On the impact of oil prices on real exchange rates in oil-exporting countries
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Abstract

This paper explores the relationship between the real oil price and the real exchange rate in predominantly oil-exporting countries (including Saudi Arabia, Mexico, Indonesia, and Venezuela) from 1995 to 2014. After controlling for the effects of GDP growth, inflation, government spending growth, and trade balance ratio, we find real oil prices significantly affect real exchange rates. Our findings further suggest that the more dependent a country is on oil exports, the higher is the impact of oil prices on the real exchange rate. A 1% increase in oil prices leads to a 0.62% appreciation in the real exchange rate for Saudi Arabia, a 0.62% appreciation for Mexico, a 0.51% appreciation for Indonesia, and a 0.75% appreciation for Venezuela. To mitigate the volatility of real exchange rates, policy recommendations include reducing the dependency on oil exports by diversifying in other exporting industries.
1. Introduction

The real exchange rate has a wide variety of determinants, and in a globalized world, it is imperative to understand the extent to which these determinants affect the real exchange rate. In recent history, oil prices were found to be a dominant determinant of the real exchange rate. This finding has major implications for both oil-exporting and oil-importing economies, but in different ways. In this paper, we will investigate the effect of oil price shocks on the real exchange rate in countries that are highly dependent on oil exports. These include Saudi Arabia, Mexico, Indonesia, and Venezuela.

We differ from other studies that have mostly looked at the OECD countries and other major countries which tend to be either oil importers or have an economy too big to isolate the effect of oil shocks. While it would have been easier to choose countries within the Middle East (particularly those surrounding Saudi Arabia) that are much more dependent on oil exports than Indonesia, for example, we have chosen a geographically and politically diverse set of countries. We also control for other variables which are considered to be the major determinants of the real exchange rate. Our findings indicate that oil price changes do cause real exchange rate changes, and in the case of oil exporters as opposed to oil importers, an increase in the price of oil leads to an appreciation in the real exchange rate. Furthermore, the effect of the real exchange rate appreciation from the increase in oil prices is higher the more the country is dependent on oil exports, with the highest effect attributed to Venezuela, and the lowest to Indonesia. With oil prices falling and fluctuating at historical lows in recent times, and forecasted to stay below $60 for 2017, this would mean that these same countries would experience further depreciations in their exchange rates. This leads to issues such as Venezuela’s expensive prices of imports and puts more
pressure on Saudi Arabia to maintain the fixed exchange rate against the US dollar. Policy recommendations include reducing the level of dependence on oil exports to maintain a steadier real exchange rate as well as minimizing adverse shocks to these countries’ economies from oil price fluctuations.

2. Literature Review

This section reviews the related literature on the effect of oil prices on the real exchange rate in oil-exporting countries through the theoretical framework of real exchange rate determination as well as empirical evidence provided on the topic.

The theory of real exchange rates is depicted by Chinn (2006) as follows:

$$q_t = s_t - p_t + p_t^*$$

where \( q \) is the log of the real exchange rate, \( s \) is the log of the nominal exchange rate in terms of home currency units per foreign currency units, \( p \) is the log of domestic price level, and \( p^* \) is the log of the foreign price level; the difference between \( p \) and \( p^* \) represents the inflation rate differentials. We do not assume purchasing power parity always holds due to trade restrictions, transaction costs, and the existence of non-tradeable goods, which means that the real exchange rate can vary instead of being immediately corrected for by \( s \).

Keeping in mind that the variables are in log, we introduce the decomposition of the price index as a geometric average of both tradeable and non-tradeable goods as follows:

$$p_t = \alpha p_i^N + (1 - \alpha) p_i^T$$

We use this equation for both home and foreign price levels, and combine them with (1) to have,

$$q_i \equiv (s_i - p_i^T + p_i^{*T}) + [-\alpha(q_i^N - p_i^T) + \alpha^*(p_i^{N*} - p_i^{*T})]$$

which can be summarized as,

$$q_i \equiv q_i^T + \varnothing_i$$
Note that $q^T$ represents the inter-country price of tradeable goods in relative terms, and $\pi_t$ represents the price of non-tradeable goods relative to tradeable goods. If purchasing power parity does not hold for tradeable goods, then only the first term of the right-hand side of the equation would be zero, while the other still varies. In more basic terms, what this equation means is that the real exchange rate depends on both the price of tradeable goods between the countries as well as the proportion of tradeable and non-tradeable goods included in the home country.

