THE SHORT-TERM EFFECT OF THE MOVEMENT OF THE USD ON OIL PRICES

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ABSTRACT

The effect of the changes in the US dollar (USD) on oil prices was examined in several trials. An indexed value of the USD and several individual currency exchange rates with the USD were compared to spot and future oil prices. The percentage change of each was taken from monthly averages and used to determine a direct correlation and if a lost in value of the US Dollar (USD) relates to greater fluctuations in the oil price. Results showed that the short-term movement of the USD appeared to have very little to no effect on the oil price. The oil price also does not appear to have a greater amount of fluctuation due to a loss in value of the USD. If there is a correlation between the value of the US Dollar and the oil price, it must occur in the long-term to preserve purchasing power, but it is not a relevant factor in determining oil price in the short-term.

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INTRODUCTION

Energy is one of the most necessary resources on the planet. At present, the majority of the world's energy is supplied by fossil fuels, specifically coal, gas and oil, and with an ever-growing population, the need for energy is only expected to increase in order to supply all people with heat, light and mobility. In fact, the world's energy hungry population is expected to grow at a rate of one percent per year every year through 2030. The regions with the highest expected rates of growth are Asia and the Middle East. Concerning GDP growth, the world growth through the year 2030 is expected to be around 3.5 percent annually, with the highest growth occurring in China, India and Pakistan. This type of population and economic expansion will only cause the need for energy supplies to increase aggressively (World Oil Outlook 2008).

At present, OPEC is predicting the need to increase energy supplies by 1.7 percent per year for the years from 2006 to 2030. In total, this will amount to an increase of over 50.0 percent by 2030. Of that total growth in energy supplies needed, OPEC is estimating that oil will still make up about 33.0 percent of the energy used in 2030, which is only slightly less than the 37.0 percent fuel market share that it held in 2006. In terms of barrels of oil demanded per day, in 2006 the world oil demand was 84.7 million barrels per day which is expected to grow to around 113.3 million barrels per day in 2030. While fuel sources other than fossil do exist, impediments such as climate changes, second-generation crop concerns, sustainability, high upfront capital costs, safety and environmental concerns and waste-disposal preclude them from taking over a significant amount of the fuel market (World Oil Outlook 2008). To say the least, oil is one of the most important commodities on the planet and its usage will not be dwindling by much any time soon.

According to the US Energy Information Administration, the amount of oil actually produced in 2006, at an average of 73,484 barrels per day, was far less than the amount demanded. These statistics indicate the top oil producers over the past five years to be Russia, Saudi Arabia, and the United States. Table 1 below lists the top ten crude oil producers in the world. Together these ten countries have control over more than 60.0 percent of the oil being produced in the world today (EIA - International Energy Data and Analysis).

Table 1: Top Ten Oil Producing Countries (2003-2007)

Country	Currency	2003		2004		2005		2006		2007		5 year Weight Average	
Russia	RUB	8,132	11.7%	8,805	12.1%	9,043	12.3%	9,247	12.6%	9,437	12.9%	9,136	12.5%
Saudi Arabia	SAR	8,775	12.6%	9,101	12.6%	9,550	12.9%	9,152	12.5%	8,722	11.9%	9,056	12.4%
United States	USD	5,681	8.2%	5,419	7.5%	5,178	7.0%	5,102	6.9%	5,064	6.9%	5,186	7.1%
Iran	IRR	3,743	5.4%	4,001	5.5%	4,139	5.6%	4,028	5.5%	3,912	5.4%	3,989	5.5%
China	CNY	3,409	4.9%	3,485	4.8%	3,609	4.9%	3,673	5.0%	3,729	5.1%	3,636	5.0%
Mexico	MXN	3,371	4.9%	3,383	4.7%	3,334	4.5%	3,256	4.4%	3,082	4.2%	3,238	4.4%
UAE	AED	2,348	3.4%	2,478	3.4%	2,535	3.4%	2,636	3.6%	2,603	3.6%	2,564	3.5%
Norway	NOK	3,042	4.4%	2,954	4.1%	2,698	3.7%	2,491	3.4%	2,270	3.1%	2,557	3.5%
Canada	CAD	2,306	3.3%	2,398	3.3%	2,369	3.2%	2,525	3.4%	2,619	3.6%	2,494	3.4%
Venezuela	VEB	2,335	3.4%	2,557	3.5%	2,565	3.5%	2,511	3.4%	2,433	3.3%	2,490	3.4%
World Total	- -	69,434	- -	72,493	- -	73,758	- -	73,484	- -	73,050	- -	72,992	- -

NOTE: Oil production expressed in thousands of barrels of crude oil per day and percentage of world total.
Information was obtained from the US Energy Information Administration website: http://www.eia.doe.gov/ipm/supply.html

On the other side are the countries that have been consuming the majority of crude oil in the world. Table 2 shows who the greatest users of oil have been. The country with the highest demand is the United States, making up more that 25.0 percent of the world's need for oil (EIA - International Energy Data and Analysis).

Table 2: Top Ten Countries for Crude Oil Demand (2001-2005)

Country	Currency	2001		2002		2003		2004		2005		5 year Weight Average	
United States	USD	19,649	25.4%	19,761	25.3%	20,034	25.2%	20,731	25.2%	20,802	24.9%	20,414	25.1%
China	CNY	4,918	6.4%	5,161	6.6%	5,578	7.0%	6,437	7.8%	6,720	8.0%	6,088	7.5%
Japan	JPY	5,396	7.0%	5,304	6.8%	5,416	6.8%	5,295	6.4%	5,353	6.4%	5,346	6.6%
Russia	RUB	2,590	3.3%	2,636	3.4%	2,682	3.4%	2,751	3.3%	2,757	3.3%	2,713	3.3%
Germany	EUR	2,815	3.6%	2,722	3.5%	2,679	3.4%	2,665	3.2%	2,618	3.1%	2,670	3.3%
India	INR	2,184	2.8%	2,263	2.9%	2,346	2.9%	2,430	3.0%	2,438	2.9%	2,377	2.9%
Canada	CAD	2,057	2.7%	2,078	2.7%	2,207	2.8%	2,302	2.8%	2,290	2.7%	2,233	2.7%
South Korea	KPW	2,132	2.8%	2,149	2.8%	2,175	2.7%	2,155	2.6%	2,176	2.6%	2,164	2.7%
Brazil	BRR	2,206	2.9%	2,132	2.7%	2,056	2.6%	2,123	2.6%	2,166	2.6%	2,131	2.6%
Mexico	MXN	2,009	2.6%	1,950	2.5%	1,949	2.4%	1,996	2.4%	2,078	2.5%	2,009	2.5%
World	- -	77,371	- -	78,016	- -	79,593	- -	82,304	- -	83,607	- -	81,296	- -

NOTE: Oil production expressed in thousands of barrels of crude oil per day and percentage of world total.
Information was obtained from the US Energy Information Administration website: http://www.eia.doe.gov/iea/contents.html

This list of ten countries also makes up close to 60.0 percent of the world's oil, but it is interesting to note that only five countries appear on both lists: Top Producers and Top Consumers. Oil is a commodity needed by every country but controlled only by a few countries in the world. It is also interesting to see that the countries and regions that are estimated to have the fastest growth in their future both economically and in population are the parts of the world that currently have access to the majority of the oil: the Middle East and Southeastern Asia.

Being that this commodity seems to exist only in certain parts of the globe, there are thousands of barrels of oil that are moved around the earth every day. Tables 3 and 4 compare the top ten importers and top ten exporters of crude oil in the world (Annual Statistical Bulletin 2007). Millions of barrels a day are transported around the world to meet the needs of every country.

