967 **	4	413.1786 *	583.16566
4-4	dr	48	2.792551	3.079762	20.10478	0.99987036	3	418.91968	549.48437 *
Model (I.b): *rhfi/inf/gm 2*									
12-6	--	54	0.678025	2.033763	61.008248		6	297.41675	438.62495
6-5	--	9	2.084281	2.17133	6.00637	0.73928062	5	286.79276	406.24731
5-4	--	9	2.143739	2.231704	6.421485	0.69710474	4	278.54199 *	376.03457
4-3	--	9	2.228244	2.415281	14.401807	0.10873288 *	3	283.06296	358.38874 *
The model with "gcps" variable									
6-5	--	16	0.546573	0.809687	16.576137	0.41352376	6	248.09845	495.83213
5-4	--	16	0.869849	1.014594	9.842622	0.87471664	5	245.41659	454.46204
4-3	--	16	1.009037	1.367262	26.150435	0.05194793 **	4	226.81329 *	396.80034
4-4	dr	48	0.692101	1.009037	22.185469	0.99947971	3	229.8104	360.37509 *

Table (6):
Response of Market Returns Indices to One-Standard-Deviation Shock in Monetary Variables

Variance\Covariance matrix					Over-identification Test	
					chi-squared	*signif. level*
			For the period 1992:7 - 2000:4			
	rhfi	***inf***	***gm1***	***gcps***		
rhfi	8.8404	0.5376	-0.0196	-2.3087	2.40727	0.492283
inf	0	0.928	0	0		
gm1	0	0	1.6575	0		
gcps	0	0	0	0.6944		
	rhfi	***inf***	***gm2***	***gcps***		
rhfi	8.7002	0.6975	-1.4969	-2.1913	1.06267	0.786093
inf	0	0.9371	0	0		
gm2	0	0	0.5293	0		
gcps	0	0	0	0.6958		
			For the period 1992:7 - 1997:12			
	rhfi	***inf***	***gm1***	***gcps***		
rhfi	9.3882	0.1647	-0.7039	-2.4036	2.75964	0.430187
inf	0	1.0943	0	0		
gm1	0	0	1.7492	0		
gcps	0	0	0	0.7061		
	rhfi	***inf***	***gm2***	***gcps***		
rhfi	9.2822	0.47	-1.6545	-2.5899	1.00103	0.801003
inf	0	1.1043	0	0		
gm2	0	0	0.5278	0		
gcps	0	0	0	0.7091		
			For the period 1997:12 - 2000:4			
	rhfi	***inf***	***gm1***	***gcps***		
rhfi	8.9284	0.7106	2.7183	-3.2496	4.88364	0.180518
inf	0	0.3188	0	0		
gm1	0	0	1.7604	0		
gcps	0	0	0	0.6439		
	rhfi	***inf***	***gm2***	***gcps***		
rhfi	9.0602	1.6005	-1.8891	-1.3253	6.69912	0.082132
inf	0	0.3188	0	0		
gm2	0	0	0.611	0		
gcps	0	0	0	0.6436		

Table (7:a): Structural (Sims-Bernanke) Decomposition of Market Returns using M1

Decomposition of Variance for Series RHFI
1992-2000

	Std Error	*INNOV_RHFI*	*INNOV_INF*	*INNOV_GM 1*	*INNOV_GCPS*
1	9.15307	93.2926	0.34502	0.00046	6.36194
2	10.63	93.7284	0.32155	0.04679	5.90329
3	11.1393	93.8795	0.32596	0.06658	5.72793
4	11.3304	93.9172	0.34377	0.08826	5.65077
5	11.3955	93.9109	0.37138	0.10323	5.61446
6	11.419	93.8883	0.40341	0.11088	5.5974
7	11.4284	93.8593	0.43705	0.11452	5.5891
8	11.4329	93.8285	0.47064	0.1162	5.58467
9	11.4358	93.798	0.50316	0.11701	5.58188
10	11.438	93.7687	0.53409	0.11744	5.57982
11	11.4399	93.741	0.5632	0.11769	5.57809
12	11.4415	93.7152	0.59042	0.11785	5.57654

