

The Flexible Model, Gold Dinar and Exchange Rate Determination.

An Exploratory Study.

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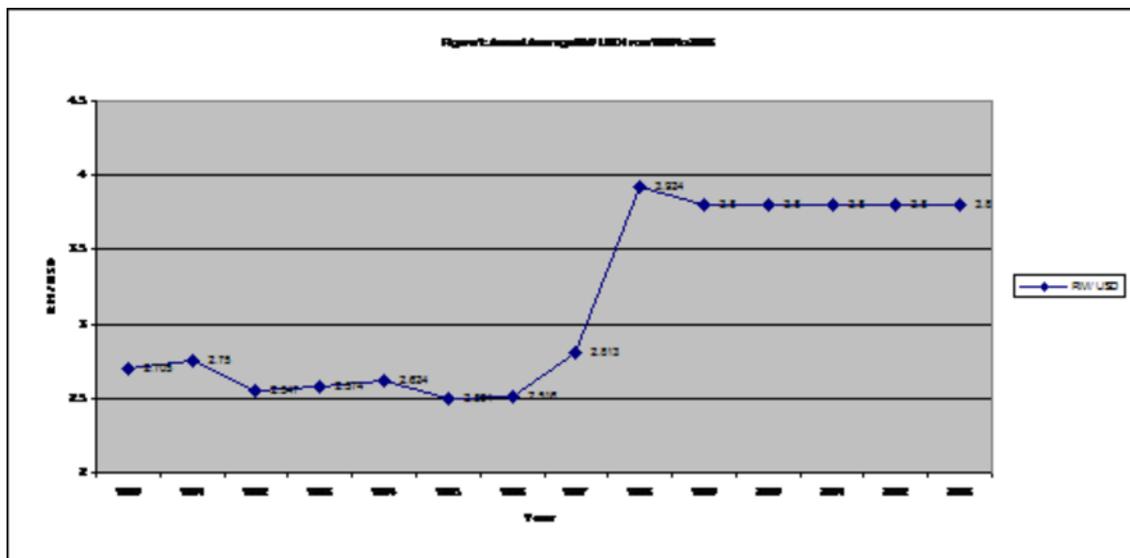
A. Introduction ^[1]

There are three basic roles of money, which are widely accepted. The roles of money are as a medium of exchange, as a store of value and as a unit of accounts. Money acts as a medium of exchange because it is accepted for exchange of goods and can be used to buy other goods. It must also act as store of value for it could be used to trade current goods for future goods and it also could be measured as a unit of account. Money that could fulfill all the three roles is categorized as good money. The problem with the existing money that in our monetary system is it failing in its role as a store of value. This in fact is true if we look at its purchasing power keeps on decreasing in value due to several reasons such inflation and currency depreciation resulted from money creation. In addressing the problem of storage of value it is important for us to see the types of money that is in existence. The type of money is as follows:

