International Pricing of OPEC Oil: Is the Dollar Preferable to Currency Baskets?

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Abstract

At the present time the OPEC's position as a monopoly cartel and as an agent influencing the world oil prices is weak. But OPEC's power as a price setter of international oil could gain momentum again as soon as the world begins to come out of the recession or if there is any major world interruption in the flow of oil. Therfore, OPEC's future price policies are still of concern to the oil importing countries.

Introduction

The pricing policies of OPEC as a monopoly cartel have three major dimensions. First, the policies involve finding and maintaining a pricing structure which increases the probability of OPEC being able to act as a viable cartel. Second, they involve the efficacy of oil availability and price as a political tool. Finally, they involve the adjustment of the nominal price of oil for inflation and the fluctuation of the United States dollar vis-a-vis other currencies for the purpose of maintaining the real price of oil in international markets. This paper will examine only the issue of price policies of OPEC with regard to the fluctuations of international currencies.

The relative strength or weakness of the U.S. dollar against other currencies generates either an economic benefit or a cost to th OPEC members. This benefit or cost cannot be avoided, especially for OPEC members which are heavily dependent on imports from the industrialized countries. For example, a strong dollar relative to the German mark makes the terms of trade better for OPEC members which are Germany's trade partners. That is, those OPEC members which are German'y trade partners enjoy a reduction in import prices relative to the price of oil.

During the 70s, when the U.S. dollar was relatively weak, the OPEC ministers on several instances called for some form of currency basket as a substitute for the U.S. dollar in the international pricing of oil. The purpose of this paper is to provide different measures (basket of currencies) for the price of OPEC oil and to compare the performance of the dollar with alternative currency baskets. In other words, this study measures the performance of different currency baskets, assuming they had been utilized for the pricing of oil. Five alternative currency basket measures for the price of oil are

calculated and compared to the dollar pricing of OPEC oil for the decade of the seventies.

This study is a partial equilibrium analysis in the sense that certain important variables and interactions are assumed constant. For example, the impact of currency basket pricing on OPEC investment and assets is ignored. Other factors, such as consumer country reactions through their export prices, income levels, import restrictions, or political retailiation to the oil prices by currency basket, are also ignored. Obviously, these factors in a general equilibrium framework exist under the current price practices.

Methodology

Under the dollar pricing of OPEC oil, which exist now, the real price of oil is subject to three factors: (1) nominal price of oil, (2) the price of imports to OPEC, and (3) the value of the U.S. dollar vis-a-vis other major currencies. Thus, the real price of oil can be written as:

$$(1)\quad P_R = P_N \cdot \frac{1}{P_M \over XR}$$

where P_R = real price of oil; P_N = nominal price of oil in the U.S. dollar; P_M = nominal unit import price to OPEC; XR = exchange rates of foreign currencies expressed in terms of dollar.

To see the impact of each of those three factors on the real price of oil in an dynamic framework that is more realistic, we take the natural logarithm of (2) as follows:

$$(2)\quad \ln P_R = \ln P_N - \ln P_M - \ln XR$$

Taking the time deritive of each variable in (2) yields the three components of the real price of oil as:

$$(3)\quad \overset{o}{P}_R = \overset{o}{P}_N - \overset{o}{P}_M - \overset{o}{XR}$$

The (o) on the top of any variable denotes the rate of growth of that variable. In equation (3) P^R represents the terms of trade of OPEC and can be decomposed into the following: (1) the change (rate of growth) in the nominal price of oil, (2) the change (rate of growth) of import prices to OPEC, and (3) the change (rate of growth) of the dollar's value against other currencies.

this paper will simulate and measure the impace of the last factor, the fluctuation of the dollar against other currencies, XR, assuming the other components to be as they were in that period — 1971-80.[1]

Nature and Design of Currency Baskets

This section includes the design, measurement, and evaluation of five different currency baskets called the Geneva I, the Geneva II, the Trade, the SDR, and the Dailami currenty baskets for the period 1971-1980. The Geneva I and Geneva II baskets were arranged and negotiated between OPEC officials and oil companies in the early '70s.[2] Originally, these currency baskets were to be used for te adjustment of the price of oil. These two baskets have never been formally measured and compared OPEC officials and OPEC member authorities have mentioned the Special Drawing Right (SDR) basket of the International Monetary Fund as another possble composite currency standard to be used for the adjustment and pricing of oil.[3] The Trade basket is based upon the weighted trade relationships between OPEC and the major industrial countries. Dailami used a basket of nine currencies for the measuremet of the price of OPEC oil for 1971 to 1977.[4] His basket is updated here for 1971-1980 and compared with the other four baskets.

