

An Interest Rates Model for Kuwait and Implications on Monetary Policy



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Abstract:

A Short run empirical model is constructed to examine the determinants of interest rates within a small economy. A GARCH-M approach is used, and the evidence points to the possibility of a time varying risk premium. This might be an indication of misspecification. The model is also tested for a structural shift, which coincides with the Iraqi threat in the latter half of 1994.

The Chow test is used, and the null hypothesis of no structural shift is rejected. The findings indicate that volatility was higher in the second interval, but persistence declined. There are indications also that the monetary policy might have become more credible in the latter period. Nevertheless, there are strong signs that the capital market is inefficient. Further, a caution is in order for researchers treating the domestic market as fully open. The paper is concluded with a suggestion to take serious steps to liberalize the economy.

Introduction:

There has been a great deal of pressure on developing countries in the past two decades to deregulate their financial markets. This in part has been attributed to the finding that freer markets tend to exhibit better economic performance⁽¹⁾. As a consequence, the policies of the IMF, the World Bank, and other international financial institutions have conditioned any financial support provided to those

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1 - See McKinnon (1973), Fry (1982), and Mathieson (1983).

countries with policies aimed to move these economies closer to market economies. These and the effects of globalization and others have pushed developing countries to accelerate their drive toward establishing capitalistic markets.

The experiences of less developed countries with market liberalization, however, have been mixed. Freeing the financial markets has resulted, in many cases, in high levels of volatility in interest rates, exchange rates, and other asset price⁽²⁾. Of course, this might be attributed to such economic factors as the lack of well developed financial markets, and irresponsible fiscal and monetary policies.

The recent financial collapse of the economies in South East Asia, however, has further emphasized the relevance of the fundamentals⁽³⁾. If any thing, the demise of the economies of South East Asia should further increase the interest of economists to better understand how the economies of less developed countries work, and particularly how interest rates are determined in those economies. This is particularly so because interest rates play a vital role in the monetary transmission mechanism even for the developing countries.

The study at hand develops an empirical model of interest rate determination that allows for differing degrees of openness. The short run model is inspired by the work of Edwards and Khan (1985). The empirical model uses daily observations of macroeconomic variables, and seeks to identify the major determinants of short term interest rates in Kuwait.

The dependent variable is the one month domestic customer deposit rates. The explanatory variables consist of the lagged dependent variable, local exchange rates, foreign exchange rates, the world interest rates, a proxy for risk, and a money supply variable.

The model assumes that economic agents are risk averse, and real income is constant. Further, it is argued that if short term interest rates are determined solely by domestic factors, then the financial market is considered to be fully closed. In this case, it is asserted that the country in question should make se-

2 - See Grable (1995).

3 - Faruqi (1992) found that with the exception of Singapore, the Pacific Basin developing countries have not exhibited a uniform level of financial openness over time.

rious efforts to liberalize its economy. If short term interest rates are determined solely by international factors, then, the capital market is fully open. And if domestic and international factors jointly affect the domestic rates, then, the capital market is said to exhibit semi-open characteristics.

The empirical model allows for dynamic adjustments in expectations through the use of the GARCH-M (GARCH in mean) approach⁽⁴⁾. This allows for volatility clustering and permits economic agents to revise their expectations based on all available information in the information set at time $t-1$. The model permits economic agents to adjust the conditional variance of one period ahead forecast by accounting for a long term constant average variance, the volatility level last period, and what was learnt yesterday. This type of specification is found to provide a better fit for monetary and financial data, and allows for the explicit inclusion of risk premium as a major determining factor of the interest rates⁽⁵⁾.