Decomposition of Variance for Series RHFI
1992-1997

	Std Error	*INNOV_RHFI*	*INNOV_INF*	*INNOV_GM 1*	*INNOV_GCPS*
1	9.71796	93.329	0.02872	0.52472	6.11754
2	11.6504	93.599	0.02003	0.39404	5.98691
3	12.4268	93.6831	0.01893	0.35526	5.94272
4	12.7689	93.6935	0.0204	0.33657	5.94955
5	12.9113	93.6957	0.02248	0.32991	5.95192
6	12.9713	93.6948	0.02462	0.32787	5.95269
7	12.9966	93.6931	0.02663	0.32733	5.9529
8	13.0073	93.6915	0.02846	0.3272	5.95286
9	13.0118	93.69	0.0301	0.32716	5.95278
10	13.0138	93.6886	0.03156	0.32714	5.95269
11	13.0146	93.6874	0.03285	0.32713	5.95262
12	13.015	93.6863	0.034	0.32712	5.95256

Decomposition of Variance for Series RHFI
1998-2000

	Std Error	*INNOV_RHFI*	*INNOV_INF*	*INNOV_GM 1*	*INNOV_GCPS*
1	9.90811	81.2025	0.51436	7.5267	10.7565
2	12.7897	82.4987	0.45909	7.54356	9.49864
3	14.4411	83.1965	0.41764	7.56062	8.82523
4	15.4605	83.7373	0.38828	7.58489	8.2895
5	16.1179	84.1121	0.36814	7.59088	7.92886
6	16.5511	84.3844	0.35408	7.58897	7.67252
7	16.8407	84.5817	0.34422	7.58333	7.49078
8	17.0361	84.725	0.3373	7.5764	7.36133
9	17.1688	84.8286	0.33246	7.56943	7.26956
10	17.2593	84.9031	0.32909	7.56307	7.20473
11	17.3212	84.9565	0.32676	7.55759	7.1591
12	17.3637	84.9947	0.32517	7.55306	7.12708

Table (7:b): Structural (Sims-Bernanke) Decomposition of Market Returns using M2

	Decomposition of Variance for Series RHFI 1992-2000					Decomposition of Variance for Series RHFI 1992-1997					Decomposition of Variance for Series RHFI 1998-2000				
	Std Error	*INNOV_RHFI*	*INNOV_INF*	*INNOV_GM 2*	*INNOV_GCPS*	*Std Error*	*INNOV_RHFI*	*INNOV_INF*	*INNOV_GM 2*	*INNOV_GCPS*	*Std Error*	*INNOV_RHFI*	*INNOV_INF*	*INNOV_GM 2*	*INNOV_GCPS*
1	9.12268	90.9533	0.58458	2.69259	5.76955	9.78904	89.9131	0.23052	2.8567	6.9997	9.48547	91.2344	2.84697	3.96657	1.9521
2	10.582	91.739	0.54789	2.37063	5.34249	11.7268	90.2505	0.19011	2.7011	6.85828	12.2775	92.4141	2.71624	3.42425	1.44541
3	11.0856	92.0646	0.54857	2.20908	5.17773	12.4992	90.4439	0.17114	2.57247	6.81249	13.8858	93.1061	2.60846	3.07353	1.21187
4	11.2749	92.1934	0.56585	2.13643	5.10437	12.8377	90.532	0.16235	2.48739	6.8183	14.8908	93.5933	2.52541	2.81948	1.06187
5	11.3404	92.2195	0.59326	2.11826	5.06902	12.9779	90.5824	0.15909	2.43975	6.8188	15.5454	93.9234	2.46468	2.63717	0.97475
6	11.3648	92.2047	0.62473	2.11873	5.0519	13.0369	90.6064	0.1585	2.41779	6.81735	15.982	94.1475	2.41941	2.51013	0.92294
7	11.3749	92.1771	0.65762	2.12181	5.0435	13.0621	90.6163	0.15919	2.40877	6.81571	16.2775	94.299	2.38551	2.42321	0.89228
8	11.3799	92.1469	0.69048	2.12356	5.0391	13.0728	90.6198	0.16047	2.40537	6.81439	16.4794	94.4008	2.36012	2.36448	0.87459
9	11.3829	92.1172	0.72239	2.12395	5.03647	13.0774	90.6204	0.16199	2.40415	6.81348	16.6183	94.469	2.34115	2.32519	0.86464
10	11.3852	92.0889	0.75285	2.12365	5.03461	13.0795	90.6198	0.16354	2.40374	6.8129	16.7142	94.5146	2.32704	2.2991	0.85926
11	11.387	92.0622	0.7816	2.12312	5.03309	13.0804	90.6188	0.16504	2.40359	6.81254	16.7806	94.545	2.31659	2.28188	0.85653
12	11.3887	92.0372	0.80854	2.12253	5.03174	13.0808	90.6177	0.16645	2.40354	6.81231	16.8267	94.5653	2.30887	2.27057	0.85527