It is worth noting that the countries that appear to do the most exporting are mostly countries that seem to have more instability within their economic and political structures and the countries that do the most importing are the countries that are more stable and have large, more developed economies. It appears that the most prevalent currencies within the top importing

countries are the USD, the JPY, and the EUR (notice it appears more than once on the table below). The volume at which this commodity is traded and the number of currencies which are used in these purchases might suggest that oil plays a role in determining more than just the price of automobile gasoline. Since oil is so necessary in daily life for people all over the world, it is reasonable to assume that price fluctuations would have a substantial effect on business and economic stability.

Table 3: Top Ten Crude Oil Exporting Countries (2003-2007)

Country	Currency	2003		2004		2005		2006		2007		5 year Weight Average	
Former USSR	SUR	6,480	16.6%	7,307	17.3%	7,723	18.0%	8,195	18.8%	8,550	19.1%	7,986	18.4%
Saudi Arabia	SAR	6,523	16.7%	6,813	16.1%	7,209	16.8%	7,029	16.1%	6,962	15.5%	6,980	16.1%
Iran	IRR	2,396	6.1%	2,684	6.3%	2,395	5.6%	2,377	5.4%	2,467	5.5%	2,453	5.7%
Norway	NOK	2,681	6.9%	2,657	6.3%	2,314	5.4%	2,314	5.3%	2,333	5.2%	2,390	5.5%
UAE	AED	2,048	5.2%	2,172	5.1%	2,195	5.1%	2,420	5.5%	2,343	5.2%	2,291	5.3%
Nigeria	NGN	2,164	5.5%	2,356	5.6%	2,326	5.4%	2,248	5.1%	2,144	4.8%	2,238	5.2%
Mexico	MXN	2,114	5.4%	2,124	5.0%	2,021	4.7%	2,048	4.7%	2,115	4.7%	2,079	4.8%
Venezuela	VEB	1,535	3.9%	1,566	3.7%	1,788	4.2%	1,919	4.4%	2,116	4.7%	1,886	4.3%
Kuwait	KWD	1,243	3.2%	1,415	3.3%	1,651	3.9%	1,723	3.9%	1,613	3.6%	1,599	3.7%
Iraq	IQD	389	1.0%	1,450	3.4%	1,472	3.4%	1,468	3.4%	1,643	3.7%	1,453	3.3%
World	- -	39,125	- -	42,325	- -	42,831	- -	43,662	- -	44,832	- -	43,405	- -

NOTE: Oil production expressed in thousands of barrels of crude oil per day and percentage of world total.

Information obtained from OPEC's online Annual Statistical Bulletin 2007: http://www.opec.org/library/Annual%20Statistical%20Bulletin/ASB2007.htm

Table 4: Top Ten Crude Oil Importing Countries (2003-2007)

Country	Currency	2003		2004		2005		2006		2007		5 year Weight Average	
United States	USD	9,665	24.7%	10,088	23.8%	10,126	23.6%	10,118	23.2%	10,017	22.3%	10,052	23.2%
Japan	JPY	4,190	10.7%	4,037	9.5%	4,131	9.6%	4,063	9.3%	3,986	8.9%	4,056	9.3%
South Korea	KRW	2,180	5.6%	2,277	5.4%	2,329	5.4%	2,413	5.5%	2,392	5.3%	2,356	5.4%
Germany	EUR	2,182	5.6%	2,251	5.3%	2,301	5.4%	2,247	5.1%	2,190	4.9%	2,235	5.1%
India	INR	1,826	4.7%	1,936	4.6%	2,053	4.8%	2,207	5.1%	2,396	5.3%	2,178	5.0%
Italy	EUR	1,691	4.3%	1,747	4.1%	1,805	4.2%	1,753	4.0%	1,776	4.0%	1,766	4.1%
France	EUR	1,736	4.4%	1,737	4.1%	1,722	4.0%	1,671	3.8%	1,646	3.7%	1,686	3.9%
Spain	EUR	1,144	2.9%	1,178	2.8%	1,189	2.8%	1,208	2.8%	1,150	2.6%	1,176	2.7%
Singapore	SGD	757	1.9%	892	2.1%	1,106	2.6%	1,184	2.7%	1,268	2.8%	1,129	2.6%
United Kingdom	GBP	996	2.5%	1,151	2.7%	1,078	2.5%	1,049	2.4%	1,018	2.3%	1,054	2.4%
World	- -	39,125	- -	42,325	- -	42,831	- -	43,662	- -	44,832	- -	43,405	- -

NOTE: Oil production expressed in thousands of barrels of crude oil per day and percentage of world total.
Information obtained from OPEC's online Annual Statistical Bulletin 2007: http://www.opec.org/library/Annual%20Statistical%20Bulletin/ASB2007.htm

Clearly if the price of oil increases, all things associated with oil increase thereby causing inflation. Barrell and Pomerantz (2008) found in a study that countries that heavily rely on oil as opposed to other means of energy naturally feel the effects of rising oil prices more than other countries. They found, as an example, that an increase of ten dollars in the oil price can impact inflation in the Euro Area by 0.25 percent, in France by 0.19 percent, in Germany by 0.22 percent, in Japan by 0.12 percent, in the UK by 0.22 percent and in the US by 0.43 percent in the first year alone. They note that the US seems to feel these effects the most due to the amount of oil used in manufacturing and shipping goods both domestically and abroad. The United States uses around 80% more fossil fuels for every unit of output than do the European countries that were part of their study. Another study by Hamilton (1983) found evidence that oil price shocks were a contributing factor to recession in the US economy, but clearly, the US is not the only country that feels the impact from higher petroleum prices. There have been several studies on the impact of oil price increases on macroeconomic activity in the G-7 countries (Cologni and Manera (2008) and Kilian (2008)). Jimenez-Rodriguez and Sanchez (2005) also investigated this but added Norway to the equation and Cunado and Perez de Garcia (2005) examined similar correlations but within Asia instead of the G-7 countries. In all studies, they found that oil price

shocks have a significant effect on each country's real economic conditions. A few, more specific studies, have found connections between the oil price and GDP growth (Gronwald (2008) and Lee and Chang (2007)). Aside from economic responses to oil price changes is the way that it affects business and the stock market. A few studies have found a significant effect on aggregate stock returns due to an increase in the oil prices (Jones and Kaul (1996). Sadorsky (1999) took a closer look at this relationship in the US stock market and found a definite correlation between the two that seemed to have been gaining strength since the mid 1980s. Park and Ratti (2008) also found a strong correlation between price shocks and stock performance in both the US and European stock markets. Oil prices clearly play a part in world economy and business.

Knowing that oil price fluctuations can have such a large impact on the world, leads to the question of how oil prices are determined and what factors have the biggest effect on them. Askari and Krichene (2008) examined the daily oil prices between 2002 and 2006 while looking for the answer to that question. That four-year period was chosen due to the significant volatility in oil prices. They found that oil price was highly affected by supply and demand shocks and news. Overall, the high economic growth of this period paired with expansionary monetary policy appeared to cause sharp reactions to supply/demand fluctuations. It will be interesting to see if this still applies with the upcoming expansionary monetary policy that Southeast Asia is facing in the future. On the other side of the supply/demand argument, OPEC has stated that while oil prices have been rising, a lack of oil supply is not the only culprit. OPEC alone has increased its supply of crude oil by four million barrels per day since 2003. According to OPEC, the primary components contributing to oil price are the fall in value of the US dollar against other major world currencies, the rise in speculation of paper barrels in the OTC markets like the

NYMEX and a rise in the upstream prices associated with the production of oil (Annual Statistical Bulletin 2007).

OPEC may be correct in saying that supply is not the only determining factor in the rising oil price. In a study done by Coimbra and Esteves (2004), they found that when comparing the futures price of oil to spot prices, in most cases, the further away the forecast was, the less accurate it became. The correlations ranged from one-month futures with a beta of 0.946 to twelve-month futures with a beta of 0.355. They also found that oil prices and market growth expectations are so linked that errors in market expectations share a positive correlation to errors in oil futures expectations suggesting that oil forecasts are subject not only to their own assumptions but also to the assumptions used when forecasting world growth and future economic conditions. The debate as to whether supply is the dominant determinant in oil prices may turn into a "the chicken or the egg" discussion in this instance, though. Did economic conditions cause a rise in oil prices or did a rise in oil prices cause the economic conditions?