The GARCH (1,1)-M model is estimated using the Marquardt nonlinear least squares algorithm. Further, due to the occurrence of a structural shift in the model, the data set is partitioned into two subsets. The first is prior to the massing of the Iraqi troops and covers the period between January of 1993 to August of 1994. The latter interval covers the period from December of 1994 to January of 1996. The estimated results show that the persistence of volatility was significantly larger in the first period, while the frequency of volatility was higher in the second period. In addition, none of the foreign variables was significant, with the exception of the Japanese exchange rates. The coefficient of money supply reversed sign and became negative in the second period. Risk premium, on the other hand, seems to have remained constant. The Japanese exchange rates became insignificant, while the coefficient of the money supply variable exhibited a negative correlation. Thus, it is concluded that a shift in monetary policy might have taken place, and that the market became more closed. In addition, the capital market might be inefficient. It should be pointed out, however, that there are signs of misspecification that is common in the literature, which might have been

4 - The GARCH model was introduced by Bollerslev (1986) and stands for Generalized Autoregressive Conditional Heteroskedasticity.

5 - See Sullivan and Giles (1995).

caused by the failure of economic theory to lay down a clear and concise model for risk premium.

Literature Review:

Until recently, few studies had sought to investigate the peculiar nature of the economies of developing countries. In general, these economies exhibit a mixture of open and closed economy aspects. Moreover, their capital markets tend to be heavily regulated. Studying the determinants of interest rates for these economies has become, however, a focus of research in the last decade or so. Nevertheless, most of the research done thus far tended to focus on countries that have liberalized their markets significantly. This might be attributed to the availability of data, and the existence of market determined interest rates, among other factors.

A pioneering study of interest rates determination for developing countries was coauthored by Edwards and Khan (1985). The study allows for differing degrees of openness in the capital account, and combines features that permit researchers to apply it for economies that are closed, semi-open, and open. In a closed economy, interest rates are determined by domestic macroeconomic variables such as the discount rates, money supply, real income, real rates of interest, and expected inflation.

The model incorporates a Keynesian real cash balances effect, where interest rates could deviate from the long run equilibrium, to account for the friction that may arise from transaction costs, imperfect information, and short-term volatility in world interest rates.

Consequently, an increase in money supply is assumed to have a dampening effect on interest rates. The derived structural equation takes the following form⁽⁶⁾:

$$i_t = \delta_0 + \delta_1 (i_t^* + \hat{c}_t) + \delta_2 \log y_t - \delta_3 \log m_{t-1} + \delta_4 \pi^e + \delta_5 i_{t-1} - \varepsilon_t$$

6 - The theoretical and empirical models utilized by Edwards and Khan (1985) assume risk neutrality and thus, uncovered interest parity.

where:

\hat{e}_t : the expected change in domestic exchange rate.

i_t : domestic rate of interest at time t .

i^* : the world interest rate.

Y : real income.

M_{t-1} : lagged value of money supply.

π^e : expected inflation.

ε : an error term.

The empirical model compares the results of the quarterly data for Singapore and Colombia. The first country is expected to exhibit open economy features, while the latter is expected to reflect aspects of a more closed economy. The results seem to be satisfactory, as the authors point out. The economy of Colombia is found to exhibit aspects of a semi-open economy, while that of Singapore is found to be highly open.

A recent shift in the direction of research on the subject of interest rates determination for less developed economies has focused on the effects of financial deregulation on interest rates and the degree of volatility that is associated with market liberalization. McNelis and Schmidt-Hebbel (1993) point out that financial deregulation tends to increase the volatility of the domestic exchange rates, while interest rates tend to converge with that of the world. In addition, they assert that market liberalization shifts, rather than eliminates interest rates volatility, through a higher level of volatility in real exchange rates. Grabel (1995) corroborated the findings of McNelis and Schmidt-Hebbel (1993), showing that financial deregulation might have caused an increase in the volatility of stock prices.

The majority of recent research on the subject of financial deregulation, however, has focused on examining the causes of volatility in asset prices that tend to prevail following market liberalization. In a study conducted by Villanueva and Mirakhor (1990), the authors conclude that a successful experiment with financial sector liberalization is directly related to sound macroeconomic policy, and an effective supervision of the banking system. Another study that em-

phasizes the importance of banking supervision is reported by Benink and Llewellyn (1994). The authors examine the banking sectors of Norway, Sweden and Finland during the 1980's and early 1990's. They conclude that the banks were not able to charge adequate risk premium, so as to be fully compensated for the increased level of lending risks which was brought about by the process of deregulation. The authors attribute the massive bank failures in those countries to the insufficient reserves in the banking system.