Each of these five baskets will be examined, and past data will be used to evaluate and compare their performance for each of the years from 1971 through 1980 and for the entire period, assuming those baskets were used for the pricing of oil.[3]The results represent the rough estimates of the dollar fluctuation impact on OPEC oil prices.

Geneva I Basket

In early 1971, the United States suspended gold convertibility of the dollar because the dollar in terms of other major currencies in the market was weak. This process of depreciation of the dollar continued, and in 1973 the floating exchange rate system was established. The reaction from OPEC members to the depreciation of the dollar in 1971.

After negotiations with the oil companies on this matter on January 20, 1972, an agreement was reached in Geneva between OPEC countries and the oil companies for adjustments of oil prices between 1972 and 1975, based on an index measuring changes between the exchange rates of the United States dollar and nine other currencies. These nine currencies known and the Geneva I basket were the Belgian franc, French franc, German mark, Italian lira, Japanese yen, Netherlands guilder, Swedish kroner, Swiss franc, and the British pound sterling.[5] These are the currencies of the major Industrial countries with which OPEC members have traded.

OPEC documents are not explicit about the weights .of the currencies in the Geneva I basket. But they are explicit about the Geneva II weights and indicate that the latter had equal weights for each currency. In our measurement equal weight is given to the currencies in the Geneva I basket as well.

Geneva II Basket

According to OPEC documents, OPEC countries decided as follows:[6]

> "To negotiate with the oil companies with a view to amending the Geneva I agreement to offset the devaluation of the United States dollar and avoid further loopholes."

In June, 1973, the Geneva agreement between OPEC and the international oil companies reached an agreement to amend the Geneva I basket. Based on this accord, known as the Geneva II basket, the parties agreed to use the arithmetic average of eleven currencies against the exchange rate of the dollar for the adjustment of the prices of OPEC oil. These eleven currencies consist of the nine currencies of Geneva I with the addition of the Australian dollar and the Canadian dollar. Similar to the Geneva I agreement, the purpose of the Geneva II basket was another step to protect that purchasing power of the OPEC oil prices denominated in terms of the United States dollar.

The Trade Basket

We have constructed as basket called the "trade basket." This basket is based on the trade relationship of OPEC with major industrial countries. Specifically, the selection of the currencies and their corresponding weights in the basket are made on the basis of OPEC members' imports of goods and services from major industrial countries: the United States, Japan, and most of the European Common Market Countres. Accordingly, the trade basket selected consists of the nine currencies of the U.S., Japan, Belgium, Denmark, France, Germany, Netherlands, and Great Bri-

tain. Luxembourg, as a member of the European Common Market, and other countries are excluded because their individual sizes of trade are relatively small. These nine countries exported 66 percent of OPEC's total imports in 1971, 73 percent in 1975, and 65 percent in 1980.

The selection of these nine currencies is also consistent with the statements and indications that OPEC might use a similar basket.[7] Also, the SDR was designed on the basis of similar concepts and weighted by the size of world trade.

As a result of this approach to the selection of the currencies and their weights, if on OPEC member had the average composition of imports from those nine countries, it could, to some degree, expect stability in its price of oil. That is, the purchasing power of its oil will not be subject to the changes of exchange rates vis-a-vis the United States dollar.

This exchange rate stability for the OPEC members is subject to a number of qualfications as follows. First, it would apply only to the "average OPEC member," that is, the country whose compositions of imports corresponds to the composition and weights of the currencies of those nine countries. Second, the basket, at least in its present form, would protect OPEC members only from the price changes due to exchange rate changes and not from price changes due to inflation.

To obtain the weights of each of the nine currencies based on their size of exports to OPEC (OPEC's imports from those nine countries), the total imports to OPEC between 1972 and 1978[8] is added. This is shown in Table I. Then, each country's exports to OPEC is divided by the total of OPEC's imports from these nine countries, which results in the weights for each currency in the basket. Accordingly, for the trade basket, the weight of the United States dollar is twenty-four percent, Japanese yen nineteen percent, and the Belgian franc three percent. The others are illustrated in Table I.

