

THE IMPACT OF NONDOLLAR-DENOMINATED OIL PRICING

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INTRODUCTION

Nominal oil prices have fluctuated a great deal since crude was first produced and used in quantity [Yergin, 1990]. The fact that oil is priced in dollars has dampened price volatility for the U.S. economy compared to other countries, which may experience both price and foreign exchange fluctuations. Dollar-denominated pricing also gives U.S. monetary authorities policy alternatives for reducing the shock of imported energy price increases not available to other central bankers. If oil producers were to commit to replacing the dollar as their currency of choice, it could subject the United States economy to greater variability, negatively impact GNP in terms of dollar depreciation and alter the Federal Reserve's ability to counteract price increases with inflationary monetary policies.

The likelihood of the dollar's demise, while currently diminished in the aftermath of the U.S. action against Iraq, has not been eliminated. Within the next ten years, OPEC production will assume an increasingly predominant role in world oil supplies and the organization may regain pricing control. Changes in the makeup of OPEC's trading partners, particularly a greater reliance on more European trade, could influence economic pragmatists to insist on replacing the dollar. Pricing may not be the only area of concern to OPEC. A changeover from the dollar benchmark has been considered in the past. An examination of the implications of such a move in the context of a simulation with historical data indicates that the impact would be dramatic.

Dethroning the dollar would constitute the kind of economic shock that could lead to immediate dollar devaluation. Beyond the immediate fallout of nondollar pricing, the added volatility to the entire U.S. economy, subjected to both energy price increases that cannot be dampened by inflation and the vagaries of foreign exchange fluctuations as a constituent of those prices, would create a greater degree of uncertainty. For financial markets, more uncertainty is synonymous with increased risk. Any additional risk implies that investors will demand higher rates of return. Changes in required rates of return reverberate from Wall Street to corporate capital budgets. Investment would be negatively affected because projects would have higher required rates of return. Stock and bond prices would decline because the present value of anticipated income streams would be lower and/or subject to a higher discount rate.

This paper will trace oil pricing, oil price shocks, and the possible rationale for replacing the dollar as the benchmark currency. A simulation using 1986-1990 data will also be performed demonstrating for the first time how substantial the economic impact of nondollar oil pricing, *ceteris paribus*, would have been over the 1986-1990 period both to actual GNP and, perhaps more important for the longer term, the added volatility such a change would bring to the cost of energy.

OIL PRODUCTION

World oil producers were content to hold to dollar pricing in the early part of the 1980s because dollar appreciation effectively increased prices outside the U.S., eliminating the need to engage in divisive debate at politically sensitive OPEC meetings. Historically high in dollar terms, petroleum prices in the 1980-1984 period increased by only 6 percent compared to the price of all dollar-denominated Organization of Economic Cooperation and Development (OECD) country exports. Oil producers, in part reacting to strong and relatively stable dollar prices, stepped up exploration and development of new reserves. In the mid-1980s, added production reached the market, creating a supply/demand imbalance. Using a model to "backcast" what world demand would have been had prices been constant in the 1980-1984 period, Huntington [1986] found that demand would have been three million barrels per day (MBPD) greater in 1984.

Although foreign exchange fluctuations were an important factor in the 1986 destabilization of the oil market, they were not the sole cause of the supply/demand imbalance [Samii and Clemenz, 1988]. Rising nominal prices throughout the 1970s and into the early 1980s were responsible for increased exploration, particularly in non-OPEC countries. OPEC's role as the oil price arbiter deteriorated as new fields brought additional production to market, dropping demand for OPEC oil by almost 40 percent from 1979 to 1982 [Gately, 1986].

OIL AND THE DOLLAR

The direction of exchange rate movements subsequent to oil price shocks has not been uniform. During the 1973-1974 oil shock, the dollar appreciated. A key factor in boosting its value was the perception of the U.S. as a major oil producer able to supply its own needs and, until then, the supplier of last resort for its trading partners. At the time, the U.S. energy market was regulated and the quantity of imports was controlled. It was assumed that the U.S. could better weather price increases than other countries [Golub, 1983]. By 1979, perceptions of U.S. energy independence had changed dramatically. Subsequent to the 1973 oil shock, U.S. reliance on OPEC oil had increased, largely due to the failure to effectively employ conservation measures such as those put in place by other countries, particularly countries lacking domestic oil production. As imports increased, so did the exchange rate sensitivity of the dollar to supply shocks or abrupt price changes. In 1979, the dollar depreciated relative to the currencies of major trading partners.