Cho (1990), on the other hand, pointed out the importance of a well developed financial system for a successful transition to market economy. Cottani and Cavallo (1991) reached a similar conclusion. The authors acknowledge the premise that a repressed financial system is harmful to economic growth. Nevertheless, they argue that even without government interference, financial markets might fail to function efficiently. Therefore, they advocate that countries postpone full deregulation of their markets until they have established well developed financial markets.

The theoretical and empirical research conducted thus far seems to be consistent with the view that developing countries need to deregulate their economies in a gradual manner so as to minimize the costs of higher levels of volatility in assets prices. Sound macroeconomic policies and a well supervised banking system seem to be necessary, prior to any serious move to full deregulation of the financial market. In addition, a prerequisite for a successful transition to market economy necessitates the establishment of well developed financial markets.

Empirical Model:

A simple short run loanable funds model within an open economy framework is utilized, where savers and investors interact in a multi-market setting. The savers, the suppliers of capital, are the households, while the demanders of capital are firms and possibly the governments. The equilibrating rates of interest that might prevail in these markets are established based on the real rates of returns of both domestic and foreign bonds. In a world without capital control, capital

flight takes place to where expected rates of returns are higher. Thus, local economies are expected to be more susceptible to changes of foreign macroeconomic variables the more these economies are classified as small and open.

The model utilized combines aspects of a small open and closed economy and, thus, accounts for differing levels of openness. It assumes that real income is constant⁽⁷⁾. The general implicit functional form can be written as:

$$i_t = f(\sigma^2, i^*, e^{DM}, e^{JY}, e^{KD}, M_{t-1}, i_{t-1})$$

where:

i_t : domestic interest rates at time t for deposits denominated in Kuwaiti Dinar.

σ^2 : risk premium.

i^* : interest rates on dollar denominated deposits.

e^{DM} : the exchange rates of the Deutsche mark against the Dollar.

e^{JY} : the exchange rates of the Japanese Yen against the Dollar.

e^{KD} : the exchange rates of the Kuwaiti Dinar against the Dollar.

M_{t-1} : lagged value of currency issued (in Millions of KD).

Appendix (1) provides description of the variables used in the model.

The model relaxes the assumptions of risk neutrality utilized by Edwards and Khan (1985); it assumes that economic agents are risk averse⁽⁸⁾. This allows for the inclusion of a risk variable, and the consequent estimation of the risk premium coefficient, or the price of volatility. The model permits expectations formation to adjust at time "t" to reflect all information available at time "t-1". This is facilitated by the use of the GARCH-M model. This technique permits economic agents to alter their expectations continuously to reflect all the information available from the previous period⁽⁹⁾. It allows for volatility clustering, and enables the researcher to forecast today's variance as a function of constant long term variance, the forecast from last period, and what was learned last period.

7 - Since the period under study is relatively small.

8 - See Hirshleifer and Riley (1992) for a detailed discussion of risk aversion and the concept of uncertainty.

9 - See Bollerslev (1996), Mills (1993), and Engle, Lilien, and Robins (1987).

The non-linear regression model to be estimated might be written as:

$$i_t = \alpha_0 + \alpha_1 \sigma_t^2 + \alpha_2 i^* + \alpha_3 e^{DM} + \alpha_4 e^{JY} + \alpha_5 e^{KD} + \alpha_6 M_{t-1} + \alpha_7 i_{t-1} + \varepsilon_t$$