LITERATURE REVIEW

Since oil is purchased in so many different currencies and priced only in US Dollars, it makes sense to think that exchange rates should be a suspect for oil price determination. Concerning commodities in general, there have been several studies showing that the degree to which the exchange rate pass-through occurs is highly dependent on the market structure, commodity characteristics, market share, and the number of firms in the industry (Giovannini(1988), Krugman(1987), Thusnelda(1996), Froot and Klemperer (1989), and Dornbusch (1987)). Oil, however, does not always behave like every other commodity. In a study done by Yousefi and Wirjanto (2004), they compared the exchange rates of major OPEC exporting countries to the oil price and found little correlation between price and exchange rates but a large amount of evidence that imperfect competition between exporting countries may play a large role in price determination. There appears to be some price rivalry between OPEC member states as each country attempts to gain some control over the market. It also appears that most OPEC countries take a pricing lead from Saudi Arabia and then adjust from there. Saudi Arabia, on the other hand, sets its price without any influence from other OPEC members' prices or the OPEC basket price. This is likely due to the very large market share held by Saudi Arabia. That may also explain why the exchange rate seemed not to have any real correlation to oil price because Saudi Arabia's currency is pegged to the USD.

Oil is a commodity, but does it behave in the same way that most commodities do? Sari, Hammoudeh, and Soytas (2008) did a comparison of the daily prices of gold, silver, platinum, palladium, and oil against each other and the USD/EUR exchange rate. They found that there does tend to be relatively strong correlations within the precious metals' prices. Among the precious metals examined, platinum shared the highest positive correlation to oil price

movement, which they speculated was due to the use of both materials in the industrial industry. Their results further showed that oil price was not strongly correlated with the exchange rate or any of the precious metals and they went on to speculate that this may be due to the way that the oil price is regularly managed by OPEC and manipulated by the speculative markets. This is different than the four other commodities studied that all showed a close relationship with the US/Euro exchange rate. It appears that oil is a commodity that does not follow the norm. Hawkes (2007) also mentions in his work that while there seems to be a very slight trend between the movement of oil prices and the movement in the exchange rate, it is not even close to being strong enough to interpret some sort of causality. He even mentions that it is not clear whether it is the exchange rate acting on the oil price or the oil price acting on the exchange rate that was responsible for the slight slope observed.

Because oil is both priced and invoiced in USD, it would seem logical that there would be a stronger correlation than what has been found in the studies above. It would seem that the relationship between the USD and the other major oil importing countries would play a large part in determining the oil price regardless of whether it is managed or not. If the USD appreciates, the other oil importing countries suffer due to a more expensive dollar; however, if the dollar depreciates, the oil producing countries lose some of their purchasing power (Yousefi and Wirjanto (2004)). In a study done by Cashin, Cespedes, and Sahay (2004), a closer look is taken at the effects of commodities prices on exchange rates in regard to the theory of Purchasing Power Parity. Their paper refutes the idea that exchange rates are subject to a "random walk" but that they are tied to commodity prices giving them the possibility to be somewhat forecasted. They especially focus their study on currencies that have a large commodity exporting economy such as Australia and Canada. Their thought is that Purchasing Power Parity would require that

exchange rates adjust to any change in commodity prices. They examined 58 commodity-exporting countries and found that about a third of them had a strong co-movement of exchange rates and commodity export prices. They also found that the idea that commodity prices tend to be sticky holds true in this instance and that it appears that the exchange rate is actually the force that adjusts to bring prices to equilibrium. In their concluding remarks, however, they do add that the Purchasing Power Parity model may not be a very good model to follow, though, because many commodity exporting countries tend to feel the effects of shocks in a much larger and long-lived way that causes shifts in the point of equilibrium throughout time.

There actually have been many articles written about the effect that the oil price has on the USD exchange rate. Amano and Norden (1998) studied this with a lagged oil price to the exchange rates between three very industrialized countries, the US, Germany, and Japan that rely heavily on oil consumption and found a definite correlation between the two. When they performed a similar test except making the oil price the dependent variable, they were not able to find quite as much evidence of a relationship. Amano and Norden also published another article that year expanding on that idea. They noticed that while past tests of traditional determinants such as interest rate movement do not explain the movement of the exchange rate any better than a random walk model, oil price movement does seem to have some forecasting ability. They focus on the time period between 1972 and 1993 and found that in the long-run, Granger-causality suggests that the exchange rate adjusts for oil prices and not the other way around. The relationship that they found in the long-term suggests that higher energy prices lead to the appreciation of the USD. In another study done by Chen and Chen (2007), a similar conclusion was found supporting oil prices as a forecasting tool for future exchange rates. This study looked at the time span from 1972 through 2005 and compared the real oil price to the real

exchange rate of the G-7 countries. It would appear that while there is a correlation between exchange rates and oil prices, in the end, the oil price affects the exchange rate more than the exchange rate affects the oil price.

While there seems to be a rather large body of evidence that the oil price is not determined by the exchange rate, it seems very counter-intuitive. If the oil price were held constant over a specified period of time along with supply and demand and only the exchange rate was allowed to fluctuate, the effective price of oil in currencies other than the USD would move with the exchange rate. If the dollar depreciated, countries which import oil through other currencies would be able to purchase oil for less, and while the US is the largest single importer of crude oil in the world, they still make up less than 25.0 percent of oil importers. This would allow the other 75.0 percent of oil importers to purchase oil at a discount, decreasing the overall income of oil exporting countries. On the other hand, if the dollar were to appreciate, oil would become more expensive for the other importing currencies and greatly increase the revenue of oil exporting countries.

Amuzegar (1978) wrote a review of the loss of purchasing power that occurred during the 1970s as the dollar was depreciating and OPEC members were losing profits. He mentions that while it is true that oil producing countries such as OPEC do lose some of their purchasing power when the USD depreciates, the depreciation of the dollar and the amount of purchasing power lost by OPEC members may not be equal. This is because many of the oil exporting countries purchase their imports from different currencies than the ones in which their oil exports are sold. While the loss of purchasing power may not be perfectly correlated to the change in the exchange rates, it was enough for the OPEC members to notice in the 1970s. To this end, they considered raising oil prices or switching to a currency basket price as a solution to this dilemma.

While these ideas were all considered as possible solutions, a switch to a basket of major currencies such as SDR (Special Drawing Rights) only seems appealing when the USD is depreciating. They realized that it would greatly diminish the future revenues of the OPEC member states if the currency were to recover. Another negative point related to the idea of switching to a currency basket as opposed to the USD is that it would have caused the markets to lose even more confidence in the USD and thus caused it to depreciate even further. This would have been a significant problem since many of the OPEC members were already largely invested in USD investments. This is probably why a hike in the oil price seemed the best solution to the purchasing power problem that they faced.

A more recent study by Hammes and Wills (2005) reevaluated the situation from the 1970s regarding oil and exchange rates. The Bretton Woods agreement, which was in effect from 1944 - 1971, fixed all member countries to the USD which was also pegged to gold at $35 per ounce. Due to high inflation throughout the US and the rest of the world, the US un-pegged their currency from gold and allowed it to float freely. Quickly the price of gold in dollars went up. While this may have stifled some inflationary problems at the time, it may have also taken away some of the purchasing power of oil producing countries. To better understand what happened with the oil price, Hammes and Wills compared the price of oil to the price of gold and took the exchange rate out of the equation. While the depreciation of the dollar was taking away from oil producers' revenue, there appeared to be a lag before they felt the effects of pricing oil at a floating currency rate. Once the connection was made, the oil price was quickly adjusted upward. This adjustment, however, was not enough to match the level where oil prices would have been had they continued to peg the dollar to gold. Throughout the decade of the 1970s, the price of oil in dollars was playing catch up to the previous average price of oil in gold. While

this is not the only factor that affected the high prices of oil in the 1970s, it was definitely a contributing factor.