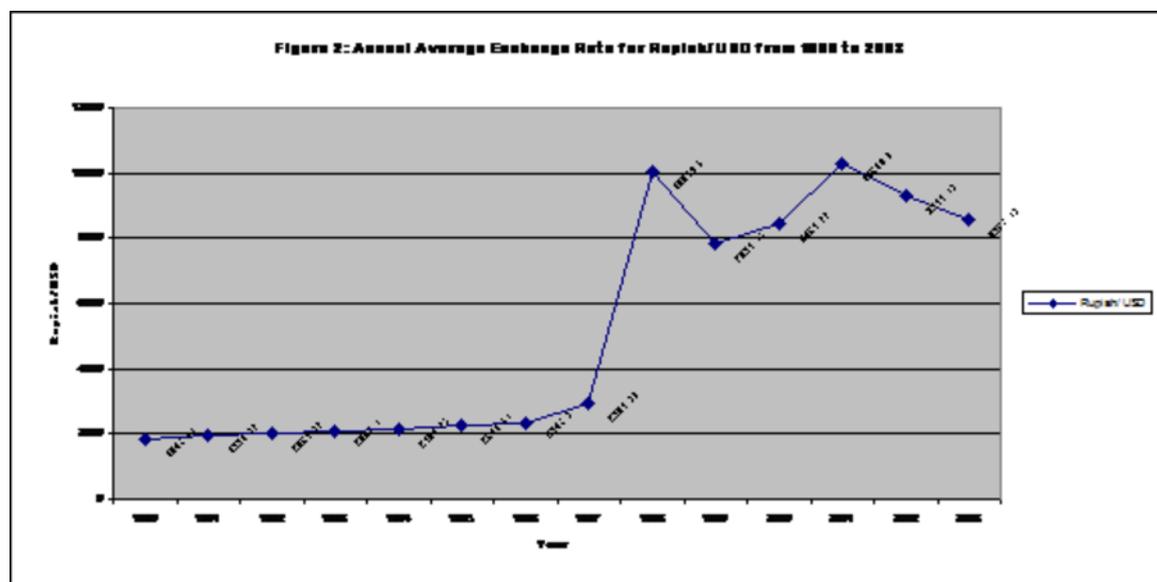
1. Commodity money is money that has its value on its own or in other word it has intrinsic value. Example of the commodity money are gold, silver, barley, wheat, salt and dates. During the world war, the prisoners of war used cigarettes as money.
2. Private bank notes ^[2] are notes that Banks issued with promise to redeem for gold. This *pbn* is widely used in 1800 in US. The major problem with *pbn* was bank insolvency due to issuance of notes more than the gold reserve.
3. Gold Standard ^[3]. This *gs* is actually government issue paper currency backed by gold. Each note could be redeemed for a specified quantity of gold and the system is more likely work as the commodity money except that it reduces the cost of carrying physical gold.
4. Fiat money ^[4]. This type of money is actually a piece of worthless paper but accepted for exchange of goods. This system depends heavily on the trust of the people to believe that it has value and being accepted by others. We have been using the fiat money since the abandonment of the Bretton Wood System and currently not a single commodity such as gold backing up the fiat money.

As we could see from the Asian financial crisis in 1997, the fiat money could not fulfill its role as a store of value. This is true when speculators could manipulate the fiat money and the monetary system through serial speculative attack on a regional group of countries, provoking massive capital outflows, simultaneous crisis and recession for a whole region (Konac, 2000).

As for example, the annual average exchange rate for Ringgit Malaysia has depreciated from 2.514 in 1996 to 3.924 in 1998 against the USD before pegging the Malaysian Ringgit at 3.80 per USD in September 1998. Figure 1 [5], shows that the RM/USD was stable from 1990 until 1997 before the currency crisis.



Another example was the case of Malaysia neighboring country, Indonesia (see Figure 2 [6]). The Rupiah also depreciated against the USD approximately 244.18 percent using the annual average data 1997 and 1998 from Rupiah 2909.38 per USD to Rupiah 10,0013.60 per USD.



Historically these two countries exchange rate could be shown in appendix 1 which shows that in 1997 the currency depreciated with a big jump.

In consequences to that, many researchers and economists are looking back to the gold standard, which could strengthen the countries from being attacked by the speculators (Mohd Dali et al, 2002). One of the systems suggested is the Gold Dinar currency, which has been widely used by our historic ancestors. Many people questioned, whether the gold Dinar currency would be similar to the classical gold standard in the 18th century.