The conditional variance is modeled as:

$$\sigma_t^2 = \eta_0 + \eta_1 \varepsilon_{t-1}^2 + \eta_2 \sigma_{t-1}^2$$

where: σ_t^2 is taken to be today's conditional forecast of volatility. Hence, the conditional variance is expected to exhibit serial correlation. The expected signs of the coefficients are as follows:

$$i_t^{KD} = \alpha_0 + \alpha_1^+ \sigma_t^2 + \alpha_2^+ i^* + \alpha_3^? e^{DM} + \alpha_4^? e^{JY} + \alpha_5^+ e^{KD} + \alpha_6^? M_{t-1} + \alpha_7^+ i_{t-1}$$

Given the assumption of risk aversion, the sign of the coefficient of risk premium is expected to be positive. In other words, an increase in the risk of the market, *ceteris paribus*, should be associated with an increase in nominal interest rates in order to compensate investors for the higher risk. The sign of the coefficient of the US interest rates should be positive since domestic and US bonds are expected to be substitutes. Failure to uncover a significant relationship between the two variables indicates that probably no substitution effect exists between these variables, which is an indication of a closed economy. The signs of the coefficients of foreign currencies may exhibit either sign.

The sign of the coefficient associated with the exchange rates of the Kuwaiti Dinar is argued to be positive, in the sense that economic agents demand higher yield if the currency is expected to depreciate. Further, changes in the amount of currency issued should be correlated with interest rates in a positive or negative way, depending on market expectations, especially as it relates to the nature and causes of the changes in money supply and the perceived intentions of policy makers. An increase in the money supply, in the short run, might produce upward or downward pressures on interest rates based on the expectations of future inflation rates. The coefficient of the lagged dependent variable could take values

ranging from zero to unity, depending on the degree of the openness in the economy. A value close to unity implies an inefficient market and an economy which is closed in nature.

The signs associated with the variance equation are positive for both the ARCH and GARCH components, such that:

$$\sigma_t^2 = \eta_0 + \eta_1 \varepsilon_{t-1}^2 + \eta_2 \sigma_{t-1}^2$$

$$\eta_1 + \eta_2 < 1$$

The sum of these components should be smaller than unity if the conditional variance is to converge⁽¹⁰⁾. Moreover, the closer the sum of these coefficients to unity, the more likely that volatility would persist, i.e. shocks to the financial markets would die out slowly.

Estimation and Results:

The model is estimated using a numerical nonlinear algorithm. The estimated coefficients are expected to be consistent but, the standard errors of the estimates are not. This is because the residuals of the regression are not expected to have normal distribution. Therefore, a robust standard error as described by Bollerslev and Wooldridge (1992) is utilized. The model yielded the following result⁽¹¹⁾:

$$I_t = .7146 + 36.90\sigma_t^2 + .002i^* + .006e^{DM} - .000009e^{IY} + .0004e^{KD} - .00003M_{t-1} + .152i_{t-1}$$

(40.90) (2.62) (2.77) (.73) (-.14) (14.62) (2.77) (232.25)

$$R^2 = .9888$$

$$\bar{R}^2 = .9887$$

Log Likelihood = 2689.30

* The numbers in parentheses are the t-statistics. "I" is the log of interest rates.

10 - Bollerslev (1986) reports that GARCH process is wide sense stationary if and only if the sum of the GARCH and ARCH elements are less than unity. If the coefficients add up to one, then, an IGARCH model should be utilized instead.

11 - It was noted during the estimation process that Marquardt nonlinear least squares algorithm is a more robust estimator for GARCH models, compared to the Berndt-Hall - Hall - Hausman algorithm. This is in line with the claim outlined in the User Manual, of E-Views TM. The BHHH method, fails to maximize the Likelihood in many occasions.

dication of market inefficiency, and a rejection of the notion of a fully open economy. The results also show that the risk premium is significant and positive, but numerically, it is very close to zero⁽¹³⁾. The coefficients of the domestic exchange rates are significant and positive. The coefficient associated with the exchange rates of the Japanese Yen is significant and negative, implying that an appreciation of the Yen exerts downward pressure on domestic interest rates. Again the actual estimated numerical impact of changes in the Yen-Dollar exchange rates is on average pretty small. All other coefficients are statistically insignificant. These findings might be taken as an indicator that the financial market is not fully open, but rather exhibit semi-open characteristics⁽¹⁴⁾.