In 1979, OPEC opened discussions on setting target prices in a different currency [Samii and Clemenz, 1988]. One option considered was changing to a basket of currencies. OPEC delegates felt a drawback to this strategy was the computational complications inherent in making price calculations in what would be a shifting currency benchmark. There would be more uncertainty for both seller and buyer prior to actual delivery. Dollar appreciation of the 1980s ended serious talk of any change, at least until 1986.

As a result of excess supply, oil prices fell to a low of \$7 per barrel during the summer of 1986. By imposing quotas which were strictly adhered to, OPEC managed to officially increase prices to \$18 by December of 1986. Prices received a further boost from the instability in the Persian Gulf as the Iran/Iraq war threatened shipping through the

Strait of Hormuz. At one point, futures prices rose as high as \$22 per barrel [Welch, 1987]. Higher prices did not necessarily mean increased purchasing power for oil exporters because the dollar was depreciating 12 percent against the mark and 7.3 percent against the yen.

Two other factors are crucial in measuring the importance of dollar devaluation to oil exporting countries--the proportion of their imports that consist of U.S. goods and services and their dollar-denominated investments. Countries with a large percentage of total imports from the U.S. would not be as adversely impacted as those buying goods and services from countries with appreciating currencies. The importance of oil exporters' trade with countries other than the U.S. can be seen in the IMF's *Direction of Trade Statistics*. Oil exporting countries' total exports to Japan, as well as their trade surplus with the Japanese, were greater than their overall trade with the U.S. during the post-1986 period. As the yen appreciated against the dollar, oil exporters were able to obtain fewer goods from Japan for their dollar-priced oil.

Increased internal investment, as well as international diversification of holdings, have made the dollar a less important currency to oil exporting countries. A compilation of annual changes in OPEC's dollar-denominated portfolio indicates that those changes consisted mainly of outflows from dollar investments [Mattione, 1985]. The adverse impact on OPEC's overall portfolio due to a move to nondollar pricing would be less severe. If the one-time shock of such a change were to lower the value of the dollar upon implementation, portfolios of nondollar investments could actually increase in market value.

With a larger trade surplus with Japan than with the U.S. and a stronger yen than dollar, it would have been better for oil exporting countries to have had their oil exports denominated in yen during the post-1986 period. The yen, however, may not be a likely candidate to replace the dollar as the world's trade currency unless major changes occur in Japan's export transactions and financial markets. Currently, only 35.2 percent of Japan's export transactions are in yen versus 98 percent of U.S. export transactions denominated in dollars, 82.3 percent of Germany's exports completed in deutsche marks, and 76 percent of Great Britain's exports in pounds [Ueda, 1991]. By the late 1980s, yen-based international capital transactions were only 5 percent of the world total, down from a high of 20 percent. In the same period, dollar-denominated transactions, while falling, still represented over 60 percent of all transactions.

A possible candidate to become the oil traders' currency of choice could be a "market basket of currencies" somewhat different from that OPEC considered in 1979. Potentially, this market basket could be created in such a way as to eliminate the calculating difficulties that led to rejection at the 1979 meeting. With eleven of the twelve European countries having already agreed on closer coordination of their economies, the ECU (European Currency Unit) is growing in popularity [Bagamery, 1991]. It could win favor with oil exporters as well. Under the auspices of the Exchange Rate Mechanism agreement of 1979, signed by ten of the twelve Common Market countries, currencies will be kept within a narrow band of exchange. The ECU could solve oil exporters' search for a more viable benchmark currency.

A simulation using historical data is used to examine what the impact on U.S. GNP of either yen or market basket currency pricing of oil would have been during the period from January 1986 through October 1990. It demonstrates the importance to the U.S. economy of maintaining dollar oil pricing.

NONDOLLAR OIL PRICING SIMULATION

Monthly West Texas Intermediate oil prices and demand were obtained from the American Petroleum Institute. Yen currency exchange rates and those of a trade-weighted market basket of currencies are as reported in the *Federal Reserve Bulletin*. In order to focus on the impact of nondollar pricing and avoid an overly complex analysis, a simplifying assumption of inelastic demand is employed. Other studies have found varying levels of elasticity of demand [Reister, 1988]. While it has been argued above that the initial shock to the dollar from a move to pricing oil in another currency could itself be a strong factor in further devaluing the dollar, for purposes of simplification, the economic implications of this possibility will also be ignored.