The Classical Gold Standard

The classical gold standard started in 1880 and ended in 1914 but it has been the focus of great interest of many policy makers and scholars ever since (Bordo, 1999). There are four desirable features of the classical gold standard that explained its perennial appeal as presented by Bordo (1999). They are listed as follows:

- a) Low inflation, stable exchange rates, relatively rapid economic growth and less real instability than in the interwar period (Bordo 1981, 1993). It also was an era of rapidly expanding international trade in commodities, services and factors production (Bordo, 1999). This favorable economic performance was because the system placed an effective limit on monetary expansion, since monetary would be based by gold, a durable commodity as compared to monetary standard based on government fiat can expend money without limit.
- b) The second admired feature of the gold standard was its operations as an automatic system with limited government involvement. The world price will depend on the supply and demand of

monetary gold. The supply of the monetary gold depended on gold production and the non-monetary demand for gold such as luxurious jewelry.

- c) A third feature of the classical gold standard era was that it both fostered and maintained by cooperation between monetary authorities of different nations.
- d) A fourth admired feature was that it represented a *credible* commitment regime. This was due that the fact many nations that adhered to the gold standard forgo their opportunities using monetary expansion and fiscal policies in order to avoid jeopardizing convertibility.

In contrast to the classical gold standard, the gold Dinar would not replace the domestic currency and the currency would not be pegged to gold as one to one basis. The system will operate in combination of the gold Dinar and the fiat money. Specifically the gold Dinar is intended for international trade whereas the fiat money will be used as the domestic currency. Therefore, the circulation of fiat money, would not be the same as the gold reserve owned by the central bank. This effort is done step by step as a transition to a full swing gold Dinar economy system, which means that the domestic currency will be 100 percent backed by gold exactly like the classical gold standard. The major difference is that the gold Dinar would be using gold coins instead of bullion in the Classical Gold Standard for daily transactions.

Many people believe that the Gold Dinar was originated from the Islamic Caliphs world. However, the history shows that the gold Dinar had been used before Caliphs time. Paper presented by Anwar Zainal Abidin in the National Dinar Conference at Hotel Nikko, Kuala Lumpur on 16 March 2002 states that Dinar is a currency minted and used since the beginning of Islam. However the word Dinar is not originated from Arabic word but it came from Greek and Latin or maybe Persian word denarius^[7]. Meanwhile Dirham is taken from the name of silver currency *drahms*, which used by Sasan people in Persia. *Drahms* was taken from the name of the silver currency *drachma* used by the historic Greek people (Hj Anwar, 2002).

Originally the Muslims used gold and silver made by the Persians. Silver dirhams of the Sassanian Yezdigird III was the first dated coins that can be assigned to the Muslims. Dr A. Zahoor and Dr Z. Haq (1998) mentioned that the Dinar and Dirham were used officially as the Islamic currency beginning with the second Caliphate (Zahoor & Haq, 1998). The first Muslim coins were used during the Khalifate of Uthman, ra^[8] and there were not many differences from the Persians coins except that Arabic inscription is found in the obverse margins of the coins (Zahoor & Haq, 1998), (E-Dinar Ltd). Writing in Arabic of the Name of Allah and parts of Qur'an on the coins became a custom in all mintings made by Muslims

(E-Dinar Ltd).

The first khalifah who ordered the dinars to be minted is Khalifah Abdalmalik Bin Marwan in the year 75 (695 CE). He ordered Al-Hajjaj to mint the dirhams, and established officially the *standard of Umar Ibn al-Khattab* ^[9]. In the year 76 he ordered the dinars to be minted in all the regions of the Dar al-Islam ^[10]. He ordered that the coins be stamped with the sentence: "Allah is Unique, Allah is Eternal". He ordered the removal of human figures and animals from the coins and that they be replaced with letters (E-Dinar Ltd).

Since then, the Dinar and the dirham writing was stamped in concentric circles written with "la ilaha ill'Allah" and "alhamdulillah"; and on the other side was written the name of the Amir and the date. Later on it became common to introduce the blessings on the Prophet, *salla'llahu alayhi wa sallam*, and sometimes, ayats of the Qur'an (E-Dinar Ltd). Bahrain Monetary Agency stated that

"the gold Dinars and the silver dirhams issued by the Caliph acted as missionaries of the Islamic faith wherever they circulated. In addition, the coinage inscription record the rise and fall of families and states, their victory and defeats, changing allegiances and shift in boundaries, as well as highlighting developments in Arabic calligraphy" (Bahrain Monetary Agency).