Figure (1): Inflation Rate and Nominal Interest during March '91 - June '00

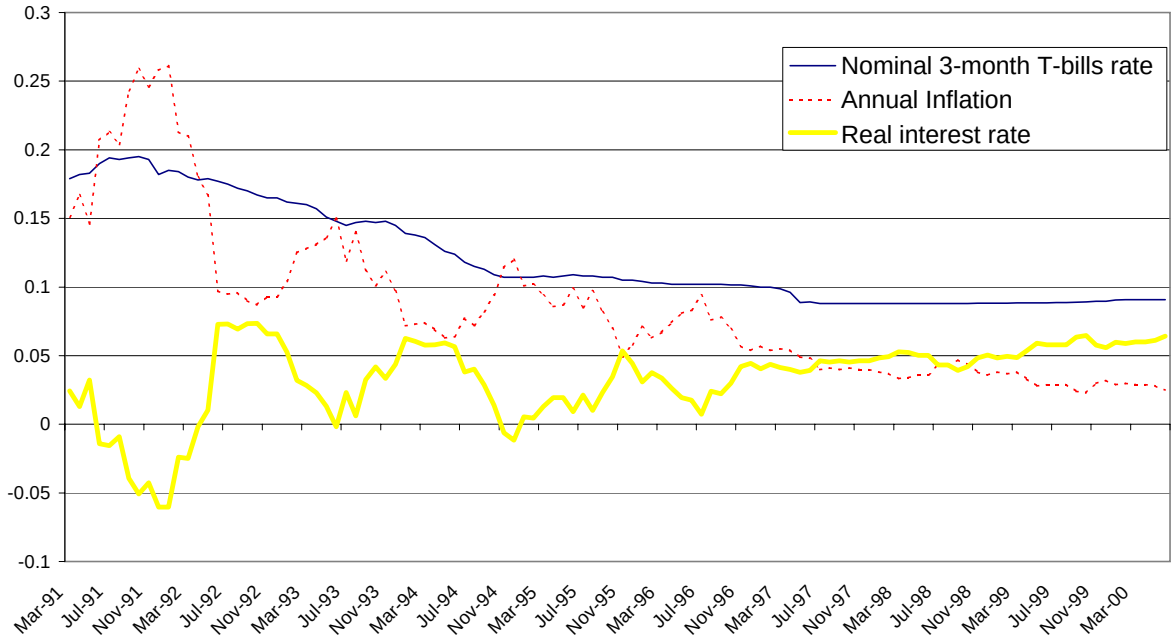


Figure (2): Annual Growth of M1, M2 & Credit to the Private Sector during June '93 - April '00