Since the real exchange rate is affected by price levels of both tradeable and non-tradeable goods, then demand side factors, productivity levels, and nominal exchange rates (which drive nominal wages and price levels) would influence the real exchange rate through the non-tradeable relative prices. For tradeable goods, especially when a country specializes (such as with oil), then the real exchange rate becomes closely related to the terms of trade as well. The literature suggests various factors which in one way or another affect relative prices and, therefore, real exchange rates. The question is which factor is dominant in explaining the movements of real exchange rates. With this in mind, it is interesting to see whether oil prices can significantly affect the real exchange rates of oil exporting countries.

Short-run monetary models of the real exchange rate with sticky prices account for the overshooting effect, but not for the purchasing power parity condition which tends to hold in the long-run (Dornbusch, 1976). When it comes to long-run models, the focus is on the non-tradeable goods’ relative prices. Samuelson (1964) and Balassa (1964) introduced the specification that includes these prices based on sectoral productivity differentials, which was later expanded by Chinn (1999, 2000) and Hsieh (1982). Other studies, including Degregorio and Wolf (1994), have introduced demand side determinants. Clarida and Gali (1995) use a structural vector autoregressive model to show demand side factors are the main determinant
of real exchange rates. Lane and Milesi-Ferretti (2002) show that net foreign assets are also important in the determination of the real exchange rate, and Bems and Carvalho Filho (2009) find that, particular to oil-exporting countries, the trade balance and the stock of oil reserves have strong links to their real exchange rates.

Chaudhuri and Daniel (1998) use the data from 1973 to 1996 to show that during the post-Bretton Woods era, the US dollar (USD) real exchange rate’s nonstationary behavior can be explained by the same type of nonstationary behavior of real oil prices, with causality going from oil to the exchange rate. They further find that the USD real exchange rate appreciates in response to an increase in real oil prices. In addition, the real exchange rate exhibits long swings away from equilibrium as a result of an increase in oil price, albeit getting weaker over the years as the world market adjusted to oil shocks.

Using panel data analysis for G7 countries, Chen and Chen (2007) investigate the effect of real oil prices on real exchange rates. Their model includes interest rate differentials (motivated by the uncovered interest rate parity condition), and productivity differentials (motivated by the Balassa-Samuelson effect), with an increase in these differentials causing an appreciation in the domestic currency. They also show that out-of-sample predictions of real exchange rates with the use of oil prices are more accurate than the random walk predictions, and become more accurate over a longer time horizon.

Huang and Guo (2007) use a four-dimensional structural vector autoregressive to model China’s real exchange rate. They show that oil prices have a smaller effect on China’s real exchange rate but a larger effect on the real exchange rate of China’s trading partners. They argue that the smaller effect is due both to China’s lower levels of dependence on imported oil in comparison to the trading partners and China’s strict energy regulations. They also find that real (not nominal) oil price shocks are a dominant source of the real exchange
rate variations. The four dimensions in Huang and Guo (2007) include oil price shocks, which are external shocks, supply shocks, demand shocks, and monetary shocks. They discuss the transmission mechanism of oil price increases on real exchange rates by outlining one key factor which is the transfer of wealth from oil importing to oil-exporting countries, as well as further currency depreciation due to monetary policy to alleviate the inflationary pressures on the home country. This is why we should expect differing results for oil-exporting countries than the results obtained for oil-importing ones.

Focusing on Syria as an oil-exporting country, Hasan and Dridi (2008) investigate the impact of oil-related income (rather than oil prices) on the equilibrium real exchange rate. They show that, as is the case for oil-exporting countries, an increase in oil-related income leads to real exchange rate appreciations, while controlling for the effects on real exchange rate due to productivity, output, net foreign assets, and government spending. Their findings further indicate that government spending leads to a depreciation instead of the usual appreciation from the increased output because of the higher levels of imports and the subsequent weaker position of the current account. They suggest a move to a flexible exchange rate regime in order to reduce fluctuations in real exchange rate.