Dailami's Basket — Updated

Mansor Dailami suggested a basket similar to the Trade basket and called it OPECA for the purpose of the measurement of the dollar fluctuation impact on the purchasing power of OPEC.[9] His results were based on the period 1971-1977. In this section the same basket and procedures are used to measure the Dailami basket index for the whole period of 1971 to 1980.

The differences between the Dailami basket and the Trade Basket is that in the former, the kroner of Denmark as a member of the European Economic Community, is substituted with the Swiss franc. Similarly, in the derivation of weights, the size of OPEC's imports from Denmark in the trade basket is replaced by the size of OPEC's imports from Switzerland in the Dailami basket. Because of the differences in the mix and weights, the results of the Dailami basket are not expected to be identical to those of the Trade Basket.

Special Drawing Right Basket

One of the currency baskets which might be used as a unit of accounts for the price of OPEC oil is the Special Drawing Right (SDR) of the International Monetary Fund (IMF). In 1974, the SDR was designed and composed of sixteen currencies. In 1978, two of the sixteen currencies were replaced with two others, and in 1981 the number of currencies in the SDR was reduced to only five currencies.

There are at least two reasons why OPEC might prefer the use of the SDR to other currency baskets for the price of oil. First, the SDR is internationally known, OPEC members know how it operates, and over the years it has been used, its operation and performance have been tested. This reduces the uncertainty about the SDR which is not the case for some other currency baskets. Second, the SDR represents the currencies of the most important countries in terms of their size of trade and their role in the world financial markets, which the OPEC members' trade proportionally with the major industrial countries.

Evaluation of Currency Baskets

Table 2 summarizes the characteristics of the five currency baskets. Geneva I, with nine equally weighted currencies and Geneva II with eleven currencies were agreed upon among OPEC and the oil companies. The United States dollar is not included in these two baskets. The Trade Basket includes the nine currencies of the Common Market countries, the United States, and Japan. Weights for each currency are based on their export shares to OPEC. Similarly, Dailami's basket with nine currencies is also trade weighted. The SDR includes the dollar and is weighted, based on the size of the volume of world trade.

Thus, in terms of design and measurement, there are two major distinctions between the Geneva I and the Geneva II baskets on one hand and the Trade, Dailami, and SDR baskets on the other. First, the weights of the currencies in both Geneva I and Geneva II composites are equal. The weights in the other three baskets are not necessarilly equal. For lthe Trade and the Dailami baskets, the weights are based on OPEC's imports from those countries whose currencies are in the baskets. For the SDR, they are based on the size of international trade. Second, the United States dollar is not included in the Geneva I and Geneva II baskets but is included with the heaviest weights in all of the other three baskets.

There is also another difference between the Trade and the SDR baskets and the Dailami basket. The weights of currencies in both the Trade and SDR baskets are fixed and do not change each year. But the weights in the Dailami basket may change from year to year depending on the changes in OPEC's imports from those nine industrial countries whose currencies are in the basket.

The annual percentage changes of the fluctuation of the U.S. dollar in terms of the five standard currency baskets are compared in Table 3. The numerical values of those five baskets, which are normalized at 100 in 1970, are also shown. In this table the negative signs indicate the reduction in OPEC purchasing power in dollar terms, and the positive signs indicate the increases of OPEC's purchasing power in dollar terms.

Based on all five baskets, due to the relative weakness of the dollar, OPEC's purchasing power was reduced in each of the years 1971 to 1980 with the exception of 1974 and 1976. In 1972, the SDR basket index did not change. In 1974 and 1976, OPEC's purchasing power in dollars increased in all five basket measures, except for the SDR in 1974.

The annual average and variance of changes in OPEC's purchasing power of those five baskets are also shown in Table 3. Accordingly, for all five basket measures, in the entire 1971-80 period, the average of OPEC's purchasing power was reduced due to the relative weakness of the dollar. The Geneva I basket, with the highest

Table 1

BASKET OF NINE CURRENCIES BASED ON THE SIZE OF EXPORTS OF OPEC AND 1970 PRICE OF SAUDI LIGHT — $1.80/BARREL

Currency	72-78 Exports to OPEC[a]	Weights[b]	Price of Oil—$1.80 1.80 x (1)[c]
U.S. dollar	64,132	.24	0.4320
Japanese yen	51,649	.19	0.3420
Belgian franc	8,006	.03	0.0540
Denmark kroner	2,795	.01	0.0180
French franc	25,266	.10	0.1800
German mark	46,281	.17	0.3060
Italian lira	24,267	.09	0.1620
Netherlands guilder	10,171	.04	0.0720
Pound sterling	32,920	.13	0.2340
Totals	265,495	1.00	1.8000

[a]Data taken from International Monetary Fund, **Directory of Trade Yearbook—1979**, millions of U.S. dollars.