Monthly historical percentage price changes in the actual data are calculated using month-to-month dollar prices for the January 1986 through October 1990 period. It is then assumed that the same percentage price changes would occur if oil prices were denominated in either yen or a market basket of currencies as defined by the *Federal Reserve Bulletin*. After calculating nondollar-denominated prices, those prices are then translated back into dollars at prevailing exchange rates for that month. Actual demand per month is calculated by multiplying average monthly demand in millions of barrels per day (MBPD) by the number of days in the specific month. Total cost is the translated dollar prices multiplied by monthly historical demand. The final figure is overall U.S. oil expenditures per month. Total demand and import demand are examined separately. It is assumed that both non-OPEC and U.S. domestic producers would follow the new nondollar-denominated benchmark prices set by OPEC, making these the prevailing prices.

Figure 1 shows the cumulative differential in overall oil costs over the period. It suggests a substantial transfer of wealth to the energy sector of the economy. Figure 2 demonstrates the impact of nondollar-denominated oil on the U.S. trade deficit, showing the cumulative changes in trade outflows. Yen-denominated oil, leading to an added trade deficit of \$97.14 billion, would have been more economically damaging than oil priced using the Federal Reserve's basket of currency, which would have added \$57.22 billion to the U.S. trade deficit. Table 1 shows the annual export bill and its impact on real GNP in 1982 dollars. GNP contracts noticeably and at an increasing rate during the years examined.

The depreciating dollar of the 1986-1990 period emphasizes the impact nondollar pricing would have had on the economy. In times of dollar appreciation, the effect would obviously be reversed. The impact of devaluation and appreciation on trade deficits and oil expenditures would likely cancel each other out over a longer period. Oil price volatility is not so easily dismissed. Prices for U.S. oil purchasers under either a yen or market basket of currency pricing regime are considerably more variable over the period examined than they were under actual dollar pricing. The simulated standard deviation is \$6.82 for yen-denominated oil and \$6.66 for market basket-denominated oil, while the historical dollar-denominated standard deviation of prices was \$4.35 over the period.

CONCLUSION

The simulation of nondollar oil pricing demonstrates, *ceteris paribus*, that nondollar pricing would have had a dramatic impact on the U.S. economy. The possibility that the

FIGURE 1
Cumulative Outflow of Nondollar Denominated Oil

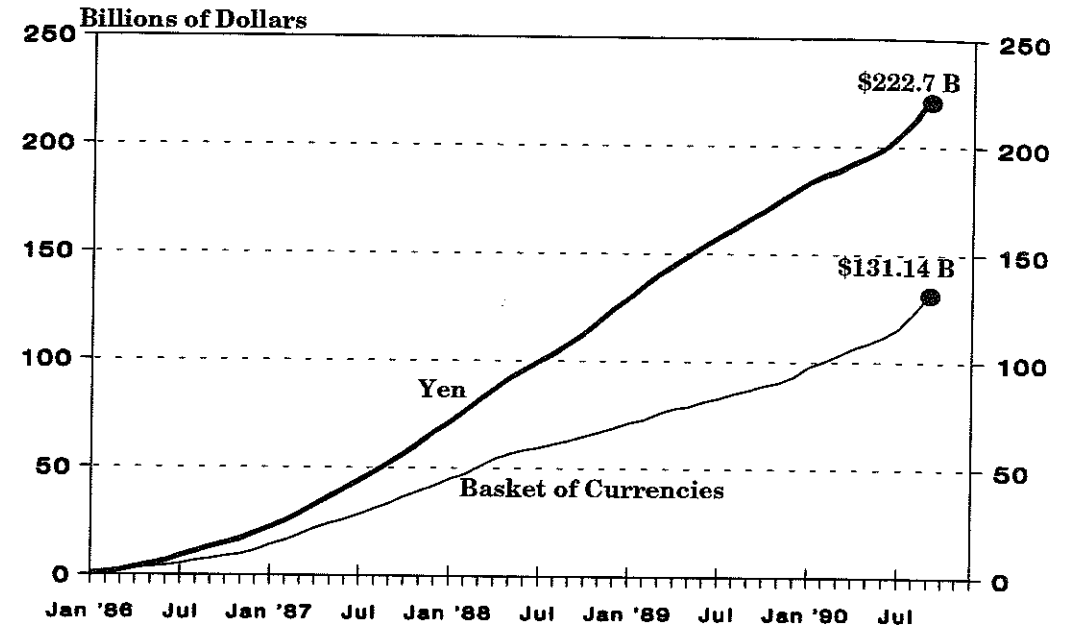


FIGURE 2
Cumulative Total Dollars Spent on Oil with Nondollar Denominated Oil Pricing