Gold and silver coins remained official currency until the fall of the Khalifate. Since then, dozens of different paper currencies were made in each of the new postcolonial national states created from the dismemberment of Dar al-Islam (E-Dinar Ltd). Dr A. Zahoor and Dr Z. Haq (1998) mentioned in their paper titled "*The Gold Coins of Muslim Rulers*", paper money was introduced in the colonial era and continued into post-colonial era (Zahoor & Haq, 1998). As Malaysia is trying to implement the Dinar system to strengthen its financial sectors, it is vitally important to see the impact of the implementation to one currency (Mohd Dali et al, 2002).

With the introduction of Gold Dinar this paper will aim on the impact of the Gold Dinar on the monetary model – flexi model. This paper would only touch on the theoretical framework since there is no country in the world are using gold as currency and therefore there is no data available for analysis. This exploratory research will use the existing monetary model of exchange rate determination developed by Dornbusch (1976), Bilson (1978), Frankel (1978) and Hodrick (1978): to show its impact on the overall home country's currency.

B. Assumptions of the model

1. Two countries, home and foreign.
2. A flexible (bilateral) exchange
3. Agents have perfect foresights i.e. producer can predict the price movement
4. All prices flexible.
5. Absolute PPP hold continuously. The domestic and foreign price of the same commodities will always equal.
6. UIP holds.
7. Gold Dinar will become a portion of M1 in the monetary base*.
8. Gold Dinar would be excluded in the money multiplier*.
9. A full swing Dinar economy would eliminate interest in the economy* [\[11\]](#).

In the model, the gold Dinar will be a fraction in M1, which will be denoted as g_s . In a country with no gold Dinar, $(1 - g_s) = 1$, and in a country with a full swing gold Dinar, $g_s = 1$.

In this case it would best to use the result of a study done by Mohd Dali et al (2004) on the level of acceptance of the MSC companies on the implementation of Gold Dinar. In this case we would use $g = .431$ as presented in the findings of the survey on the willingness of the MSC companies to use the Gold Dinar as a fraction of companies in Malaysia that would be using gold Dinar.

In this model it is best to assume that the foreign country in long run equilibrium i.e its price level and interest rate is not changing over time (for simplicity, set $p_t^* = y_t^* = 0$, $I_t^* = I^*$) which means that the price of foreign goods would be the same as the income in foreign and interest at time t will be the same as interest at time 0 .

It should be also noted that in a full Dinar economy, no interest will be available anywhere in the system but since, the domestic fiat money will not be replaced totally then the interest rate would be also considered in the fraction Dinar economy model.

In this paper, only section C (The Monetary Model – Flexible Price) will be tested empirically since

section D (The Monetary Model with a full swing Dinar economy) and E (The Monetary Model with a fraction of Dinar economy) are conceptual and data for the **gs** is not available since it has not been implemented. However, further research will be conducted in the future for section D and E.

C. The Monetary Model – Flexible Price

The monetary models of exchange rate determination start with the assumption of perfect capital mobility. PPP and interest rate parity conditions are used in the models to define equilibrium conditions. Bonds (foreign and domestic) are assumed to be perfect substitutes.

$$S = p - p^* \quad (1)$$

where s is the logarithm of exchange rate expressed in units of home currency per foreign currency, and p and p^* are, respectively, domestic and foreign price levels.