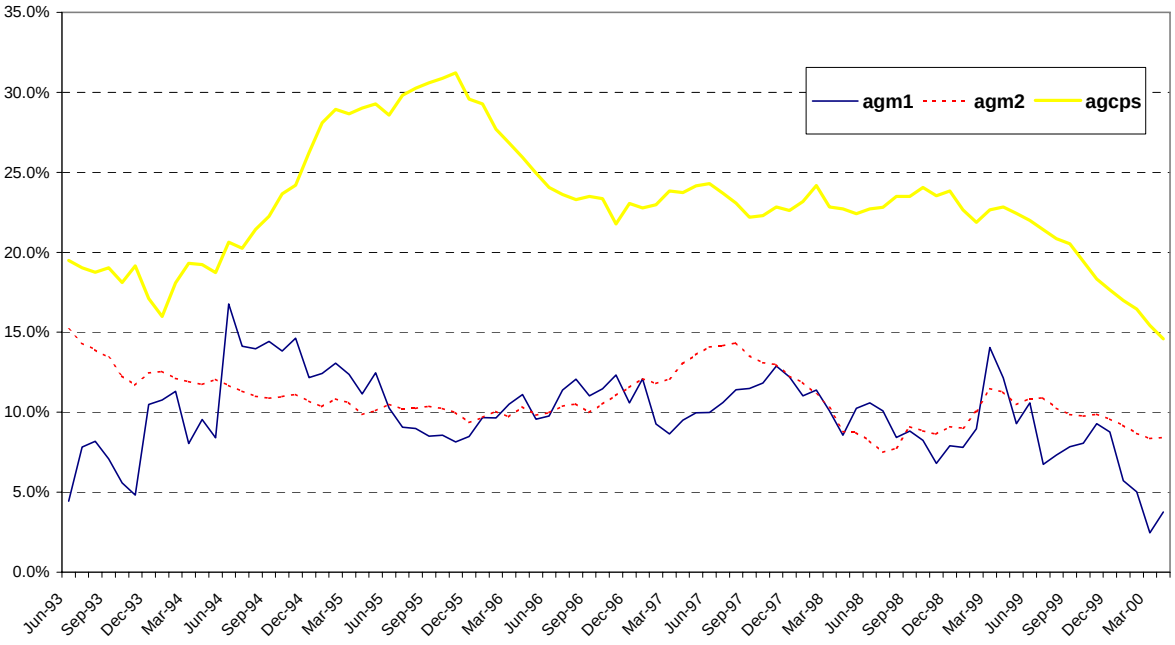
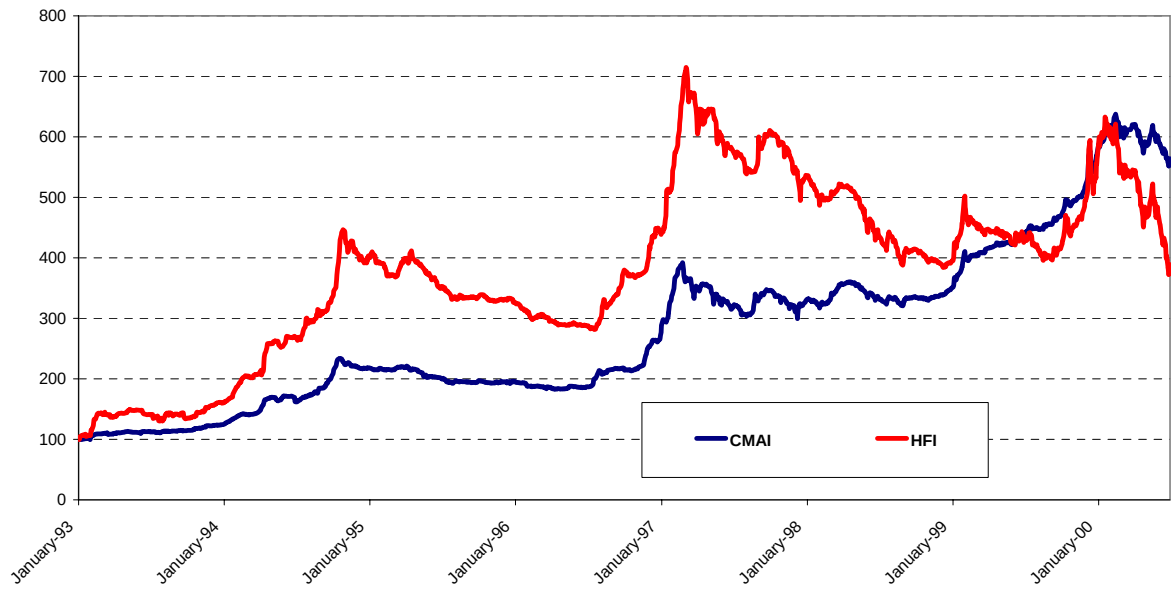