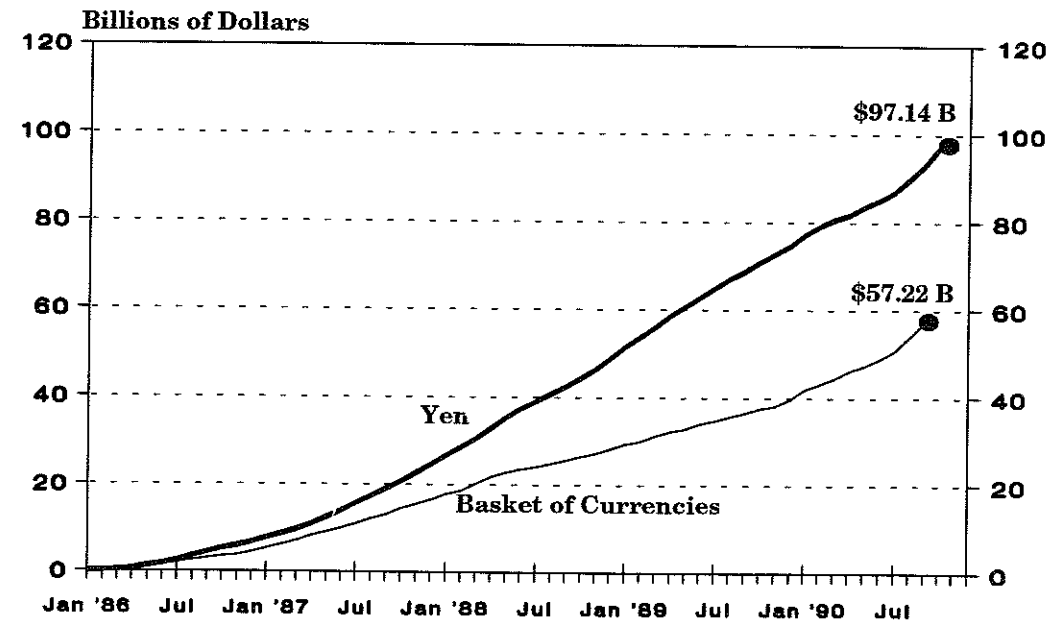


TABLE 1
Nondollar-Denominated Oil's Impact on GNP
(1982 Dollars)

Year	Additional Imports w/basket	Additional Imports w/Yen	Historic GNP in 1982 Dollars	GNP Less Additional Oil Imports w/Basket	GNP Less Additional Oil Imports w/Yen	Yr-to-Yr Growth in GNP w/Basket	Yr-to-Yr Growth in GNP w/Yen	Historic GNP Growth	Percentage Difference in GNP Growth w/Basket	Percentage Difference in GNP Growth w/Yen
1985			\$3,723							
1986	\$3.60	\$6.35	\$3,848	\$3,844	\$3,841	3.25%	3.18%	3.35%	-2.89%	-5.09%
1987	\$11.78	\$17.95	\$3,964	\$3,952	\$3,946	2.71%	2.55%	3.02%	-10.13%	-15.44%
1988	\$12.05	\$25.03	\$4,093	\$4,081	\$4,068	2.95%	2.62%	3.25%	-9.24%	-19.40%
1989	\$11.23	\$26.66	\$4,172	\$4,161	\$4,145	1.66%	1.28%	1.93%	-14.22%	-33.75%

All dollars figures are billions of dollars.

dollar's reign in the oil markets could end, particularly as the ECU becomes a more attractive and viable alternative currency, is distinct.

As European and Japanese economies play a growing role in the overall world economy, major oil producers will likely become increasingly uncomfortable being tied to the dollar as the proportion of their nondollar purchases rises. With the prospect of OPEC regaining strength, a reconsideration of nondollar oil pricing is inevitable. From the perspective of the U.S., even the possibility of removing the dollar as the currency of oil should be yet another reason to hasten the formulation of a viable energy policy.

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