# *Foreign Aid Flows and Real Exchange Rate: Evidence from Syria*

*By*

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## Abstract

This paper uses time series data from Syria for the period 1965 to 1997 to test the hypothesis that foreign aid flows generate "Dutch disease" in the recipient country. Employing the newly developed technique to cointegration, the Auto Regressive Distributed Lag (ARDL) approach proposed by Pesaran *et al*. (1996) and Pesaran *et al.* (2001), we find no support for this hypothesis neither in the long run nor in the short run. On the contrary, our results indicate that foreign aid flows are associated with depreciation of the real exchange rate. The main policy implication, based on the long run results, is that increasing aid to Syria is an effective policy tool to boost its export competitiveness.



Keywords: Aid flows; Dutch disease; Real exchange rate; Cointegration; Error correction; Syria.

JEL Classification F35 C32

## *1. Introduction*

There have been concerns that foreign aid inflows might lead to the appreciation of the real exchange rate of the recipient country, and thus impact negatively its trade position, a case known in the literature as "The Dutch Disease".

Although, the literature on foreign aid is voluminous much of the attention has been focused around the aid-growth, aid-savings and aid-investment relationships. Studies on the effect of aid on the real exchange rate of the recipient economies are sparse in spite of the crucial role of the real exchange rate in policy discussion and in the economic performance of developing countries. The focal point of the theory on aid inflows and Dutch disease has been the impact exerted by aid on the relative prices of non-tradable goods *(*e.g., *Van Wijnbergen 1985 and 1986*). This theory holds that part of foreign aid will be channelled to the non-tradable sector of the economy causing a possible increase in the demand for non-tradable goods, thereby raising their price. Given that the real exchange rate (REER) is defined as the relative price of tradable goods to that of non-tradable goods (i.e. *REER = price tradable/price of non-tradable*), a rise in the price of the latter would result in a decline (appreciate) in the real exchange rate.

The empirical evidence on the "Dutch disease" effect of foreign aid appears to be rather mixed. Indeed, in a panel study of 62 developing countries, Elbadawi (1999) found that aid inflows caused the real exchange rate to appreciate. This finding is further confirmed by White and Wignaraja (1992) study of Sri Lanka. By contrast, Ogun (1995) for Nigeria, Nyoni (1998) for Tanzania, Sackey (2001) for Ghana and Ouattara and Strobl

(2003) for a panel of CFA countries, found that aid flows were associated with real depreciation.

The research in this study is motivated by the fact that, on one hand, the aid real exchange rate relationship has, relatively, received less attention in the aid literature and, on the other hand, the conflicting empirical results of the few available works.

The empirical study in this paper employs time series data from Syria for the period 1965-1997 and applies the ARDL method to investigate the long-run relationship among aid, government consumption, GDP per capita, openness, terms of trade, growth of money (proxy for expansionary monetary policies), and real exchange rate with special attention to effect of foreign aid. The main finding of this paper is that foreign aid flows are not associated with an appreciation of the real exchange rate. In other words the "Dutch disease" hypothesis of aid is rejected in the context of Syria.

Section 2 outlines briefly key aspects related to Syria. In Section 3, issues related to the model specification and the data are discussed. Section 4 presents the econometric methodology. The results are discussed in Section 5. Finally, Section 6 concludes the paper.

## 2. Syria: some facts

Syrian Arab Republic "SURIYAH" is located in the northern corner of the continent of Asia on the eastern coast of the Mediterranean Sea. Since a long time ago following its independence, Syria has adopted the central planning system that followed a wide nationalisation process in the 1950s and 1960s. The Syrian economy is divided into

three main sectors namely (public, private and joint venture) with an explicit dominance of the first one over the national economy. However, since the mid 1980s continuous attempts have been made to encourage the other two sectors to play more active role in the economy. The most important attempt has been The Investment Act number 10 that was passed in 1991. The key economic indicators for Syria show an increase in the GDP from 6800 million Syrian Pound to 569.262 million S.P. in 1970 and 1995 respectively (Syrian Statistical Abstract 1997). The main industries are petroleum, food processing, textile, cement, tobacco, beverage, phosphate rock mining and electrical power. The main agricultural products are wheat, barley, cotton, olives and citrus fruits. Total external debt has increased from 3.552 million US$ in 1980 to 21.420 million US $ in 1996 equal to 106% and 321% of goods and services export and 27% and 130% of GNP in 1980 and 1996 respectively. Syrian population has grown rapidly from 6.305 million inhabitants to 13.782 million inhabitants in 1970 and 1994 respectively (Syrian Statistical Abstract 1997) with annual population growth rate of about 3.1%. Life expectancy rate at birth increased from 53 year in 1970 to 68 year in 1994 (World Bank 91). Total fertility rate decreased from 7.5 in 1978 to 4.22 in 1993 (Syrian Statistical Abstract 97).