Figure (3): Various Egyptian Stock Market Indices Performance during January '93 - June '00



(Rebased Jan 1/93=100)

Source: Ministry of Economy Monthly Digest

Figure 4: Monthly Returns for Hermes Financial Index during June '92 - June '00

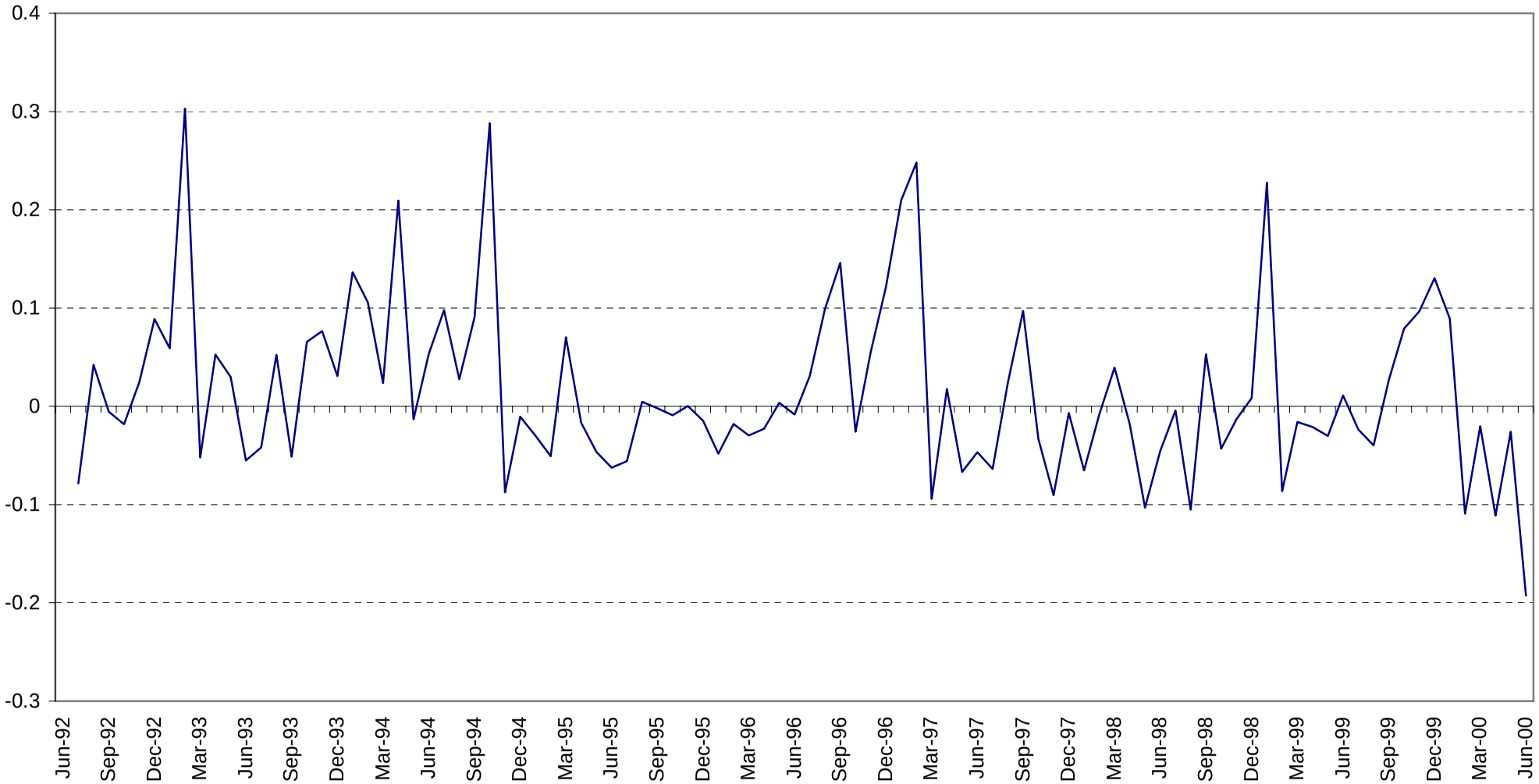


Figure (5:a): Responses to One-Standard-Deviation Shock for Model (I.a)