The 2005 Hammes and Wills study is important for more than one reason. It brings into perspective one reason why previous studies may not have found a definite causality of oil price movement due to exchange rate movement during the 1970s: the oil price is at least partially managed. While it makes sense that both oil importers and oil exporters would feel the effects of a change in the value of the USD, the speed at which they react may not have occurred quickly enough to be gauged in cause-and-effect studies.

Verleger (2008) wrote an interesting article where he mentions that while it can be somewhat inconclusive as to whether the exchange rate and the oil price are directly linked, a movement in the oil price may be an accurate reflection of the amount of confidence that oil producers have in the ability of the Federal Reserve to control inflation. He goes on to explain that throughout the year, the price of oil follows a cyclical pattern. In the spring and summer months the price is higher and during the fall and winter months the price is lower. This is due to the larger amount of light sweet crude oil that is consumed during the warmer months. The cycles tend to switch in January and August. What is interesting is that the year of 2008 did not follow this pattern because the declining period only lasted one month as opposed to the usual five months. Verleger theorizes that this is due to a decline in confidence in the Fed's ability to control inflation due to the already rising price of oil and the worsening financial crises faced by the US. He also points out that when faced with the possibility of inflation it is common for commodities to be invested in more heavily, which seems to be happening with oil. As forward contracts are being made, the speculators seem to be driving the price of oil even higher than the natural order of supply and demand would suggest. If this is the case, it would make sense to see

some fluctuation in the spot rate and/or futures prices of crude oil that would share a correlation to the movements in the exchange rate due to the reactions of speculators in the market.

In another article by Verleger (2007), one explanation as to how speculators skew the price of commodities, particularly oil, with their expectations is explained with a recent example. In 2006, both oil prices and oil inventories were both at record highs at the same time. This is counter-intuitive given that high commodity prices are often thought to stem from a lack in inventory rather than a surplus. His explanation was that speculators within the market place were investing largely within commodities as a safe haven for large investments such as pension funds. At the same time, OPEC was trying to decrease the amount of oil available. This served as a catalyst to rising oil prices. With the knowledge that oil prices would already be rising, many investors jumped into oil commodity futures. The increase in the amount of people buying and the lack of people selling simply caused the prices to rise even faster.

OBJECTIVES

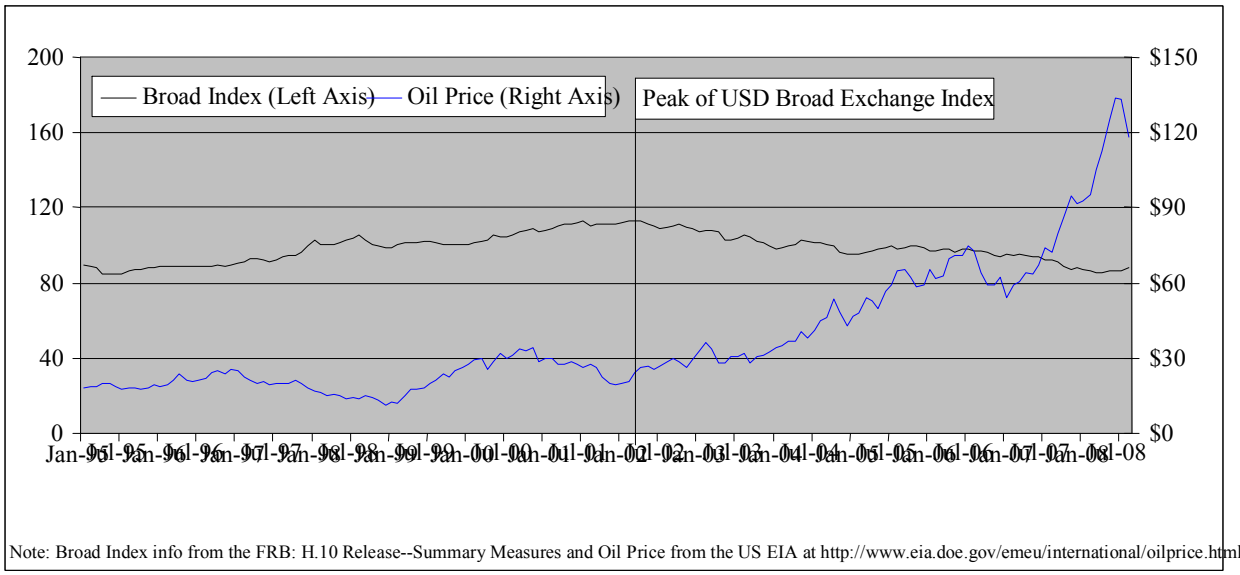
It is well documented that oil prices and the USD exchange rate are linked, but most evidence thus far points to the oil price having greater influence on the exchange rate than the exchange rate has on oil price. In Chart 1 below, a comparison is offered between the monthly oil spot price and a broad USD exchange index consisting of 26 weighted currencies against the USD (FRB: H.10 Release--Summary Measures).[1]

Chart 1 shows an interesting perspective of the movement of both the value of the USD and the price of oil. The value of the USD appears to have a somewhat simple curve. For the time period between 1995 and 2002, the USD appears to steadily have been increasing in value and then in the time period that followed, the dollar began declining in value. The movement in the oil price, on the other hand, has not had quite as simple of a shape during that time period. It appears that in the years between 1995 and 2002 the oil price fluctuated up and down but stayed mostly within a range of slow, stable growth (perhaps a growth that would be comparable to the stable growth in demand that is happening in Southeast Asia and the Middle East). Then after 2002, the oil price appears to have taken off, quickly growing in price. While it is certain that exchange rates and oil prices are subject to more than their co-movements, it seems that they at least have a relationship. What is interesting to notice is that when the USD seems to have a steady, predictable growth pattern, the oil price tends to stay within a reasonable amount of fluctuation; however, when the dollar starts to show a steady decline in value, the oil price appears to become a great deal more volatile. Perhaps this is a good example of the effect that a

[1] Countries included in the index are the Euro area, Canada, Japan, Mexico, China, United Kingdom, Taiwan, Korea, Singapore, Hong Kong, Malaysia, Brazil, Switzerland, Thailand, Philippines, Australia, Indonesia, India, Israel, Saudi Arabia, Russia, Sweden, Argentina, Venezuela, Chile, and Colombia. These countries were included in the index because they are major US trading partners. The weight of each country has changed over time and is based on the amount of importing and exporting of goods that is done between each country and the US. The details of how the weights are determined are found within The Winter 2005 Federal Reserve Bulletin.

loss in confidence in the US Federal Reserve can have on the oil price. As long as investors remain confident that the USD is stable and or appreciating, the oil price stays within a moderate range of movement and growth, but when the USD depreciates, oil prices appear to fall victim to major over-compensation for a loss in purchasing power. Ultimately it may be that the exchange rate's fluctuation is due largely to oil price movement, but it seems reasonable to believe that both forces serve to exacerbate the effects of the other.

Figure 1: Monthly USD Index and Oil Price Values



Note: Broad Index info from the FRB: H.10 Release--Summary Measures and Oil Price from the US EIA at http://www.eia.doe.gov/emeu/international/oilprice.html

The purpose of this paper is to take another look at the relationship between oil prices and the value of the USD. It will try to answer three questions:

1.) Does a change in the value of the USD have a direct or indirect effect on the price of oil?

2.) Does a decline in the value of the USD cause more agitation in the price of oil than a stable or appreciating USD?