Lizardo and Mollick (2010) include real oil prices into exchange rate monetary models. They show that real oil prices could significantly explain the USD exchange rate movements from 1970 to 2008. More specifically, the USD depreciates against major oil exporters when the real oil price rises, but is more insulated and relatively depreciates less than other oil importers like Japan, as they need to purchase US dollars to buy the higher priced oil.

The study by Al-Mulali and Sab (2011) pertains to the impact of oil prices on the UAE’s real exchange rate. Like Saudi Arabia, the UAE is a major oil-exporting country and
its currency’s value is fixed to the USD. Oil price increases cause relatively higher inflation, which has the effect of weakening the domestic currency. Al-Mulali and Sab’s paper, however, is very simple in its analysis of the impact of oil price shocks on the UAE real exchange rate, although the paper does echo what Hasan and Dridi (2008) argue regarding Syria that a move away from a fixed exchange rate to a floating one may help reduce real exchange rate fluctuations due to oil price shocks. The link between oil price and the exchange rate is intuitively discerned to be through the net foreign asset position change. Al-Abri (2008) shows that fixed exchange rates are affected more by inflation than the floating exchange rates.

Focusing on Romania (a transitional Eastern European country), Tiwari et al. (2013) investigate the effect of real oil price on real exchange rate by using a discrete wavelet transform approach and a scale-by-scale Granger causality test. Romania at the time had the lowest level of retail fuel prices within the European Union and was, as well, experiencing an increase in the price of oil. Tiwari et al. (2013) show that oil prices have significant influence on the real exchange rate in both the short- and long-run. They also used the Hamilton approach, pioneered by James Hamilton (2003), to find the effects of an oil price shock, through characterizing a shock as the difference between the oil price at that point in time and its maximum value over the past number of months. Their results indicate that positive as well as negative shocks have affected the real exchange rate over both the short- and long-run, with the positive having a stronger effect in the short-run compared to the negative shocks. Tiwari et al. (2015), focus on Russia and examine the same relationship. They find a strong short-run relationship between the real exchange rate and oil prices, while controlling for the effects of output (GDP), the terms of trade, government spending, and productivity differentials. Given their findings, Tiwari et al. (2015) argue that it was imperative (especially
at the time) for Russia to reduce its dependence on oil due to its stronger effects on their exchange rates.

Bal and Rath (2015) take a nonlinear causality approach as opposed to the linear one between the price of crude oil and the exchange rate in a comparative study of India and China. Their findings indicate a significant bi-directional nonlinear Granger causality between the two variables in India, and the influence continued regardless of the exchange rate regime in the country. They did find, however, that in the case of China, the oil price does not Granger cause the exchange rate.

It is clear from the literature that oil does play a major role in determining the real exchange rate, while controlling for important international trade indicators as well as domestic fiscal and monetary policy variables. Our investigation into the effects of oil prices on the real exchange rates of developing countries where oil exports account for a major percentage of their overall trade is both important and fills the gap in the literature which largely focuses on developed and oil-importing countries.

3. Data and Empirical Analysis

We start our analysis with the following model,

\[ e_{1t} = \beta_0 + \beta_1 o_{1t} + \beta_2 y_{1t} + \beta_3 g_{1t} + \beta_4 t_{1t} + \beta_5 p_{1t} + \mu_{1t} \]  

Model (1)

where \( e \) is the rate of change in real exchange rate, \( o \) is the rate of change in real oil price, \( y \) is real GDP growth, \( g \) is real government spending growth, \( t_b \) is the real trade balance (calculated as the difference between log of exports and log of imports), and \( p \) is the GDP deflator. It is important to note that the inclusion of \( g \) is motivated by Zhao (1995) who finds
that real shocks, including real government spending, significantly influence the real exchange rate.¹