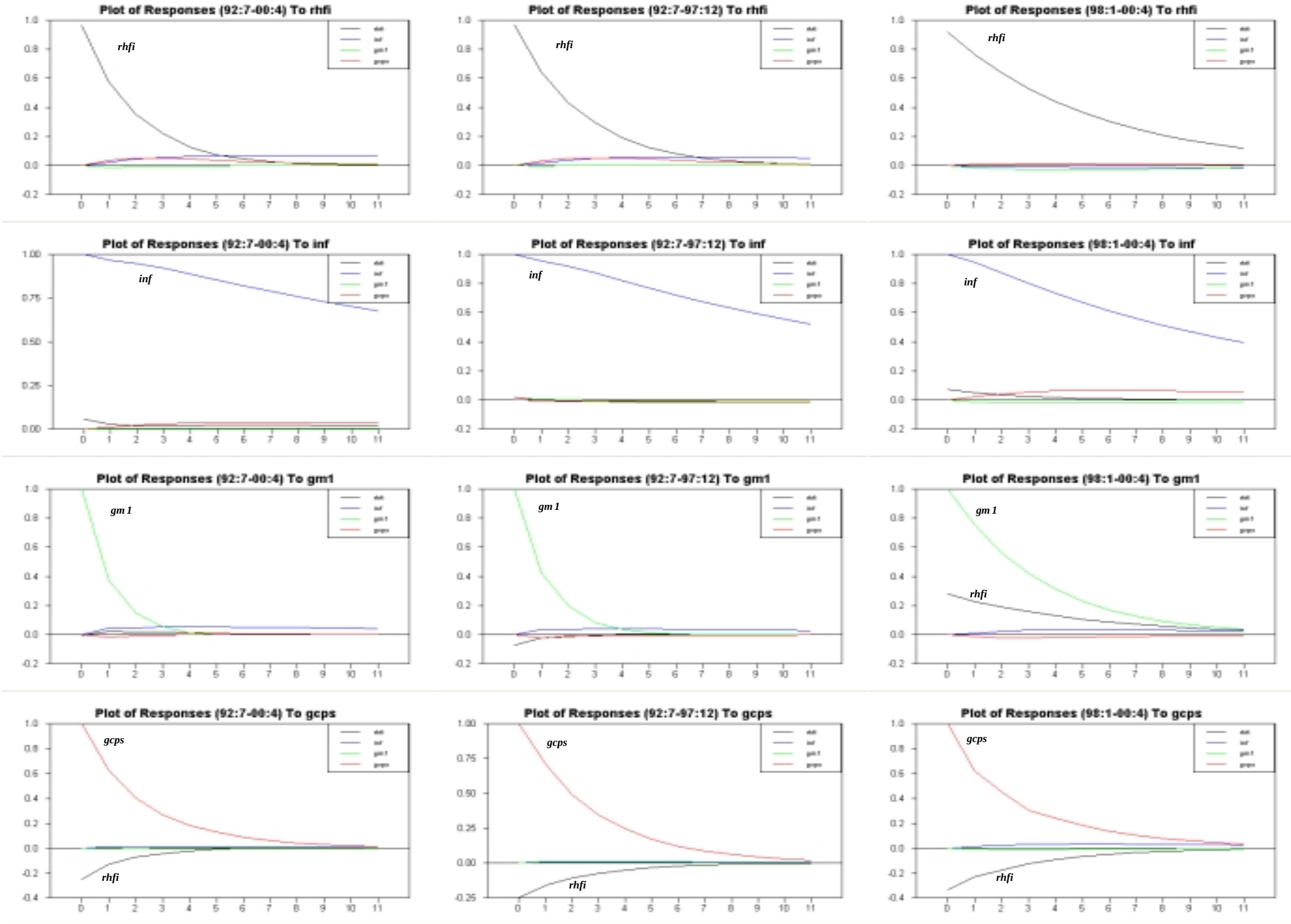


Figure (5:b): Responses to One-Standard-Deviation for Model (I.b)