The model assumes a stable money demand function in domestic and foreign countries. The money market equilibrium conditions for domestic and foreign countries are assumed to depend on the logarithm of real income, y and the logarithm of price level, p and the nominal interest rate, i . An identical relationship can also be assumed for the foreign country, where asterisks denote foreign variables. Monetary equilibria in the domestic and foreign country are then given by equation (2) and (3):

$$m = p + \alpha_2 Y - \alpha_3 I \quad (2)$$

$$m^* = p^* + \alpha_2 Y^* - \alpha_3 I^* \quad (3)$$

where m and m^* are the domestic and foreign money supply, respectively. α_2 is the income elasticity of demand for money and α_3 is the interest rate semi-elasticity. Rearranging equation (2) and (3) for domestic and foreign price levels and substituting into equation (1) yields the following flexible price monetary model of exchange rate equation of Bilson (1978), Frankel (1978) and Hodrick (1978):

$$S = m - \alpha_2 Y + \alpha_3 I - (m^* - \alpha_2 Y^* + \alpha_3 I^*)$$

$$S = \alpha_1 (m - m^*) - \alpha_2 (Y - Y^*) + \alpha_3 (I - I^*) - \epsilon_t$$

D. The Monetary Model with a full swing Dinar economy.

The purchasing power parity will hold and if the two countries are using full swing Dinar economy then the PPP will have the form of $p = sp^*$ where s will be equal to 1. Therefore the price of goods in home country will be the same as the price of goods in foreign country, which could be summarized as follows:

$$p = p^* \quad (1)$$

Where;

p = price of goods in home country

p^* = price of goods in foreign country

From the definition of UIP, the equation will be:

$$S_{t+1} - S_t = I_t - I_t^* \quad (2)$$

Where;

S_{t+1} = Expected exchange rate at time $t+1$

S_t = Spot Exchange Rate

I = Interest rate in home country

I^* = Interest rate in Foreign Country

If the two countries are using full swing gold Dinar economy then UIP will look like this;

$S_{t+1} - S_t = 0$ since there are no interest in the gold economy. Or in other word the the spot exchange rate would not be changing since there is no interest rate differential between the home and foreign country.

It is also useful to relate the money market equilibrium in the home country with the CPI. So let the CPI in the home country be Q . Therefore;

$$Q = P(SP^*/P)^b$$

In a full swing Dinar economy, $Q = P(1P^*/P)^b$ or $Q = P$

Therefore the money market equilibrium in the home country would have this form:

$M/P = Y_t^\alpha (1 + I)^{-\beta}$ where M/P is the real money balances, Y is the real domestic output and α is the income elasticity of money demand, and β is the semi elastic of money demand w.r.t to the domestic interest rate.

In money market equilibrium $M_d = M_s = M_t$

However in a full swing Gold Dinar economy $(1 + I)^{-\beta} = 1$, therefore $M/P = Y_t^\alpha$

This is due to the nature of the gold economy do not recognize interest as in the conventional economy. In other word there is no money for speculation because when $I = 0$, we will get $L_s = a(I^{-\eta}) = 0$

A = Arbitrary constant

I = interest rate

$-\eta$ = interest elasticity of the speculative demand for money.

Therefore in a full swing Dinar economy the money demand will be money for transaction only, L_s .

In order to neutralized the power, change the equation to log from and we get;

$$M - P = \alpha Y$$

$$\text{Or } P = M - \alpha Y \quad (3)$$

Substitute (1) in (3) we will get

$$P = M - P^* - \alpha Y \quad (4)$$

Now consider that the price level in foreign country have the same variables as the domestic.

$$P^* = M^* - \alpha Y^* \quad (5)$$

Now substitute (5) in (4) we will get

$$P = M - P^* - \alpha Y$$

or

$$P = M - (M^* - \alpha Y^*) - \alpha Y$$

or

$$S = M - M^* + \alpha Y^* - \alpha Y$$

In order for S to be equal to one, Y and Y* will play a role in this matter depending on the level of M and M*.

Or

$$S = M - M^* - \alpha(Y - Y^*) \quad (6)$$

Domestic Monetary Expansion.

If there is a monetary expansion of the domestic money supply M, i.e. discovery of gold mines, M will increase and in order for PPP to hold $P=SP^*$, and since S will always equal to one, Y the domestic output will increase if all other variables are ceteris paribus.