3.) Is there any particular currency where the exchange rate with the USD seems to have a stronger correlation to the movement of the oil price?

METHODOLOGY AND RESULTS

To begin this experiment, regressions will be run against a monthly broad currency index of the value of the USD and daily crude oil spot and future contract prices. The monthly broad currency index used was collected from the Federal Reserve Statistical Release. The broad index used values of the USD against other major currencies using a weighted average. An increase in the index number indicates the appreciation of the USD and a decrease in value indicates depreciation of the USD (FRB: H.10 Release--Summary Measures).

The daily crude oil spot and future contract prices used were collected from the Energy Information Administration website. The future contract prices are for one-month, two-month, three-month and four-month contracts. All of these contracts were examined to see if USD movement affects investors' opinions of future oil prices. Descriptive Statistics of the information used are given in the table below.

Table 5: Descriptive Statistics of Daily Oil Spot and Future Prices and Monthly USD Broad Index Values (January 1986-September 2008)

Spot		*1 Month Contract*		*2 Month Contract*		*3 Month Contract*		*4 Month Contract*		*USD Broad Index*	
Mean	30.98	Mean	30.97	Mean	30.89	Mean	30.79	Mean	30.68	Mean	96.52
Std Err	0.30	Std Err	0.30	Std Err	0.30	Std Err	0.30	Std Err	0.30	Std Err	0.46
Median	21.30	Median	21.28	Median	21.02	Median	20.88	Median	20.78	Median	94.98
Mode	20.38	Mode	18.67	Mode	19.77	Mode	18.13	Mode	19.84	Mode	#N/A
Std Dev	22.67	Std Dev	22.69	Std Dev	22.81	Std Dev	22.90	Std Dev	22.95	Std Dev	7.67
Variance	513.90	Variance	514.87	Variance	520.40	Variance	524.24	Variance	526.72	Variance	58.80
Kurtosis	5.42	Kurtosis	5.40	Kurtosis	5.28	Kurtosis	5.21	Kurtosis	5.18	Kurtosis	(0.79)
Skew	2.29	Skew	2.28	Skew	2.27	Skew	2.27	Skew	2.27	Skew	0.49
Range	135.06	Range	134.87	Range	135.32	Range	135.55	Range	135.72	Range	30.77
Min	10.25	Min	10.42	Min	10.54	Min	10.58	Min	10.71	Min	84.33
Max	145.31	Max	145.29	Max	145.86	Max	146.13	Max	146.43	Max	115.10
Sum	176,955	Sum	176,813	Sum	176,415	Sum	175,859	Sum	175,209	Sum	26,252
Count	5,712	Count	5,709	Count	5,711	Count	5,711	Count	5,711	Count	272

Past studies have all shown that movement of the USD does not play a direct role in the movement of the oil price. In order to verify these findings, the daily oil spot and future contracts were averaged by month and compared with the monthly broad index prices where the

percentage change in the USD was the independent variable and the percentage change in the oil price was the dependent variable. A comparison was made on a month-to-month basis and also on a three-month lag. The three-month lag was done in an irregular manner by averaging the calculated percentage changes of three months: the current month and the previous two months. This was done under the assumption that investors who would take dollar movement under considerations when making their investments would not look at the percentage change of the USD value from three months previous all by itself. They would be much more likely to look at the USD movement over all three previous months if they were looking for an upward or downward trend; therefore an average of the three months seemed to be the most prudent number for comparison purposes.

As expected, all r-squared values were below two-hundredths of a point meaning that any correlation found in the comparison accounted for less that two percent of all dependent variable movement, thus confirming the findings from previous studies. The US dollar's broad index movement value does not appear to have any direct correlation to the movement of the spot of any future contract movement. As a second test to check for co-movement, a dummy variable was used to see if a positive or negative percentage change in the value of the USD had a significant effect on oil price. The sign of the percentage change of the USD determined the dummy variable. If the percentage change was negative, then the dummy variable would be 1; if the percentage change was positive or zero, then the dummy variable would be zero. Much like the previous regression, there appeared to be little to no direct correlation of these two variables.

Table 6 below recaps the r-squared, standard error, y-intercept, and betas of all of the regressions discussed above. None of the regressions suggested a correlation that would explain

greater than 1.5 percent of the oil prices' movement. The highest r-squared value in each category has been highlighted in yellow below.

Table 6: Regressions: X-Broad Index Movement, Y-Crude Oil Price Percentage Change

Variables		SPOT Price				1 Month Contract				2 Month Contract			
X-Variable	Y-Variable	R-Sqrd	Std Err	Y-Inter	Beta	R-Sqrd	Std Err	Y-Inter	Beta	R-Sqrd	Std Err	Y-Inter	Beta
1 Month %Δ	Avg Price %Δ	0.0060	0.0840	0.0090	-0.5453	0.0060	0.0833	0.0090	-0.5399	0.0035	0.0784	0.0088	-0.3878
3 Month %Δ	Avg Price %Δ	**0.0142**	0.0806	0.0105	-1.1512	**0.0143**	0.0798	0.0104	-1.1442	**0.0115**	0.0753	0.0102	-0.9663
1 Month Dummy	Avg Price %Δ	0.0026	0.0842	0.0052	0.0086	0.0020	0.0834	0.0058	0.0074	0.0009	0.0785	0.0068	0.0047
3 Month Dummy	Avg Price %Δ	0.0095	0.0808	0.0032	0.0158	0.0090	0.0800	0.0034	0.0152	0.0063	0.0755	0.0047	0.0120

Variables		3 Month Contract				4 Month Contract			
X-Variable	Y-Variable	R-Sqrd	Std Err	Y-Inter	Beta	R-Sqrd	Std Err	Y-Inter	Beta
1 Month % Δ	Avg Price % Δ	0.0020	0.0739	0.0087	-0.2778	0.0014	0.0693	0.0085	-0.2162
3 Month % Δ	Avg Price % Δ	**0.0097**	0.0709	0.0099	-0.8344	**0.0079**	0.0664	0.0097	-0.7045
1 Month Dummy	Avg Price % Δ	0.0005	0.0739	0.0074	0.0031	0.0002	0.0693	0.0076	0.0021
3 Month Dummy	Avg Price % Δ	0.0051	0.0711	0.0053	0.0102	0.0042	0.0665	0.0058	0.0086

While the r-squared values do not suggest causality, it is interesting to notice the betas. When the USD was depreciating, the price of oil was rising in all regressions ~~run~~ in both the one-month and three-month trials. This is true in both the monthly percentage change and when using the dummy variable. The betas are positive for the dummy variable only because the dummy variable was only present when the percentage change was negative.

While the regressions run against the broad index seem to show that there is not a strong connection between the value of the USD and the oil prices, they only account for the USD as a whole against many currencies, some of which may not have a significant tie to the oil market. There could be one currency that the dollar is depreciating against while it is gaining value against another, so a comparison of individual currencies seems like a pertinent step to help confirm the broad regressions' findings. The currencies that the USD will be compared to can be separated into two groups: countries that produce and/or export large amounts of oil and

countries that consume and/or import large amounts of oil. All of the currencies chosen have a free-floating currency.

Table three shows that the top exporting countries with free-floating currencies are Canada, Mexico, Norway, and Russia.[2] The descriptive statistics for these countries are given below. Since all currencies have been in use for different periods of time and have different amounts of available information, any individual currency information discussed hereafter pertains to the period between January 1993 and September 2008 because all currencies had available information during these times. If information was available further back than 1993 for any currency, then regressions were also run for the entire period available. All regressions of longer time periods than 1993 to 2008 had similar results, so only the information from 1993 to 2008 is presented in the following charts in order to only compare information for different currencies across the same time line.

