ON THE EMPIRICAL EVIDENCE OF PRICE STABILITY AND MONEY SUPPLY RELATION IN THE UNITED ARAB EMIRATES

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Abstract

This research paper attempts to meet three objectives. First, is inflation and money supply relation very significant in a small open economy of the UAE? Second, what is the causal point for a relative stability of prices in the UAE as compared to other GCC countries? Third, is monetary targeting as a policy option to achieve overall economic stability a sufficient measure? The examination of these questions results in some interesting findings. The methodology used to examine our objectives covers historical overview and econometric techniques. Our first result confirms Monetarists' view that prices and money supply are highly correlated. In the economy of UAE, prices are relatively stable because of the stability of transactions velocity related to M1 and the relation between prices and M1 has been found to be more significantly correlated than the significance level of the relationship of M2 with prices though it is much more highly correlated than M1. The inverse relation between prices and money supply has turned out to be very insignificant. Even the exchange rate shows a significant influence on prices although the data regressed on this variable cover only fixed exchange rates due to paucity of data on dollar versus dirham appreciation or depreciation covering a considerable period of time. Our estimation of demand for money function with real GDP and interest rates as the two determining variables of Md (Demand for Money) does not give us any significant relation with prices except the real GDP which has shown low correlation but high significance. Overall, it has been found that in a small open economy of the UAE monetary targeting has been successful in maintaining price stability with a fixed exchange-rate system. Nonetheless, in the long-run a fiscal policy accompanying monetary targeting should be the action plan for overall economic stability on the part of the government of the UAE

Key Terms: Money supply (M1and M2), Velocity (Transactions), Demand for Money, Real cash balances, Nominal GDP, Real GDP, GDP deflator, Exchange rate, Interest rate, 't' statistic and 't'value, Mean ,Standard Deviation, Ordinary Least Square(OLS)

Part 1

Introduction

In spite of high fluctuations in oil price and revenue that lead to similar, though smaller fluctuations in real GDP, the economy of UAE remained remarkably stable in terms of inflation rates and the exchange rate. Since 1981, the UAE dirham has been fully pegged to the US$ at the rate of 3.67 and the inflation rate never exceeded the average of 2.5% over the period considered here. It was only in 2003 the inflation rate crossed 3 percentage points because of price rises in all major expenditure groups. The index for the housing and related housing services rose from 104.3 in 2002 to 110.4 in 2003. The index for the medical care and medical services group also rose from 150.0 in 2002 to 152.8 in 2003. Likewise, the index for the transportation and communication services increased from 135.1 in 2002 to 137.9 in 2003, while the index for each of the remaining groups registered only slight increases.

In this paper we have examined an empirical relationship between prices and money supply. The attempt has also been made to find out whether changes in money supply have been affecting prices. Other than money supply, our empirical investigation went into examining the impact of exchange rate and demand for money function on prices.

The time series data covering a period from 1973 to 2003 on macro economic indicators such as Nominal GDP (NGDP), Real GDP (RGDP), GDP Deflator (GDPDEF), Money Supply (M1 and M2), and Exchange Rate have been used for regression analysis. The Ordinary Least Square (the OLS) Linear Regression Model is used to regress the data. For interpreting our econometric results with a specific significance level, the Null Hypothesis (H0: ß =0 and H1: ß≠0) as well as for testing Beta coefficients' significance the Hypothesis (H0: ß =1 and H0: ß≠1) have been examined for carrying out the 't' test. Other than this, we have made some calculations shown in tables 4, 5 and 8. Like money supply, the demand for money function may also

affect prices in the economy. To examine the possible effect of it, the attempt is made to estimate the demand for money function for the UAE economy. This function covers a period from 1998 to 2003; relatively a smaller one. The reason for the selection of such a small period is that the time series data has not been available on market interest rates So, the results that are found on the significance level of this factor could be taken as temporary or short-lived and may be, to some degree, insignificant.

For finding out whether M1 or M2 is highly correlated with prices and are their significance levels differ in exerting the influence on prices, frequencies on M1 and M2 are calculated and their means and standard deviations are compared with the mean value of nominal GDP. This exercise has helped us understand the relative stability of V1 corresponding to M1 and V2 corresponding to M2.

In monetary theory it has always been presumed that it is the money supply that affects prices. But, at times, prices also affect money supply. In that case we get an inverse relation between the two. To examine this possibility, we also regressed money supply on prices. The results in this connection are discussed in part two of this paper.