The data on the real exchange rates for Saudi Arabia, Mexico, Indonesia, and Venezuela are all available on the Federal Reserve Bank of St. Louis website. The data on the Dubai Fateh oil prices are obtained from the Bloomberg Terminal, and the rest of the data for the four countries come from the International Monetary Fund Database, primarily from the World Economic Outlook databases (WEO), the International Monetary Fund’s Statistics Data (IMF), and International Financial Statistics (IFS). Due to data unavailability, our model does not include productivity differentials. Table 1 provides the descriptive statistics on the variables for Saudi Arabia, Mexico, Indonesia, and Venezuela in columns 1-4, for the period 1995-2014. Theoretically, we expect $\beta_1$ to be negative for oil-exporting countries. This is because an increase in the price of oil would lead to an appreciation in the real exchange rate, as the value of their exports increases relative to the importing countries. Oil prices would also enhance output, and therefore GDP growth in oil-exporting countries, thereby promoting importation and depreciating the currency. The effect of government spending is ambiguous as it could appreciate (depreciate) the currency if focused on non-tradeable (tradeable) goods due to its consequent impact on the fiscal balance and, therefore, the current accounts position. Trade balance, however, should exhibit a positive relationship, as depreciation would drive up the level of exports and the opposite would have a similar effect on imports. Finally, by definition, the real exchange rate would be positively linked to the price level as the increase in the price level would depreciate the currency.

¹ Our model includes most determinants that are found to be significant in the literature, but it excludes some (including productivity differentials) due to the unavailability of the data.
Before proceeding further, we should note that there are several reasons for choosing panel regression analysis as opposed to time-series regression or cross-sectional regression alone. First, real exchange rates are affected by many factors. Some of these variables can be observed, but some cannot be observed or controlled for. Panel data analysis would allow us to fix the effect by varying across countries or across time periods, thereby controlling for the effect of unobservable variables. Second, as noted before, we analyze the effect of oil prices on real exchange rates for countries that have a sizable amount of their exports attributed to oil. We thereby would require that we have multiple countries fitting that description to properly conduct our analysis, and as those countries tend to be emerging market countries, they do not have data long enough for regression to be meaningful. This requires us to aggregate the countries together, which is what panel regression allows us to do. Lastly, time does play an important factor, as we cannot observe these movements at one point in time. Panel data analysis allows us to correct for this limitation of cross-sectional analysis. Third, we should recall that the geographical, cultural, and political distinctions between the countries in the panel were intended to further control for unobserved variables and macroeconomic events.

**Table 1 – Descriptive Statistics**

<table>
<thead>
<tr>
<th></th>
<th>Saudi Arabia</th>
<th>Mexico</th>
<th>Indonesia</th>
<th>Venezuela</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observations</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td><strong>Real Exchange Rates</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>-0.40%</td>
<td>-0.47%</td>
<td>-0.92%</td>
<td>5.87%</td>
</tr>
<tr>
<td>Min</td>
<td>-10.00%</td>
<td>-39.17%</td>
<td>-73.09%</td>
<td>-47.95%</td>
</tr>
<tr>
<td>Max</td>
<td>8.28%</td>
<td>14.52%</td>
<td>38.21%</td>
<td>41.88%</td>
</tr>
<tr>
<td><strong>Real Oil Price</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>6.56%</td>
<td>0.82%</td>
<td>-1.42%</td>
<td>-16.70%</td>
</tr>
<tr>
<td>Min</td>
<td>-102.04%</td>
<td>-93.67%</td>
<td>-104.46%</td>
<td>-114.12%</td>
</tr>
</tbody>
</table>
Max 95.88% 71.55% 66.95% 67.35%

**Real GDP**

Mean 3.11% 3.11% 4.24% 2.26%

Min -3.84% -3.84% -14.07% -9.27%

Max 10.65% 10.65% 7.90% 16.79%

**Real Gov. Spending**

Mean 3.35% 3.03% 4.62% 4.21%

Min -11.39% -16.00% -32.46% -35.45%

Max 24.38% 9.40% 17.48% 105.52%

**Real Trade Balance X/IM**

Mean 0.46 -0.05 0.12 0.32

Min 0.12 -0.25 -0.05 -0.17

Max 0.84 0.09 0.30 0.71

**Price Level (Inflation)**

Mean 77.14% 67.04% 54.44% 47.24%

Min 48.55% 15.44% 10.41% 1.25%

Max 120.23% 110.54% 117.04% 198.06%

*Annual data from 1995 to 2014*

on a regional scale. To ensure the inclusion of this added controlling element, we use panel regression, as time series would limit us to the choice of one country, thereby negating our controlling factor.