The estimates for the second period utilize 312 daily observations which span the period from December 1994 till January 1996. The estimated regression yielded the following results.

$$I_t = .853 + 25.70\sigma_t^2 + .004i^* + .003e^{DM} - .00002e^{JY} + .0001e^{KD} - .000024M_{t-1} + .149i_{t-1}$$

(33.08) (2.91) (.82) (.33) (.27) (45.27) (-2.41) (57.66)

$$R^2 = .953$$

$$\bar{R}^2 = .952$$

Log Likelihood = 1145.81

The variance equation yielded the following results:

$$\sigma_t^2 = .00002 + .606 \varepsilon_{t-1}^2 + .038 \sigma_{t-1}^2$$

(1.25) (3.36) (.617)

These estimates seem to differ significantly from those obtained for the first interval, particularly with respect to the estimates of the variance equation, and the coefficients of money supply and the Yen exchange rates. The money supply variable reversed sign, to exhibit a Keynesian short run liquidity effect. It is argued that the inflow of funds into the Kuwaiti economy causes interest rates

13 - In the sense that doubling the value of the conditional variance impact interest in a marginal way.

14 - The laws and regulations allow individuals and firms to transfer funds to and from Kuwait without any restrictions. The signs of a semi-open economy might be attributed to the regulations that are imposed on some financial firms, and particularly on the banking sector, which restrict their ability to lend to foreign residents.

the following period to decline, and vice versa. This might indicate that economic agents perceive the policy followed by the monetary authority to be non-inflationary. In other words, the policy followed by the Central Bank might be considered to be credible, in the sense that the monetary policy is prompt to neutralize the inflationary effects of capital flows.

The coefficient of the Japanese exchange rates is shown to be insignificant, even though it was significant and negative in the first period. In addition, the risk premium coefficient remained practically unchanged. The constant long run geometric variance turned out to be insignificant. The coefficient of the ARCH term has increased significantly compared to the first period, while the coefficient of the GARCH element is insignificant⁽¹⁵⁾. In other words, the frequency of volatility might have increased, while the degree of persistence in volatility might have markedly decreased. Further, the international variables tend to play, even, a lesser role in the second interval, implying relatively a more closed economy.

Finally, it should be mentioned that further investigations of the diagnostics revealed the possibility of mis-specification. The mis-specification seems to be more severe in the first interval. This problem has plagued the literature of risk premium. Causes of the mis-specification are not currently fully understood. Potential causes could be related to measurement errors, omitted variables, and time varying rather than a constant risk premium. Hence, the estimated parameters and their implications should be viewed with caution.

Conclusion and Implications:

In a nutshell, the results provide indications that a shift in the monetary policy might have taken place shortly following the Iraqi threat of 1994⁽¹⁶⁾. This shift however, did not impact risk premium. Hence, if the intentions of the Iraqi threat were designed to reduce confidence in the Kuwaiti economy, then such goals might not have materialized.

15 - Appendix (2), Figure (2) and (3), show the graphical representations for the conditional standard deviations for the two periods.

16 - See Milton and Roley (1988) Where they argue that significant changes in the volatility of interest rates across periods provide evidence of a possible regime shift.

Further, it is observed that all the independent variables, with the exception of the lagged domestic interest rates, were either irrelevant from a statistical viewpoint or have coefficients that are very close to zero. This, among others, and the finding that the long run constant variance is not significantly different from zero, lead one to argue that the capital market is inefficient. On the average, current interest rates are pretty much determined by their lagged values. In the short run, however, interest rates could fluctuate, and money supply, volatility, and exchange rates tend to impact the behavior of interest rates in a significant manner.