Part 2
Economic Theory and Econometric Results
(A) Monetarists' View

Monetary theory believes that changes in money supply bring about changes in real variables such as output and employment. In extension of this view the theory states that changes in the quantity of money supply bring about changes in output as well as prices in the short run but in the long- run the changes in the size of money supply will only bring changes in the nominal value of GNP. In their theory money supply becomes passive in bringing about changes in output and employment and only scales up prices. So, in their theoretical structure, money supply

can become a cause for volatility in prices. This paper, therefore, precisely focused on the empirical aspect of this causal relationship between price level and money supply.

The demand for money is a demand for real money balances (M/P) because people hold money for what it will buy. The higher the price level, the more nominal balances a person has to hold to be able to purchase a given quantity of goods. The demand for real balances depends on the level of real income (realGDP) and the interest rate. It depends on the level of real income because individuals hold money to pay for their purchases, which, in turn, depend on income.

On these simple grounds, then, the demand for real balances increases with the level of real income and decreases with the interest rate. The demand for real balances, which we denote as L, is accordingly expressed as

L= kY-hi   k, h > 0

(B) Empirical Investigation

Our linear regression results on price and money supply relationship and other variables affecting prices are as follows.

a) Money supply (M1 and M2) is found to be significantly correlated with prices in the economy of UAE. But, their degree of correlation and the level of significance differ. For example, the R^2 in the case of M1 is .30 which is not a good result but taking into account the significance level we found that for the intercept as well as for the ß coefficient the correlation is significant at 0.5% and 0.01% levels. This shows that although our result based only on the R^2 value is not very satisfactory but looking at the significance level for the ß coefficient the result is very encouraging from the point of view of establishing a possible relationship between prices and M1 only.

b) The second result is much more significant. The money supply M2 is highly correlated with prices with the R^2 equal to .68 and the ß coefficient t statistics and the t value showed that the relation is significant at 0.01% level and even the second test looking into whether ß = 1 or ß≠1 showed us that the significance level of correlation is lying between 0.2 and 0.1% levels.

c) To examine the cause behind the relative price stability in the economy of UAE, we looked into the mean value of the NGDP growth rates and the mean value of the M1 growth rates. The mean value of the growth rates of M1 is found to be very close to the mean value of the growth rates of the NGDP (M1=17.13 and NGDP=16.41. See table no.8). The mean value of the M2 being 23.61 was not found to be close to the value of the NGDP. Since the mean value of the M1 is much closer to the mean value of the NGDP, we can infer that the V1 (velocity corresponding to M1) has been relatively much stable and that precisely has brought the relative stability in general level of prices in the economy of the UAE.

d) In our attempt to look into the inverse relation between money supply and prices the R^2 turned out to be .17 which is very poor and, therefore, the causation is not very strong from money supply to prices. But, taking into account the ß coefficient significance level which is 5%, we can not reject the possibility of money supply driving prices in the economy of UAE. Bur the correlation based on the data studied is not very strong at this juncture.

e) Our result owing to the exchange rate effect on prices is somewhat mixed. Looking at the R^2 value which is .40 close to .50, the correlation is somewhat meaningful. But looking at the significance levels for the intercept as well as the ß coefficient which are .01% at both the levels correspondingly, the possibility of exchange rate strongly affecting prices can not be rejected. Our regression analysis has obviously faced a problem of not finding time series data on dollar versus dirham exchange rate volatility. We have, as a result, used the data on fixed exchange rates. The data on volatility might give us much better result on the R^2.

f) Our estimated demand function for the economy of UAE taking a very short period of time starting from 1998 to 2002 looks as follows:

(M/P)=L=841.862+100.417r-.003RGDP

This demand for money function does not cope up with a standard demand for money function with a negative coefficient of r and a positive coefficient of RGDP. We have not introduced M1 separately. Instead of that we have taken money stock owing to M2 which consists of bank deposits in addition to currency with the public. Our result tells us that if real GDP increases keeping prices relatively stable, the demand for nominal cash balances would fall. And with the increase in interest rates, people might prefer, for a short period of time, bank deposits to liquid cash. That perhaps is the case in the economy of UAE. But, looking at the significance level of this correlation for both the variables, .50% is not that promising. In short, the demand for money function is not that important variable in influencing prices in the economy of UAE.