Column 1 of Table 2 reports the OLS estimates of Model (1). The coefficient estimate on the oil price variable (β₁) is significant and has the correct sign. However, none of the control variables significantly influence the real exchange rate and the adjusted $R^2 (= 0.12)$ is rather low. To improve the estimation results, we introduce the following two models,

$$ e_{2t} = a_1 D_K + a_2 D_M + a_3 D_I + a_4 D_V + \beta_1 o_{2t} + \beta_2 y_{2t} + \beta_3 g_{2t} + \beta_4 i_{2t} + \beta_5 p_{2t} + u_{2t} \quad \text{Model (2)} $$

$$ e_{3t} = \gamma_1 t_1 + \gamma_2 t_2 + \ldots + \gamma_{20} t_{20} + \beta_1 o_{3t} + \beta_2 y_{3t} + \beta_3 g_{3t} + \beta_4 i_{3t} + \beta_5 p_{3t} + u_{3t} \quad \text{Model (3)} $$
where the dummy variables $D_K$, $D_A$, $D_P$ and $D_R$ in Model (1) are the country dummy variables, and the dummy variables $t_1$, $t_2$, ... , $t_{20}$ in Model (2) are the time or year dummy variables. We refer to Model (2) as the country (or the cross-section) fixed effects model, since it allows for the intercept term to vary across the four countries. Also, we refer to Model (3) as the time fixed effects model, since it allows for the intercept term to vary over time for each country.

Column 2 of Table 2 reports the OLS estimates of Model (2). The coefficient estimate on the oil price variables ($\beta_1$) is again significant and has the correct sign. However, the adjusted $R^2$ (= 0.13) remains low. In fact, the Wald test $p$-value for testing the null hypothesis that $\alpha_1 = \alpha_2 = \alpha_3 = \alpha_4$ is 0.22 (> 0.10), meaning that the intercept term does not vary across the four countries. Column 3 of Table 2 reports the OLS estimates of Model (3). The coefficient estimate on the oil price variable ($\beta_1$) is significant and has the correct sign, and the adjusted $R^2$ (= 0.36) increases significantly. This is not surprising, since the Wald test $p$-value for testing the null hypothesis that $\gamma_1 = \gamma_2 = ... = \gamma_{20}$ is 0.00 (<0.10), meaning that the intercept term does vary over time for each country.

Our results so far indicate that the time fixed effects model (Model 3) is preferable to the country fixed effects model (Model 2). However, Model (3) assumes that the effect of oil prices on the real exchange rate is the same across the countries. To check the validity of this assumption, we re-specify Model (3) as follows,

$$e_{it} = \gamma_1 t_1 + \gamma_2 t_2 + ... + \gamma_{20} t_{20} + \delta_1 D_K o_{it} + \delta_2 D_A o_{it} + \delta_3 D_P o_{it} + \delta_4 D_R o_{it} + \beta_1 y_{it} + \beta_2 s_{it} + \beta_3 t b_{it} + \beta_4 p_{it} + u_{it}$$

Model (4)

where $\delta_1$, $\delta_2$, $\delta_3$, and $\delta_4$ measure, respectively, the effect of real oil prices on the real exchange rate of Saudi Arabia, Mexico, Indonesia, and Venezuela.
Column 2 of Table 2 reports the OLS estimates of Model (2). The Wald test $p$-value for testing the null hypothesis that $\delta_1 = \delta_2 = \delta_3 = \delta_4$ is 0.08 ($<0.10$), meaning that the slope coefficient varies across the four countries. In addition, our results are in line with what the theory suggests for oil-exporting countries and show that real oil price changes do in fact have a significant effect on real exchange rate movements. That is, a 1% increase in oil prices leads to a 0.51% appreciation of the real exchange rate in Indonesia, which is the least dependent on oil exports, and a 0.62% appreciation of the real exchange rate in Saudi Arabia and Mexico. The effect was highest for Venezuela with a 0.75% appreciation in the real exchange rate for every 1% increase in the real oil price. All the control variables have the theoretically correct signs, but government spending and trade balance were not significant, possibly due to not including important variables for which the data are not available.