Further, it seems that the inflationary expectations and/or the fear of a depreciation of the currency have decreased in the second period. In the early period, economic agents perceived increases in the money supply as permanent, and inflationary expectations were altered accordingly. In the latter interval, a more credible policy seems to have emerged, and economic agents seem to have become less wary of the intentions of the monetary authority. This might be a step forward by the Central Bank to establish a reputation that it is following a non inflationary policy⁽¹⁷⁾.

Nevertheless, the finding that the financial market is relatively closed is a bit troubling, specially that the domestic market has to be opened up sometime in the near future. Failure to take concrete steps now to gradually liberalize and develop the financial market might prove to be costly later on. Further, it is important to note that the Monetary authority has taken some measures to de-regulate the financial markets, one of which is the removal of the interest rates floor imposed on customer deposit rates. Nevertheless, the pace and scope of liberalization that has been followed thus far might not be enough compared to what could have been achieved.

It is suggested, therefore, that policy makers move gradually and steadily to increase the depth and width of the financial markets. Foreign Banks should be allowed to operate in Kuwait, and a better system of banking supervision should be established. It should also be clear that a developed financial market

17 - Or that Central Bank is less likely to devalue the currency.

may not be achieved without developing the real sector of the economy. Hence, one might argue, even under current financial circumstances, that the government should take a more serious role to energize the real sector of the economy, directly or indirectly. The infrastructure should be modernized and expanded. The local labor force should be retrained and reallocated. Public officials should also work diligently to reduce the size of the public sector, curtail monopolies, reduce red tape and bureaucracies, and provide incentives to attract foreign direct investments.

The recent suggestions of imposing direct taxation might be counterproductive at this point in time as it further reduces the growth of the economy and the attractiveness of domestic investments. A serious implication of this study is the need to exercise caution when treating economies like that of Kuwait as fully open without considering the impact of financial regulations. Finally, future research may examine the sources of volatility in the market, and the nature and characteristics of the tools, procedures and targets that are utilized by the monetary authority to stabilize the economy.

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Appendix (1)

This appendix briefly indicates the source of the data and defines the variables used in the empirical model. The daily data used are obtained from the Central Bank of Kuwait and span the period from January 1993 to January 1996. The variables used in the regression model are:

i_t : the daily average of one month customer deposit rates, denominated in the Kuwaiti Dinar, which is based on the transactions of the banking system in Kuwait.

i^* : the one month customer deposit rates, denominated in the US dollar, which is based on the transactions of the banking system in Kuwait.

e^{DM} : The Deutsche Mark exchange rates vis-a-vis the Dollar, which is calculated based on the average daily exchange rates. The average daily exchange is based on the transactions of the dealing room of the Central Bank of Kuwait.

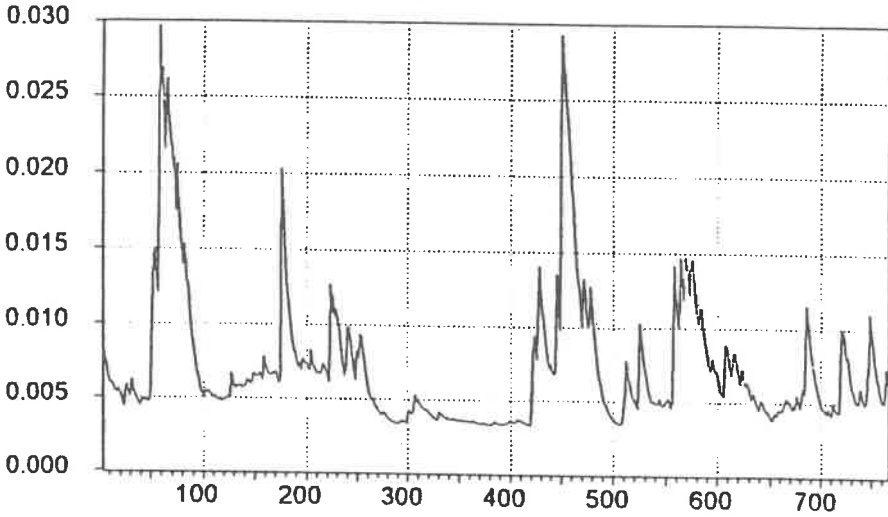
e^{JY} : the Japanese exchange rates, which is calculated based on the average daily exchange rates: The average daily exchange is based on the transactions of the dealing room of the Central Bank of Kuwait.

e^{KD} : the Kuwaiti exchange rates is calculated based on the average daily exchange rates. The average daily exchange is based on the transactions of the dealing room of the Central Bank of Kuwait.