Part 3
Conclusion

Our empirical analysis suggests us that there is a significant correlation between prices and money supply in the economy of UAE. It is especially M1 and the corresponding V1 have been keeping prices stable. But M2 is not that insignificant variable which definitely exerts its influence on prices. If we look at the factors affecting domestic liquidity in the economy of UAE, we better understand the relevance of M2. The domestic liquidity in this economy is affected by the three main factors like Net Foreign Assets, Net Domestic Credit and Net Other Factors. A review of the factors affecting private domestic liquidity from 2002 to 2003, shows that the effect of net foreign assets was expansionary, as they increased by AED 3.68 billion (2.8%), and the effect of net domestic credit was also expansionary, as it rose by AED 28.4 billion (22.9%). Net other factors which rose by AED 5.10 billion (6.1%) had a contractionary impact on private domestic liquidity (M2).

So, over the period studied in this paper, we can firmly say that the monetary targeting as a policy tool to stabilize prices and the overall economy has been successful in the economy of UAE. But, the question keeps on lingering in the minds of scholars about the role of the fiscal policy in the economy of UAE.
Since the turn of the 1990s, the consolidated budget (including the federal government and emirates governments) has experienced sustained deficits. But as Hamed and Elhiraika (2001) argue "The UAE government does not rely on fiscal policy tools in achieving macroeconomic stability. Rather it relies mainly on monetary policy tools, particularly the link between the Dirham and the US dollar, to maintain macroeconomic stability, and that

the governments of the dominant emirates finance their budget deficits by drawing down their own abundant overseas assets, thereby eliminating inflationary pressures, and avoiding crowding out of private sector activities".

This suggests the absence of any important link between macroeconomic performance and the budget deficits, but government spending undoubtedly stimulates private economic activity. The structure and financing of the budget deficit may look into two important dimensions. One, the fiscal sustainability in the absence of taxes and the second, the potential impact of cuts in government expenditure on growth. Unfortunately, there is paucity of sufficient data, especially on accumulated domestic and foreign investment by the various emirates to look into these fiscal dimensions. To the extent the deficit financing does not exceed the income generated by public assets; the government would be able to maintain fiscal stability. Otherwise, there will be a need for significant adjustment of government expenditure and increases in government revenue. So, in addition to monetary policy as a tool of overall economic stability, the government of UAE has to seriously think of looking into fiscal policy adjustments in the long-run. This would help the UAE government stabilize prices along with targeted rate of growth in the long-run.

Glossary
- Exchange rate: The price of one currency in terms of another.
- GDPDEF: NGDP/RGDP
- Monetary targeting: The policy aiming at overall economic stability through changes in monetary policy instruments and money supply.

- Nominal GDP: Money value of the output in current prices.
- Money supply: Total quantity of money in the economy M1: Currency with the public + Monetary Deposits (Chequable deposits) M2: M1+ Quasi monetary deposits (Quasi here means 'near money assets which Function as 'store of value' rather than 'medium of exchange'.
- Price level: (Consumer Price Index) a weighted average of prices of major commodities.
- Real GDP: NGDP/ GDPDEF
- R2 : Goodness of Fit (Coefficient of Correlation).
- 't' statistics: estimated value of a variable on intercept and beta/standard error.

- Velocity: Average number of times a unit of transaction changes hands.

- V1 : The transactions velocity where money is functioning as a medium of exchange. It shows the average number of times currency with the public is changing hands.

- V2: The transactions velocity of deposits.

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Model Summary(b)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.548(a)	.301	.275	19.5430

a Predictors: (Constant), growth rate in m1
b Dependent Variable: growth rate in prices

ANOVA(b)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	4433.904	1	4433.904	11.609	.002(a)
	Residual	10312.081	27	381.929		
	Total	14745.985	28			

a Predictors: (Constant), growth rate in m1
b Dependent Variable: growth rate in prices

Coefficients(a)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-3.386	4.625		-.732	.470
	growth rate in m1	.620	.182	.548	3.407	.002

a Dependent Variable: growth rate in prices

Casewise Diagnostics(a)

Case Number	Std. Residual	growth rate in prices
1	4.221	115.54

a Dependent Variable: growth rate in prices

Residuals Statistics(a)

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	-7.3348	47.4015	6.3845	12.5839	29
Residual	-38.9200	82.4968	-1.3476E-15	19.1908	29
Std. Predicted Value	-1.090	3.259	.000	1.000	29
Std. Residual	-1.992	4.221	.000	.982	29

a Dependent Variable: growth rate in prices

Variables Entered/Removed(b)