Table 7: Descriptive Statistics for Oil Producing/Exporting Countries' Currencies

Canada *USD/CAD*		**Mexico** *USD/MXN*		**Norway** *USD/NOK*		**Russia** *USD/RUB*	
Mean	0.8227	Mean	0.1263	Mean	0.1455	Mean	0.0675
Std Error	0.0012	Std Error	0.0010	Std Error	0.0003	Std Error	0.0010
Median	0.8173	Median	0.1049	Median	0.1465	Median	0.0371
Mode	0.7202	Mode	0.3218	Mode	0.1603	Mode	0.0342
Std Dev	0.1124	Std Dev	0.0618	Std Dev	0.0194	Std Dev	0.0594
Variance	0.0126	Variance	0.0038	Variance	0.0004	Variance	0.0035
Kurtosis	(0.9031)	Kurtosis	4.2881	Kurtosis	0.1193	Kurtosis	0.2253
Skewness	0.2737	Skewness	2.3634	Skewness	0.1441	Skewness	1.4414
Range	0.4706	Range	0.2476	Range	0.0978	Range	0.1896
Minimum	0.6199	Minimum	0.0758	Minimum	0.1043	Minimum	0.0313
Maximum	1.0905	Maximum	0.3234	Maximum	0.2021	Maximum	0.2209
Sum	7,826	Sum	484	Sum	653	Sum	217
Count	9,512	Count	3,829	Count	4,486	Count	3,218

[2] All individual currency exchange rate historical information were taken from W. Antweiler's website at http://fx.sauder.ubc.ca/data.html

All currencies are shown in USD per unit of the foreign currency; therefore a decrease in the exchange rate would indicate the appreciation of the USD and an increase in the exchange rate would indicate the depreciation of the USD. The each monthly average was calculated from the daily exchange rates. That average was used to find the percentage change and then the dummy variable, which was then compared to the spot and future oil price like the broad index comparison above.

The table below gives a summary of the r-squared values associated with the same regressions run using the currencies of the oil exporting countries. Within each comparison, the highest r-squared value has been highlighted in yellow. None of the comparisons produced an r-squared that could explain more than three and fifty-two hundredths of a percent of the movement of the oil price. In oil exporting countries, the exchange rate between the USD and their respective currencies does not seem to have a significant correlation to the movement of the oil price.

Table 8: R-Squared Values for High Production Currency Regressions (1993-2008)
USD Movement vs. Oil Price % Change

		Canada					Mexico				
X-Variable	**Y-Variable**	**Spot**	**1Mon**	**2Mon**	**3Mon**	**4Mon**	**Spot**	**1Mon**	**2Mon**	**3Mon**	**4Mon**
1Mon % Δ	Avg Price % Δ	0.0070	0.0073	0.0063	0.0053	0.0044	0.0000	0.0000	0.0000	0.0001	0.0004
3Mon % Δ	Avg Price % Δ	0.0033	0.0033	0.0029	0.0021	0.0013	0.0000	0.0000	0.0000	0.0000	0.0000
1Mon Dummy	Avg Price % Δ	0.0128	0.0128	0.0124	0.0113	0.0099	0.0022	0.0025	0.0026	0.0030	0.0034
3Mon Dummy	Avg Price % Δ	0.0036	0.0041	0.0049	0.0037	0.0022	0.0044	0.0042	0.0047	0.0054	0.0061

		Norway					Russia				
X-Variable	**Y-Variable**	**Spot**	**1Mon**	**2Mon**	**3Mon**	**4Mon**	**Spot**	**1Mon**	**2Mon**	**3Mon**	**4Mon**
1Mon % Δ	Avg Price % Δ	0.0020	0.0025	0.0025	0.0023	0.0019	0.0114	0.0108	0.0122	0.0147	0.0172
3Mon % Δ	Avg Price % Δ	0.0006	0.0007	0.0014	0.0022	0.0029	0.0015	0.0012	0.0016	0.0025	0.0035
1Mon Dummy	Avg Price % Δ	0.0054	0.0058	0.0058	0.0050	0.0041	0.0255	0.0245	0.0270	0.0308	0.0352
3Mon Dummy	Avg Price % Δ	0.0048	0.0046	0.0040	0.0038	0.0039	0.0004	0.0004	0.0005	0.0007	0.0008

On the other side of the supply and demand curve, there are the oil consuming and/or importing countries like China, India, Japan, South Korea, and Europe. When doing the

individual country currency comparisons for Europe, the Euro was used but also four of the original currencies of countries that now use the Euro: France, Germany, Italy, and Spain. The values of the currencies that were replaced by the Euro represent historical values up to the time when the Euro was adopted in their country and after that time the values were calculated by using the Euro locking rate and applying it to the Euro exchange rate. The descriptive statistics for the importing currencies are listed in the table below.

Table 9: Descriptive Statistics for Oil Consuming/Importing Countries' Currencies

Great Britain *USD/GBP*		**China** *USD/CNY*		**India** *USD/INR*		**Japan** *USD/JPY*		**South Korea** *USD/KRW*	
Mean	1.7944	Mean	0.1256	Mean	0.0250	Mean	0.0066	Mean	0.0011
Std Error	0.0033	Std Error	0.0002	Std Error	0.0001	Std Error	0.0000	Std Error	0.0000
Median	1.7184	Median	0.1208	Median	0.0231	Median	0.0073	Median	0.0012
Mode	2.4189	Mode	0.1208	Mode	0.0319	Mode	0.0033	Mode	0.0013
Std Dev	0.3225	Std Dev	0.0132	Std Dev	0.0039	Std Dev	0.0024	Std Dev	0.0002
Variance	0.1040	Variance	0.0002	Variance	0.0000	Variance	0.0000	Variance	0.0000
Kurtosis	(0.1481)	Kurtosis	7.0636	Kurtosis	(0.8081)	Kurtosis	(1.4240)	Kurtosis	(1.0265)
Skewness	0.7573	Skewness	2.8011	Skewness	0.7848	Skewness	(0.1146)	Skewness	(0.3120)
Range	1.5916	Range	0.0609	Range	0.0141	Range	0.0095	Range	0.0010
Minimum	1.0521	Minimum	0.1144	Minimum	0.0204	Minimum	0.0028	Minimum	0.0005
Maximum	2.6437	Maximum	0.1753	Maximum	0.0345	Maximum	0.0123	Maximum	0.0015
Sum	17,058	Sum	496	Sum	99	Sum	63	Sum	8
Count	9,506	Count	3,946	Count	3,970	Count	9,500	Count	6,872

Europe *USD/EUR*		**France** *USD/FRF*		**Germany** *USD/DEM*		**Italy** *USD/ITL*		**Spain** *USD/ESP*	
Mean	1.1676	Mean	0.1813	Mean	0.5201	Mean	0.0009	Mean	0.0094
Std Error	0.0025	Std Error	0.0003	Std Error	0.0012	Std Error	0.0000	Std Error	0.0000
Median	1.1845	Median	0.1813	Median	0.5385	Median	0.0007	Median	0.0080
Mode	1.2724	Mode	0.1813	Mode	0.2754	Mode	0.0011	Mode	0.0172
Std Dev	0.1605	Std Dev	0.0329	Std Dev	0.1193	Std Dev	0.0004	Std Dev	0.0035
Variance	0.0258	Variance	0.0011	Variance	0.0142	Variance	0.0000	Variance	0.0000
Kurtosis	(0.0865)	Kurtosis	(0.4098)	Kurtosis	(0.8091)	Kurtosis	0.2061	Kurtosis	0.0621
Skewness	0.0046	Skewness	(0.1671)	Skewness	(0.0737)	Skewness	1.1888	Skewness	1.1102
Range	0.7737	Range	0.1653	Range	0.5442	Range	0.0014	Range	0.0130
Minimum	0.8273	Minimum	0.0947	Minimum	0.2744	Minimum	0.0004	Minimum	0.0050
Maximum	1.6010	Maximum	0.2600	Maximum	0.8186	Maximum	0.0018	Maximum	0.0180
Sum	4,637	Sum	1,724	Sum	4,944	Sum	8	Sum	84
Count	3,971	Count	9,506	Count	9,506	Count	9,506	Count	9,005

When the same regressions were run on these currencies, the following r-squared values were obtained.