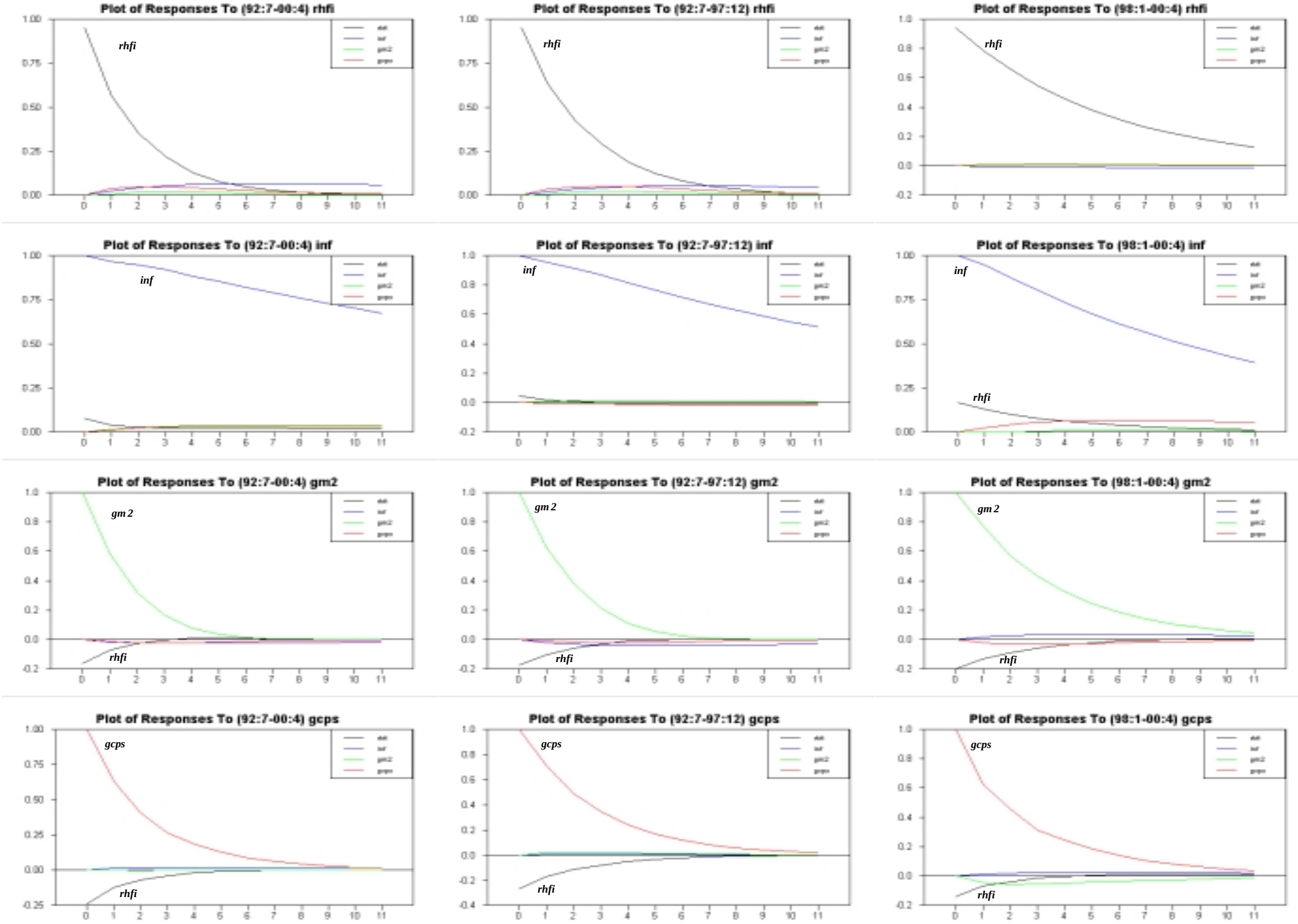


Figure (6:a): Structural (Sims-Bernanke) Variance Decomposition of Market Returns for Models includes Money Supply (M1)