Model	Variables Entered	Variables Removed	Method
1	growth rate in m2(a)	.	Enter

a All requested variables entered.
b Dependent Variable: growth rate of prices

Model Summary(b)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.825(a)	.681	.670	19.1737

a Predictors: (Constant), growth rate in m2
b Dependent Variable: growth rate of prices

ANOVA(b)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	21985.104	1	21985.104	59.802	.000(a)
	Residual	10293.664	28	367.631		
	Total	32278.769	29			

a Predictors: (Constant), growth rate in m2
b Dependent Variable: growth rate of prices

Coefficients(a)

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	-1.645	4.042		-.407	.687
	growth rate in m2	.825	.107	.825	7.733	.000

a Dependent Variable: growth rate of prices

Residuals Statistics(a)

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	-8.4316	136.2740	13.9767	27.5337	30
Residual	-43.9973	36.9160	5.329E-15	18.8402	30
Std. Predicted Value	-.814	4.442	.000	1.000	30
Std. Residual	-2.295	1.925	.000	.983	30

a Dependent Variable: growth rate of prices

Variables Entered/Removed(b)

Model	Variables Entered	Variables Removed	Method
1	VAR00002(a)	.	Enter

a All requested variables entered.
b Dependent Variable: VAR00001

Model Summary(b)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.416(a)	.173	.137	25132.91191

a Predictors: (Constant), VAR00002
b Dependent Variable: VAR00001

ANOVA(b)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3039741391.763	1	3039741391.763	4.812	.039(a)
	Residual	14528255008.237	23	631663261.228		
	Total	17567996400.000	24			

a Predictors: (Constant), VAR00002
b Dependent Variable: VAR00001

Coefficients(a)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	50137.420	5490.842		9.131	.000
	VAR00002	-485.266	221.210	-.416	-2.194	.039

a Dependent Variable: VAR00001

Residuals Statistics(a)

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	-5930.2241	52631.6875	45290.0000	11254.14996	25
Residual	-37890.64453	48138.85156	.00000	24603.73871	25
Std. Predicted Value	-4.551	.652	.000	1.000	25
Std. Residual	-1.508	1.915	.000	.979	25

a Dependent Variable: VAR00001

Variables Entered/Removed(b)

Model	Variables Entered	Variables Removed	Method
1	exchange rate(a)		Enter

a All requested variables entered.
b Dependent Variable: inflation rate

Model Summary(b)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.636(a)	.405	.373	15.41497

a Predictors: (Constant), exchange rate
b Dependent Variable: inflation rate

ANOVA(b)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3067.538	1	3067.538	12.909	.002(a)
	Residual	4514.805	19	237.621		
	Total	7582.343	20			

a Predictors: (Constant), exchange rate
b Dependent Variable: inflation rate

Coefficients(a)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	366.727	71.156		5.154	.000
	exchange rate	-67.410	18.762	-.636	-3.593	.002

a Dependent Variable: inflation rate

Residuals Statistics(a)

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	71.0677	119.3331	111.3531	12.38454	21
Residual	-20.61083	31.19687	.00000	15.02465	21
Std. Predicted Value	-3.253	.644	.000	1.000	21
Std. Residual	-1.337	2.024	.000	.975	21

a Dependent Variable: inflation rate

Variables Entered/Removed(b)

Model	Variables Entered	Variables Removed	Method
1	real gdp, interest rate(a)	.	Enter

a All requested variables entered.
b Dependent Variable: real cash balance

Model Summary(b)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.467(a)	.218	-.303	633.8246

a Predictors: (Constant), real gdp, interest rate
b Dependent Variable: real cash balance

ANOVA(b)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	335925.149	2	167962.574	.418	.692(a)
	Residual	1205200.960	3	401733.653		
	Total	1541126.109	5			

a Predictors: (Constant), real gdp, interest rate
b Dependent Variable: real cash balance

Coefficients(a)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	841.862	1591.537		.529	.633
	interest rate	100.417	149.440	.358	.672	.550
	real gdp	-.003	.006	-.215	-.404	.713

a Dependent Variable: real cash balance

Residuals Statistics(a)

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	366.7820	977.7676	705.4748	259.2008	6
Residual	-656.4781	746.6782	-9.4739E-14	490.9584	6
Std. Predicted Value	-1.307	1.051	.000	1.000	6
Std. Residual	-1.036	1.178	.000	.775	6

a Dependent Variable: real cash balance