Table 10: R-Squared Values for High Consumption Currency Regressions (1993-2008)
USD Movement vs. Oil Price % Change

		Great Britain					South Korea				
X-Variable	**Y-Variable**	**Spot**	**1Mon**	**2Mon**	**3Mon**	**4Mon**	**Spot**	**1Mon**	**2Mon**	**3Mon**	**4Mon**
1Mon % Δ	Avg Price % Δ	0.0087	0.0109	0.0124	0.0119	0.0112	0.0025	0.0028	0.0031	0.0031	0.0036
3Mon % Δ	Avg Price % Δ	0.0079	0.0075	0.0082	0.0098	0.0112	0.0002	0.0004	0.0001	0.0000	0.0000
1Mon Dummy	Avg Price % Δ	0.0039	0.0051	0.0058	0.0054	0.0047	0.0023	0.0025	0.0030	0.0027	0.0032
3Mon Dummy	Avg Price % Δ	0.0025	0.0025	0.0025	0.0026	0.0026	0.0000	0.0000	0.0001	0.0003	0.0007

		China					India				
X-Variable	**Y-Variable**	**Spot**	**1Mon**	**2Mon**	**3Mon**	**4Mon**	**Spot**	**1Mon**	**2Mon**	**3Mon**	**4Mon**
1Mon % Δ	Avg Price % Δ	0.0044	0.0045	0.0053	0.0068	0.0086	0.0001	0.0001	0.0001	0.0000	0.0000
3Mon % Δ	Avg Price % Δ	0.0054	0.0052	0.0060	0.0074	0.0090	0.0166	0.0172	0.0194	0.0222	0.0251
1Mon Dummy	Avg Price % Δ	0.0001	0.0001	0.0001	0.0006	0.0018	0.0217	0.0220	0.0275	0.0329	0.0357
3Mon Dummy	Avg Price % Δ	0.0070	0.0075	0.0080	0.0087	0.0102	0.0138	0.0140	0.0169	0.0196	0.0225

		Japan					Europe				
X-Variable	**Y-Variable**	**Spot**	**1Mon**	**2Mon**	**3Mon**	**4Mon**	**Spot**	**1Mon**	**2Mon**	**3Mon**	**4Mon**
1Mon % Δ	Avg Price % Δ	0.0096	0.0114	0.0130	0.0119	0.0108	0.0026	0.0036	0.0037	0.0032	0.0027
3Mon % Δ	Avg Price % Δ	0.0249	0.0264	0.0272	0.0280	0.0283	0.0016	0.0016	0.0026	0.0036	0.0045
1Mon Dummy	Avg Price % Δ	0.0003	0.0008	0.0021	0.0023	0.0022	0.0003	0.0001	0.0001	0.0002	0.0003
3Mon Dummy	Avg Price % Δ	0.0098	0.0114	0.0105	0.0092	0.0089	0.0004	0.0003	0.0000	0.0000	0.0000

Table 11: R-Squared Values for European Consumer Currency Regressions (1993-2008)
USD Movement vs. Oil Price % Change

		France					Germany				
X-Variable	**Y-Variable**	**Spot**	**1Mon**	**2Mon**	**3Mon**	**4Mon**	**Spot**	**1Mon**	**2Mon**	**3Mon**	**4Mon**
1Mon % Δ	Avg Price % Δ	0.0022	0.0031	0.0032	0.0027	0.0023	0.0022	0.0031	0.0032	0.0027	0.0023
3Mon % Δ	Avg Price % Δ	0.0019	0.0019	0.0029	0.0040	0.0049	0.0019	0.0019	0.0029	0.0041	0.0050
1Mon Dummy	Avg Price % Δ	0.0003	0.0001	0.0001	0.0002	0.0003	0.0003	0.0001	0.0001	0.0002	0.0003
3Mon Dummy	Avg Price % Δ	0.0004	0.0003	0.0000	0.0000	0.0000	0.0004	0.0003	0.0000	0.0000	0.0000

		Italy					Spain				
X-Variable	**Y-Variable**	**Spot**	**1Mon**	**2Mon**	**3Mon**	**4Mon**	**Spot**	**1Mon**	**2Mon**	**3Mon**	**4Mon**
1Mon % Δ	Avg Price % Δ	0.0021	0.0030	0.0031	0.0027	0.0022	0.0022	0.0031	0.0032	0.0028	0.0023
3Mon % Δ	Avg Price % Δ	0.0019	0.0020	0.0030	0.0041	0.0050	0.0019	0.0019	0.0029	0.0040	0.0049
1Mon Dummy	Avg Price % Δ	0.0003	0.0001	0.0001	0.0002	0.0003	0.0003	0.0001	0.0001	0.0002	0.0003
3Mon Dummy	Avg Price % Δ	0.0004	0.0003	0.0000	0.0000	0.0000	0.0004	0.0003	0.0000	0.0000	0.0000

The regressions for all the consuming/importing currencies could not produce a linear correlation that could explain the movement of oil to any degree of real significance. The highest r-squared value achieved by any of the above regressions would only explain 3.57 percent of the oil price movement.

Having taken a closer look at the possibility of co-movement between the value of the USD and the oil price and finding no direct causal relationship, there is still a question left to be answered: does a decline in the value of the USD cause greater fluctuation in the oil price? In order to examine this, the daily oil price data was configured in a different way. The standard deviation of each month's oil price was computed and then used to find the percentage change from month to month and with another averaged three month lag. When first applied to the broad index USD monthly values the following results were found.

Table 12: Regressions: X-Broad USD Index Movement, Y-Crude Oil Price Standard Deviation

Variables		SPOT Price				1 Month Contract				2 Month Contract			
X-Variable	Y-Variable	R-Sqrd	Std Err	Y-Inter	Beta	R-Sqrd	Std Err	Y-Inter	Beta	R-Sqrd	Std Err	Y-Inter	Beta
1 Month % Δ	Std Dev % Δ	0.0001	0.6960	0.1669	-0.6376	0.0050	0.8597	0.2058	5.0480	0.0004	1.1019	0.2149	1.7969
3 Month % Δ	Std Dev % Δ	0.0000	0.6967	0.1720	0.2049	0.0035	0.8617	0.2112	6.0983	0.0000	1.1051	0.2169	-0.7273
1 Month Dummy	Std Dev % Δ	0.0031	0.6949	0.1290	0.0767	0.0000	0.8618	0.2039	-0.0056	**0.0009**	1.1017	0.2456	-0.0646
3 Month Dummy	Std Dev % Δ	**0.0053**	0.6949	0.2250	-0.1008	**0.0076**	0.8600	0.2850	-0.1499	0.0003	1.1049	0.2390	-0.0407

Variables		3 Month Contract				4 Month Contract			
X-Variable	Y-Variable	R-Sqrd	Std Err	Y-Inter	Beta	R-Sqrd	Std Err	Y-Inter	Beta
1 Month % Δ	Std Dev % Δ	0.0002	1.2839	0.2363	1.3482	0.0005	1.2003	0.2239	2.2643
3 Month % Δ	Std Dev % Δ	**0.0098**	1.2816	0.2525	15.2130	0.0002	1.2043	0.2235	-2.1771
1 Month Dummy	Std Dev % Δ	0.0020	1.2827	0.2931	-0.1156	**0.0011**	1.1999	0.2625	-0.0811
3 Month Dummy	Std Dev % Δ	0.0073	1.2832	0.3553	-0.2201	0.0000	1.2044	0.2238	0.0030

The broad index comparison seemed to produce even less significant results than the co-movement comparisons with the highest r-squared value no greater than ninety-eight millionths of a point. When the same regressions were applied to each of the individual currencies, similar r-squared values were found.