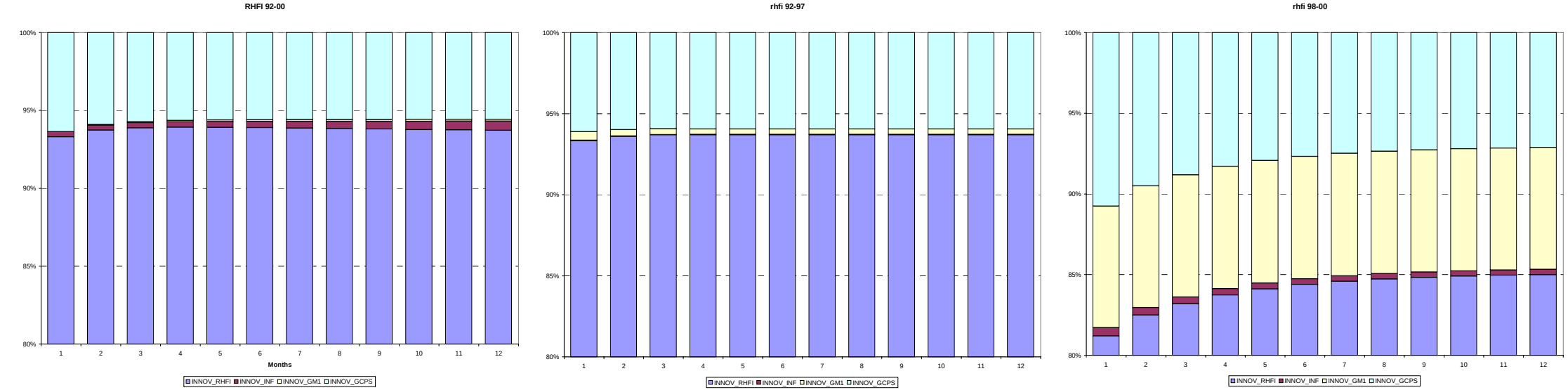


Figure (6:b): Structural (Sims-Bernanke) Variance Decomposition of Market Returns for Models include Broad Money (M2)