[b]Weights are derived from dividing each country's exports by 265,495.

[c]From International Monetary Fund, **International Financial Statistics**, different issues.

Table 2

Characteristics of Five Currency Baskets

Basket	No. of Currencies	Dollar Inclusion	Weights	Origin
Geneva I	9	Not included	Equal	Agreement between OPEC & oil companies
Geneva II	11	Not included	Equal	Agreement between OPEC & oil companies
Trade	9	Included	Not equal: This study based on trade with OPEC	
Dailami	9	Included	Not equal: Dailami Based on trade with OPEC	
SDR	16:74-80 5:since 81	Included	Not equal: International Based on Monetary Fund world trade	

Table 3

COMPARISONS OF THE IMPACT OF THE FLUCTUATION OF THE DOLLAR ON OPEC'S PURCHASING POWER BY DIFFERENT BASKETS[a]

Year	Geneva I		Geneva II		Trade		Dailami		SDR	
	% Change	Value	% Change	Value	% Change	Value	% Change	Value	% Change	Value
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1970	---	100.00	---	100.00	---	100.00	---	100.00	---	100.00
1971	-5.23	105.23	-4.06	104.06	-2.00	102.00	-3.42	103.48	-8.57	108.57
1972	-7.59	113.22	-6.66	110.99	-6.88	109.01	-5.97	109.59	0.00	108.57
1973	-11.53	126.27	-11.11	123.32	-7.84	117.56	-8.21	118.59	-9.79	119.20
1974	+2.51	123.10	+1.73	121.19	+3.41	113.68	+4.40	113.37	-0.89	120.00
1975	-5.20	129.50	-3.08	124.92	-5.93	120.42	-2.30	115.98	-0.95	121.20
1976	+6.88	120.59	-5.94	117.50	+5.98	113.22	+5.53	109.57	+4.91	115.44
1977	-2.17	123.21	-0.57	118.17	-2.20	115.71	-2.35	112.14	-1.13	116.74
1978	-13.96	140.41	-11.10	131.29	-12.34	129.99	-13.10	126.93	-7.23	125.18
1979	-5.54	148.19	-4.09	136.65	-3.39	134.40	-3.27	131.08	-3.20	129.19
1980	-0.96	149.61	-0.94	137.93	-0.04	134.45	-0.47	131.70	-0.88	130.33
Average 71-80	-4.28	(#1)	-3.39	(#2)	-3.12	(#3)	-2.92	(#4)	-2.77	(#5)
Variance	38.52	(#4)	38.67	(#5)	29.60	(#2)	30.33	(#3)	20.31	(#1)
Average 71-75	-5.41	(#1)	-4.64	(#2)	-3.85	(#4)	-3.10	(#5)	-4.04	(#3)
Average 76-80	-3.15	(#1)	-2.15	(#4)	-2.40	(#3)	-2.73	(#2)	-1.51	(#5)

[a](-) signs indicate a reduction and (+) signs indicate an increase in the purchasing power of OPEC in dollar terms using the alternative currency baskets as the measurement base.

Source: See Table 1 and text.

average reduction of the purchasing power of 4.28 percent, appears to rank as the best basket to protect the loss of purchasing power for OPEC; the SDR basket, with the lowest average reduction of 2.77 percent, can be considered to rank order as the worst choice for OPEC. Table 3 indicates the Geneva II, with the average reduction of 3.39 percent, is ranked second, the Trade Basket, with the average reduction of 3.12, is third, and the Dailami, with 2.29 percent reduction, is ranked fourth.

The better performance of the Geneva I and Geneva II baskets during the period 1971-80 are due to the exclusion of the dollar in both of the baskets. Because the United States dollar on the average was weak for the whole period of 1971 to 1980, its exclusion made these two baskets perform better.