E. The Monetary Model with a fraction of Dinar economy.

The purchasing power parity will hold and if the two countries are using a fraction of the Dinar economy then the PPP will have the form of $p = sp^*$ where s will be the exchange rate.

$$p = sp^* \quad (1)$$

From the definition of UIP, the equation will be:

$$S_{t+1} - S_t = I_t - I_t^* \quad (2)$$

If the two countries are using a fraction of the Dinar economy then the UIP will look like this;

$$S_{t+1} - S_t = I - I^*$$

It is also useful to relate the money market equilibrium in the home country with the CPI. So let the CPI in the home country is Q . Therefore;

$$Q = P(SP^*/P)^b$$

In a fraction of the Dinar economy, $Q = P(SP^*/P)^b$ or $Q = P/C$

Therefore the money market equilibrium in the home country would have this form:

$M/P = Y^\alpha (1 + I)^{-\beta}$ where M/P is the real money balances, Y is the real domestic output and α is the income elasticity of money demand, and β is the semi elastic of money demand w.r.t to the domestic interest rate.

In money market equilibrium $M_d = M_s = M_t$

However in a fraction of the Dinar economy $(1 + I)^{-\beta + \beta(gs)}$,

In order to neutralized the power, change the equation to log from and we get;

$$M - P = \alpha Y - (-\beta + \beta(gs))I$$

$$\text{Or } P = M - \alpha Y + (-\beta + \beta(gs))I \quad (3)$$

Substitute (1) in (3) we will get

$$P = M - P^* - \alpha Y + (-\beta + \beta(gs))I \quad (4)$$

Now consider that the price level in foreign country have the same variables as the domestic.

$$P^* = M^* - \alpha Y^* + (-\beta + \beta(gs))I^* \quad (5)$$

Now substitute (5) in (4) we will get

$$P = M - P^* - \alpha Y + (-\beta + \beta(g_s))I$$

or

$$P = M - (M^* - \alpha Y^* + (-\beta + \beta(g_s))I^*) - \alpha Y + (-\beta + \beta(g_s))I$$

or

$$S = M - M^* + \alpha Y^* - \alpha Y + (-\beta + \beta(g_s))I^* + (-\beta + \beta(g_s))I$$

Or

$$S = M - M^* - \alpha (Y - Y^*) + (-\beta + \beta(g_s))(I - I^*)$$

F. Research Methodology and Data Specification

The empirical research will be tested on the flexi model (Please refer Section C) only using the annual time series data compiled from the Asian Development Bank Reports from 1981 until 2001. Malaysia and Indonesia are chosen for the sample because these two countries are within the same region. Data on M2 from both countries will represent the money supply, interest rate on the savings will represent I and GDP per Capita will represent the national output.

In verifying the flexi model, it is useful that all variables to be tested on the stationary test. This test is important in order to avoid spurious regression. Spurious regression occurs when the variables used are non-stationary (Granger and Newbold 1974). This could be identified when the regression R square is high but the t statistics is not significant. The result would not represent the true relationship. Therefore in this research, the Augmented Dickey Fuller Unit Root Test will be conducted to identify the whether the data is stationary or not. Next, the data will be tested using the cointegration test to see whether there is a long-term relationship between the variables.

G. Empirical Result

1. Regression Analysis

The following equation is derived from the analysis.

$$\text{Ln Exc} = 1.914 + 0.211 \text{ Ln I}^* + 0.085 \text{ Ln I} - 0.102 \text{ Ln M}^* - 0.14 \text{ Ln M} + 1.72 \text{ Ln Y}^* - 1.51 \text{ Ln Y}$$

(0.16) (0.18) (0.26) (0.37)* (0.28)* (0.42)

* Significant at 5% level.

Even though the R square is high which was at 0.98 but the result was doubtful and it is suspected that the data is a non-stationary data. In order to test whether the data is stationary or not, the unit root test has to be conducted.