Our results indicate that oil as a commodity of energy globally has a significantly large effect on trade competitiveness between countries through its effects on real exchange rates. When oil prices increase, an oil importer would import a more expensive commodity from an oil exporter, depreciating the importer’s currency against the exporter’s currency. The primary effect for the oil exporter would be a stronger current account balance from the higher trade import revenues, but there are other secondary effects for the country outside the revenue from oil for the oil exporter. The capital flow into the oil exporter’s economy would increase the price level, while at the same time, the currency’s appreciation in the oil-exporting country
Table 2 – Regression Estimates (Dependent variable: Real Exchange Rate’s rate of change)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Model (1)</th>
<th>Model (2)</th>
<th>Model (3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>-8.28 (-1.57)</td>
<td>-10.45 (4.38)</td>
<td>-27.21 (2.1)</td>
</tr>
<tr>
<td>O</td>
<td>-0.12 (-2.15)</td>
<td>-0.11 (1.90)</td>
<td>-0.69 (7.5)</td>
</tr>
<tr>
<td>D_k *O</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D_m *O</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D_t *O</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D_v *O</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Control Variables
- Y: 1.03 (1.50) 0.99 (1.37) 1.56 (2.7)
- G: 0.00 (-0.02) 0.00 (0.02) 0.29 (2.6)
- TB: 7.27 (1.39) 11.12 (1.24) 6.57 (1.2)
- P: 0.07 (1.14) 0.09 (1.80) 0.30 (4.4)

Country fixed effects: No
Year fixed effects: No

Adjusted R^2: 0.12 0.13 0.36

Wald test p-values
- H_0: a_1 = a_2 = ... = a_4
- H_0: gamma_1 = gamma_2 = ... = gamma_20
- H_0: delta_1 = delta_2 = ... = delta_4

Model 1: e_{it} = beta_0 + beta_1 Y_{it} + beta_2 Y_{it} + beta_3 Y_{it} + beta_4 Y_{it} + u_{it}
Model 2: e_{it} = a_1 D_K + a_2 D_M + a_3 D_T + a_4 D_P + beta_1 Y_{it} + beta_2 Y_{it} + beta_3 Y_{it} + beta_4 Y_{it} + beta_5 Y_{it} + beta_6 Y_{it} + u_{it}
Model 3: e_{it} = gamma_1 Y_{it} + gamma_2 Y_{it} + ... + gamma_20 Y_{it} + beta_1 Y_{it} + beta_2 Y_{it} + beta_3 Y_{it} + beta_4 Y_{it} + beta_5 Y_{it} + beta_6 Y_{it} + u_{it}
Model 4: e_{it} = delta_1 Y_{it} + delta_2 Y_{it} + ... + delta_20 Y_{it} + delta_1 D_K + delta_2 D_M + delta_3 D_T + delta_4 D_P + beta_1 Y_{it} + beta_2 Y_{it} + beta_3 Y_{it} + beta_4 Y_{it} + beta_5 Y_{it} + beta_6 Y_{it} + u_{it}

Countries: Saudi Arabia, Mexico, Indonesia, and Venezuela.