Table 13: R-Squared Values for High Production Currency Regressions (1993-2008)
USD Movement vs. Oil Standard Deviation

		Canada					Mexico				
X-Variable	**Y-Variable**	**Spot**	**1Mon**	**2Mon**	**3Mon**	**4Mon**	**Spot**	**1Mon**	**2Mon**	**3Mon**	**4Mon**
1Mon % Δ	Std Dev % Δ	0.0064	0.0060	0.0054	0.0056	0.0045	0.0001	0.0000	0.0021	0.0025	0.0041
3Mon % Δ	Std Dev % Δ	0.0085	0.0094	0.0102	0.0121	0.0120	0.0003	0.0000	0.0006	0.0008	0.0015
1Mon Dummy	Std Dev % Δ	0.0022	0.0040	0.0064	0.0080	0.0076	0.0006	0.0007	0.0018	0.0011	0.0019
3Mon Dummy	Std Dev % Δ	0.0003	0.0000	0.0000	0.0003	0.0004	0.0008	0.0003	0.0000	0.0003	0.0011

		Norway					Russia				
X-Variable	**Y-Variable**	**Spot**	**1Mon**	**2Mon**	**3Mon**	**4Mon**	**Spot**	**1Mon**	**2Mon**	**3Mon**	**4Mon**
1Mon % Δ	Std Dev % Δ	0.0053	0.0055	0.0026	0.0028	0.0032	0.0236	0.0162	0.0092	0.0072	0.0043
3Mon % Δ	Std Dev % Δ	0.0004	0.0002	0.0019	0.0048	0.0057	0.0061	0.0049	0.0026	0.0014	0.0004
1Mon Dummy	Std Dev % Δ	0.0053	0.0044	0.0030	0.0039	0.0050	0.0030	0.0017	0.0017	0.0020	0.0025
3Mon Dummy	Std Dev % Δ	0.0070	0.0077	0.0038	0.0009	0.0001	0.0012	0.0012	0.0006	0.0002	0.0001

Table 14: R-Squared Values for High Consumption Currency Regressions (1993-2008)
USD Movement vs. Oil Price Standard Deviation

		Great Britain					South Korea				
X-Variable	**Y-Variable**	**Spot**	**1Mon**	**2Mon**	**3Mon**	**4Mon**	**Spot**	**1Mon**	**2Mon**	**3Mon**	**4Mon**
1Mon % Δ	Std Dev % Δ	0.0012	0.0005	0.0000	0.0001	0.0005	0.0015	0.0004	0.0000	0.0003	0.0006
3Mon % Δ	Std Dev % Δ	0.0000	0.0005	0.0004	0.0027	0.0041	0.0125	0.0069	0.0070	0.0075	0.0067
1Mon Dummy	Std Dev % Δ	0.0054	0.0045	0.0005	0.0000	0.0005	0.0000	0.0000	0.0007	0.0016	0.0015
3Mon Dummy	Std Dev % Δ	0.0080	0.0110	0.0040	0.0014	0.0009	0.0082	0.0041	0.0069	0.0074	0.0093

		China					India				
X-Variable	**Y-Variable**	**Spot**	**1Mon**	**2Mon**	**3Mon**	**4Mon**	**Spot**	**1Mon**	**2Mon**	**3Mon**	**4Mon**
1Mon % Δ	Std Dev % Δ	0.0016	0.0015	0.0010	0.0008	0.0006	0.0001	0.0000	0.0002	0.0009	0.0019
3Mon % Δ	Std Dev % Δ	0.0008	0.0008	0.0007	0.0006	0.0005	0.0000	0.0002	0.0002	0.0003	0.0003
1Mon Dummy	Std Dev % Δ	0.0001	0.0001	0.0033	0.0043	0.0079	0.0008	0.0002	0.0002	0.0004	0.0012
3Mon Dummy	Std Dev % Δ	0.0001	0.0003	0.0023	0.0047	0.0078	0.0002	0.0003	0.0005	0.0007	0.0006

		Japan					Europe				
X-Variable	**Y-Variable**	**Spot**	**1Mon**	**2Mon**	**3Mon**	**4Mon**	**Spot**	**1Mon**	**2Mon**	**3Mon**	**4Mon**
1Mon % Δ	Std Dev % Δ	0.0010	0.0006	0.0007	0.0015	0.0038	0.0040	0.0054	0.0025	0.0019	0.0012
3Mon % Δ	Std Dev % Δ	0.0001	0.0004	0.0003	0.0000	0.0001	0.0012	0.0017	0.0049	0.0087	0.0101
1Mon Dummy	Std Dev % Δ	0.0059	0.0032	0.0052	0.0074	0.0114	0.0025	0.0015	0.0012	0.0015	0.0006
3Mon Dummy	Std Dev % Δ	0.0007	0.0022	0.0029	0.0027	0.0021	0.0003	0.0003	0.0001	0.0008	0.0015

Table 15: R-Squared Values for European Consumer Currency Regressions (1993-2008)
USD Movement vs. Oil Price Standard Deviation

		France					Germany				
X-Variable	**Y-Variable**	**Spot**	**1Mon**	**2Mon**	**3Mon**	**4Mon**	**Spot**	**1Mon**	**2Mon**	**3Mon**	**4Mon**
1Mon % Δ	Std Dev % Δ	0.0038	0.0051	0.0023	0.0018	0.0011	0.0038	0.0051	0.0023	0.0018	0.0011
3Mon % Δ	Std Dev % Δ	0.0012	0.0017	0.0049	0.0087	0.0101	0.0012	0.0017	0.0049	0.0086	0.0101
1Mon Dummy	Std Dev % Δ	0.0025	0.0015	0.0012	0.0015	0.0006	0.0025	0.0015	0.0012	0.0015	0.0006
3Mon Dummy	Std Dev % Δ	0.0003	0.0003	0.0001	0.0008	0.0015	0.0003	0.0003	0.0001	0.0008	0.0015

		Italy					Spain				
X-Variable	**Y-Variable**	**Spot**	**1Mon**	**2Mon**	**3Mon**	**4Mon**	**Spot**	**1Mon**	**2Mon**	**3Mon**	**4Mon**
1Mon % Δ	Std Dev % Δ	0.0036	0.0049	0.0022	0.0017	0.0010	0.0038	0.0051	0.0023	0.0018	0.0011
3Mon % Δ	Std Dev % Δ	0.0012	0.0017	0.0047	0.0085	0.0100	0.0012	0.0017	0.0048	0.0086	0.0101
1Mon Dummy	Std Dev % Δ	0.0025	0.0015	0.0012	0.0015	0.0006	0.0025	0.0015	0.0012	0.0015	0.0006
3Mon Dummy	Std Dev % Δ	0.0003	0.0003	0.0001	0.0008	0.0015	0.0003	0.0003	0.0001	0.0008	0.0015

CONCLUSION

While past studies have shown that the movement of the price of oil plays a significant part in the value of the USD and the US economy, there does not appear to be the same kind of correlation when the dependent and independent variables are reversed. Although there has been a great deal of speculation that a declining value of the USD causes the oil price to rise, there is no reliable, measurable, short-term correlation that can be found. This does seem counter-intuitive given that oil is priced in US Dollars and a loss in value of the pricing currency would cause a loss in purchasing power. The reason for this disconnect could be that the price of oil is dependent on many other factors and is really not allowed to float and react freely to the market. The market also tends to recognize this fact since futures contracts appear not to react to fluctuations in the value of the US Dollar either. This study took a close look at the short-term reactions of the spot and future oil price reactions to the value of the US Dollar and found little to no direct movement causality. It may still be pertinent in the future to do a similar test but in a long-term rather than short-term setting to see if the managed price adjusts more to make up for changes in purchasing power more in a year-to-year setting instead of a month-to-month setting.

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