2. Stationary Test

Table 1: Augmented Dickey Fuller – Unit Root Test (log data)

Country		Level τ	First Difference τ	Second Difference τ
Malaysia	Money Supply	-0.33	-1.08	-3.25*
	Output	-0.61	-3.00*	-4.96*
	Interest	-0.89	-2.10	-3.81*
Indonesia	Money Supply	-0.69	-2.84**	-4.16*
	Output	0.93	-3.07*	-4.78*
	Interest	-7.96*	-8.79*	-6.93*

The T value is compared with the critical value MacKinnon as provided in Eview package. * = Significant at 5% and ** = significant at 10%.

In summary, the original series have to be differenced twice before it becomes stationary; the original series is integrated of order 2 at 5% percent significant level.

3. Cointegration Test

The previous ADF test has identified that the data is non-stationary and may resulted to spurious regression. The data was difference twice before the cointegration test is conducted. After the using the data for second difference, cointegration test could not be conducted because the numbers of observations were insufficient. The span of data must be a longer span of data, however, data on Indonesian M2 was unable to be collected [\[12\]](#).

G. Conclusion

Further research would be conducted in this area especially in order to make sure that the cointegration

test could be conducted by increasing the numbers of observations. Monthly data instead of annual data could be used instead of annual data. A simulation on the model with full swing Gold Dinar and with fractional Gold Dinar also would be conducted in the future. Hopefully, this paper would be a stepping-stone for all other practical researchers [\[13\]](#) to start with.

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Appendix 1

Figure 3: Annual Average Exchange Rate for RM/USD from 1948 to 2003

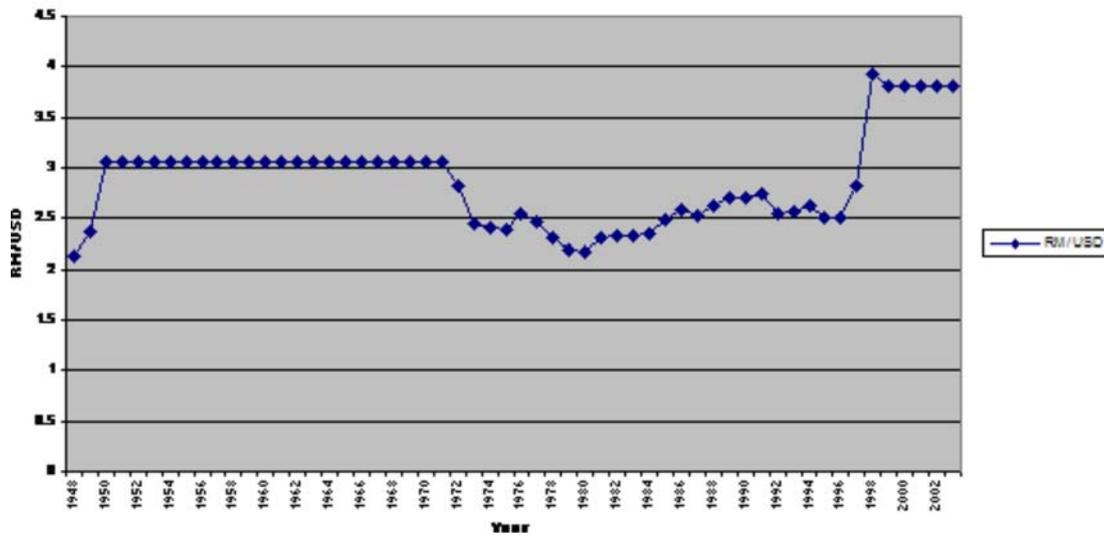
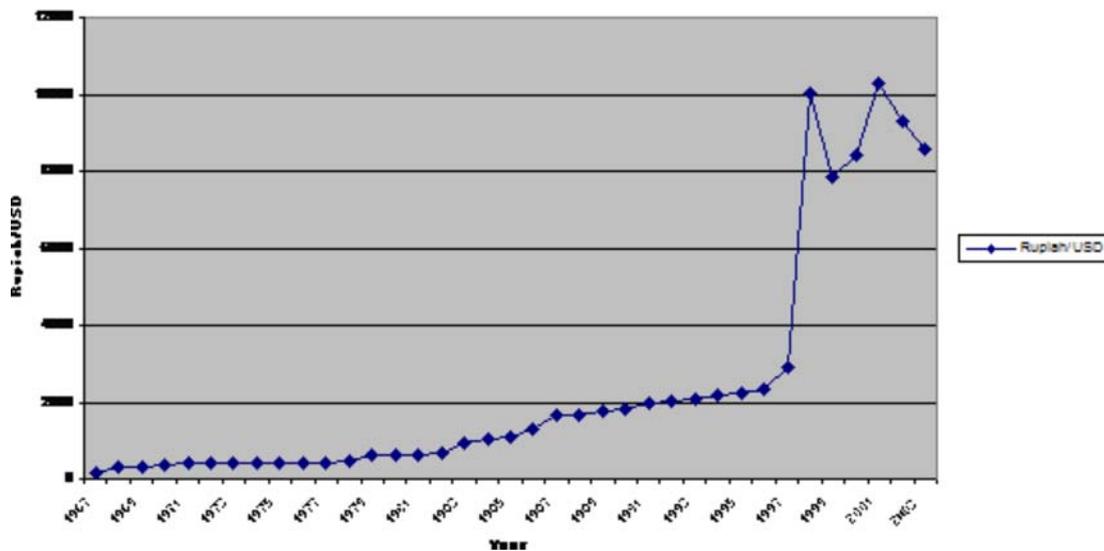