The year-to-year variation in the purchasing power of OPEC in terms of the variance around the mean values during 1971-80 is calculated and shown in Table 3 as well. Thus the SDR basket, with the lowest variance of 20.31 percent, appears as the most stable, and the Geneva I basket, with the highest variance of 38.52 percent, can be considered as the least stable basket for OPWX. Obviously, this result is due to the relatively higher weights that are given to the currencies with higher exchange rate variations in the Geneva I basket, which has nine currencies compared with the SDR basket that had sixteen currencies.

Thus, apparently there is a potential conflice in the choice of a currency basket. If the average performance is considered, then the Geneva I (or Geneva II) baskets are viewed as the best choices for OPEC. However, if reduced variance around the average is considered (wth the implied smaller year-to-year variations in purchasing power), then the SDR becomes the preferred choice and the Geneva basket is the worst choice.

The annual average performance of each of the five baskets for the two sub-periods of 1971-75 and 1971-80 are constructed and shown in the last two rows of the table. For the period 1971-75 compared with 1971-80, the rank order of the baskets did not change. That is, the Geneve I is still the best choice; the Geneva II, the Trade, the Dailami and the SDR basket are ranked in order. But the rank of the basket changes for 1976-80 are as follows: Dailami ranked first; Geneva I ranked as second; the Trade third (as for the other two periods); Gevena II, fourth, and the SDR ranked fifth (as for the other two periods). The reasons for the differences are as follows: first, during 1976-80 the United States dollar was not as weak as during 1971-75, and second, the strong Swiss franc in the Dailami basket made it the best for the 1976-80 period. These differences suggest that a basket that can perform the best during one period may not necessarily do so in other periods. Therefore, the past may not be a good guideline for the furture.

In summary, based on the 1971-80 period and the fluctuations in the U.S. dollar, the Geneva I basket appeared to be the best choice for OPEC. But based on the 1976-80 average, Dailami's basket appeared the best. In addition, if the choice of a basket is based on minimizing the year-to-year variance in the purchasing power of OPEC, then the SDR basket is the best choice. The differences in the results are due to the differences in the time period of measurement, the number, the composition, and the weights of currencies in each basket.

Conclusions and Implications

The purpose of this paper was to examine the performance of a number of alternative currency baskets for OPEC designed to protect the real price of oil from currency fluctuations. Five currency baskets were reviewed and analyzed for the period 1971-1980. The results are:

(1) Over the time period 1971-1980, the adoption of any of the five baskets would have prevented some of the erosion of OPEC purchasing power due to fluctuations in the U.S. dollars. However, this is viewing the problem **ex poste** during a time period when the dollar was known to be generally weak relative to a number of currencies. The **ex ante** desirability of any basket assumes continued deterioration in the dollar, which is not the case today. In the past two years the U.S. dollar has been very strong against most currencies. Therefore, any move from the dollar pricing of oil by OPEC is not in the interests of the members.

(2) In examining the individual baskets over the entire 1971-80 period, the Geneva I basket would have performed best in protecting OPEC's purchasing power from currency fluctuations. However, the rank order preference for the baskets depends on the time period selected. If 1976-80 were used, the Dailami basket would be the better choice. Thus, the weights and choice of currencies impact on the performance of any basket.

(3) In the same manner, if reduced year-to-year variation in currenty fluctuations were the goal of any currency basket, then the SDR performs the best, and Geneva is the worst.

Therefore, apparently there can be a conflict of objectives in the selection of any currency basket, even if it could be assumed that OPEC members could agree on the desirability of a basket. The difference in the trade ties, investments, and debts of the individual OPEC members with the industrial countries can prevent an agreement on the weights and currencies of the basket for the price of oil. One way of solving some of these issues related to the differences among the OPEC members is to apply the principle of compensation. This requires the solution to two problems for OPEC — the goals of an optimum basket and the identification of the losers and gainers of OPEC members.

The differences in the performance and ranks of the currency baskets, therefore, are due to the time period and differences in the objectives of the baskets. These objectives may or may not be compatible. To choose a basket for the price of oil for the future, performance must depend on the composition, weights, and relative exchange rate changes of the currencies in the baskets. The last factor is something that is hard to predict and, therefore, makes the deicisions on the composition and weights of the currencies in the basket difficult and the future performance of any basket uncertain.

The evaluations were limited for the decade of the '70s, and the experiences of the past cannot necessarily be used as a good guideline for the future. If the dollar remains as strong as it has been in the past two years, dollar pricing of oil will be better than any of those five currency baskets.

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