M_{t-1} : lagged value of currency issued, which includes cash with local banks and currency in circulation, in million Dinars.

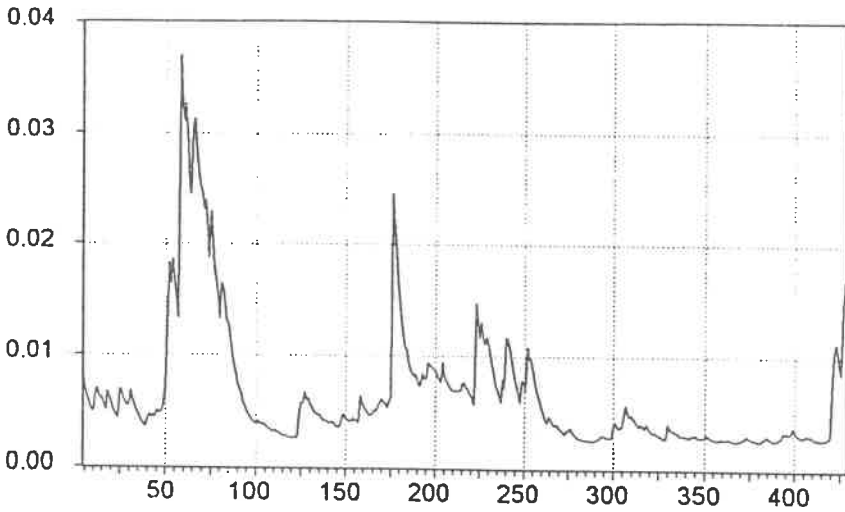
Appendix (2)

Figure (1)



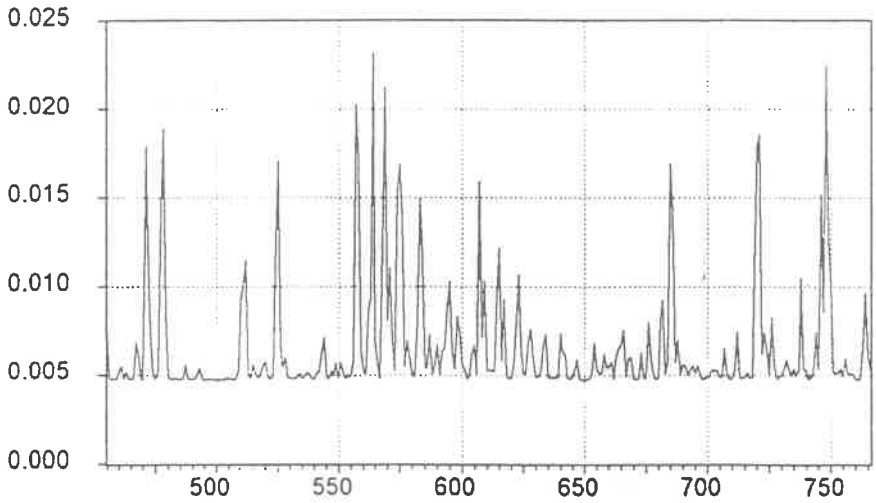
The conditional Standard Deviation over the whole period

Figure (2)



This graph shows the conditional standard deviations for the first 427 data points.

Figure (3)



This graph shows the conditional standard deviations for the 312 data points.

المجلة العربية للعلوم الادارية



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الدول العربية 4 دينار للأفراد
15 دينار للمؤسسات
الدول الأجنبية 15 دولاراً للأفراد
60 دولاراً للمؤسسات

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