Figure 4: Annual Average Exchange Rate for Rupiah/USD from 1967 to 2003



Appendix 2

Dependent Variable: LEXC

Method: Least Squares

Date: 03/30/04 Time: 14:51

Sample(adjusted): 1981 2000

Included observations: 20 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LII	0.210972	0.161888	1.303197	0.2151
LIM	0.084784	0.182115	0.465554	0.6492
LMI	-0.102678	0.257709	-0.398426	0.6968
LMM	-0.138193	0.369755	-0.373741	0.7146
LYI	1.721255	0.283646	6.068324	0.0000
LYM	-1.513091	0.415999	-3.637250	0.0030
C	1.914027	3.276146	0.584231	0.5691
R-squared	0.982723	Mean dependent var		6.599500
Adjusted R-squared	0.974749	S.D. dependent var		0.607700
S.E. of regression	0.096567	Akaike info criterion		-1.567947
Sum squared resid	0.121227	Schwarz criterion		-1.219440
Log likelihood	22.67947	F-statistic		123.2415
Durbin-Watson stat	1.692005	Prob(F-statistic)		0.000000

[1] The authors also wish to express their appreciation for many scholars and practitioners who made extensive comments on earlier drafts especially to

[2] Private Bank Notes which will be denoted as *pbn*

[3] Gold Standard which will be denoted as *gs*

[4] Fiat money, which will be denoted as *M*

[5] Data collected from International Financial Statistics Online

[6] Data collected from International Financial Statistics Online

[7] Aramaic Language

[8] Radiy'allahu anhu (Blessed upon him)

[9] Under what was known as the coin standard of the Khalif Umar Ibn al-Khattab, the weight of 10 dirhams was equivalent to 7 dinars (mithqals).

[10] The Islamic world

[11] * Additional Assumptions added to the existing Flexi Model Assumptions

[12] The data span was from 1981 to 2000, It would be a great assistance if anyone could provide me with data starting from the 60s.

[13] The author would appreciate if other scholars could review and give comments on the paper. The author also would be grateful make research collaboration with other researchers in the area of Gold Dinar.