Numbers in bold indicate significance at 10% level – Absolute T-statistic between parenthesis – Regres (Newey-West)

- Model 1: e_{it} = beta_0 + beta_1 Y_{it} + beta_2 Y_{it} + beta_3 Y_{it} + beta_4 Y_{it} + u_{it}
- Model 2: e_{it} = a_1 D_K + a_2 D_M + a_3 D_T + a_4 D_P + beta_1 Y_{it} + beta_2 Y_{it} + beta_3 Y_{it} + beta_4 Y_{it} + beta_5 Y_{it} + beta_6 Y_{it} + u_{it}
- Model 3: e_{it} = gamma_1 Y_{it} + gamma_2 Y_{it} + ... + gamma_20 Y_{it} + beta_1 Y_{it} + beta_2 Y_{it} + beta_3 Y_{it} + beta_4 Y_{it} + beta_5 Y_{it} + beta_6 Y_{it} + u_{it}
- Model 4: e_{it} = delta_1 Y_{it} + delta_2 Y_{it} + ... + delta_20 Y_{it} + delta_1 D_K + delta_2 D_M + delta_3 D_T + delta_4 D_P + beta_1 Y_{it} + beta_2 Y_{it} + beta_3 Y_{it} + beta_4 Y_{it} + beta_5 Y_{it} + beta_6 Y_{it} + u_{it}
would reduce the competitiveness of both the country’s non-oil-exporting industry and import competing industry. Oil is also interconnected with other parts of the determinants of the real exchange rate, as oil is closely related to the oil exporter’s government revenue stream (Saudi Arabia and the UAE’s oil operations are done through government-owned entities for example), meaning that when oil prices increase, government revenues increase, and in turn, the ability for the government to spend, which would theoretically depreciate the currency, as governments usually favor domestic producers. We can never truly disentangle oil’s effect on both the real exchange rate directly through it as a tradeable good, as well as through the determinants of the real exchange rate.

4. Conclusion and Future Direction

According to the literature, oil prices play a major role in determining real exchange rates. An increase in the oil price would lead to the real exchange rate appreciation of an oil-exporting country. We see that the more dependent a country is on oil exports, the higher the degree of real exchange rate changes from a change in oil price. Given oil price volatility from 2014 until 2017 and possibly for some time in the future (due to the uncertainty surrounding the prospects of shale oil), we expect future volatility in the real exchange rate.

Our paper looked at emerging, oil-dependent countries that are more susceptible to exchange rate volatility than advanced economies. The exchange rate volatility risk comes in the form of higher costs of maintaining a fixed exchange rate regime (such as with Saudi Arabia) and prohibitively high prices of imports (such as with Venezuela). Our results are two-fold; they first indicate that emerging countries who are oil-dependent are at risk of higher exchange rate volatility given the uncertainty surrounding oil prices, but our results
also show the means of minimizing the exchange rate volatility risk. We see that the less dependent a country is on oil exports, the less its real exchange rate is affected through oil price shocks. We therefore suggest that the means of minimizing the exchange rate volatility is through reducing the impact of oil prices on the exchange rate using various measures or policies.

For policy recommendation, we recall that real exchange rates are more affected by oil price movements the more dependent a country is on oil exports. Therefore, to mitigate the shocks to the real exchange rate, policies should be enacted to transition oil-exporters towards an economy that is less energy-dependent with a more diverse trade basket composition. This can be in done in conjunction with policies for a more flexible exchange rate, as the literature shows that flexible exchange rates would better absorb the external shocks from oil price changes (Bouoiyour, 2015). The literature also shows that, in conjunction with a flexible exchange rate regime, a central bank with an inflation target can counteract the exchange rate volatility (Beck, 2009). The relationship between oil prices and exchange rates is, of course, variable over time and space (as this paper demonstrates through both literature and results) and policy action should be wary of this fact to avoid poorly conceived policy actions.

Therefore, for future direction and research suggestions, a measure of oil dependence over time should be included to test the degree to which oil price fluctuations would affect the real exchange rate of different oil-exporting countries when oil dependence is either increased or decreased. A possible instrument for oil dependency could be the percentage of oil exports to total exports. Furthermore, as some oil-exporters maintain a fixed exchange rate regime with the US dollar, research should be conducted on
the degree to which oil dependency affects the costs of maintaining a fixed exchange rate for oil exporters.

We conclude that oil price fluctuations cause real exchange rate changes, and the more oil-dependent a country is, the higher the degree of effect stemming from oil price changes to their real exchange rate changes. Unless policies are enacted to reduce the energy dependency of emerging oil exporters, the costs could come in the form of difficulty in fixed exchange rate maintenance and curbed international trade.
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