In terms of aid flows to Syria Figure (1) in Appendix shows that they were relatively low until 1972 (around 8 millions of USD, in real term). In 1973, year of the first oil shock, Syria received 46 millions in aid and by 1975 this amount rose to almost 75 millions before skyrocketing to 127 millions in 1979 at the time of the second oil shock. Thereafter, aid flows to Syria started to drop gradually falling as low as 1.66 millions in real term) in 1997, perhaps due to the sanctions imposed on the country by the US. With regard to the real exchange rate three phases can be observed from Figure (1). The first phase, which covers the period of 1965-1987, shows that the real exchange rate has

appreciated over that period dropping from 272 percentage points in 1965 to 79.32 percentage points in 1987. In the second phase (1987-1988) period the Syrian currency witnessed a real depreciation (176.1 percentage point in 1988). Finally in the third phase the real exchange rate started to appreciate again falling to 95.5 percentage points in 1997.

## 3. Model Specification and Data Issue

The model used in this paper is based on the framework developed by Edwards (1989). The baseline regression equation is assumed to take the following functional form:

$$REER_t = \alpha_0 + \alpha_1 Aid_t + \alpha_2 G_t + \alpha_3 GDP_t + \alpha_4 Open_t + \alpha_5 TOT_t + \alpha_6 GM2 + \varepsilon_t \quad (1)$$

where $REER$ is the real effective exchange rate, $Aid$ is official development assistant (ODA), $G$ is real government consumption, $GDP$ is real per capita income, $Open$ is openness, TOT is terms of trade, GM2 is the growth of money, which captures expansionary monetary policies, $\varepsilon$ is the error term, and $t$ as time subscript.

The study employs annual data from Syria over the period of 1965-1998. The following is the list and discussion of the variables. The real effective exchange rate (REER), base year 1995, calculated according the following formula $REER = 100 \times (\frac{NER \times CPI_{US}}{CPI_{Syria}})$, where NER is the nominal exchange rate (expressed as the number of Syrian currencies per unit of foreign currency) and, $CPI_{Syria}$ and $CPI_{USA}$ are consumer price indices for

Syria and the United States respectively. With this definition, an increase in REER reflects a depreciation of the Syrian currency. All relevant data are obtained from the World Development Indicators (2002).

Aid: Net foreign aid namely official development assistant ODA obtained from the OECD-DAC online statistics.

G: government consumption obtained from the World Development Indicators (2002).

GDP: GDP per capita obtained from the World Development Indicators (2002).

Open: openness of the economy (1995 = 100), calculated as 100*(imports + exports)/GDP. Imports and exports data come from the World Development Indicators (2002).

The time series for Aid, GDP and G were deflated by GDP deflator (1995=100), obtained from the World Development Indicators (2002), to obtain their real values.

TOT: terms of trade has been constructed by dividing export unit value by import unit value, both obtained from the IMF international financial statistics (online version 2003).

Summary statistic of the above variables is given in Table (1), in Appendix.

The expected theoretical impacts of the respective variables included in our model are as follows:

- Aid (-) Tends to cause real appreciation by changing the composition of the demand for traded and non-traded goods, according to the "Dutch disease" theory of foreign aid.
- GDP (-) The expected effect of this variable on REER is to be negative. According to the Balassa-Samulson hypothesis as

development takes place the productivity improvement in the tradable goods sector exceeds that of non-tradable goods sector. This implies that the decrease in the price of the former is relatively bigger than that in the later, thus, causes appreciation of the REER.

- G (?) The effect depends on the composition of government consumption. Consumption of non-tradable tends to appreciate the REER, while that of tradables leads to real depreciation.
- OPEN (?) Openness of the economy would cause real depreciation (appreciation) if it reduces (increases) the demand for non tradables.
- TOT (?) The effect of the terms of trade on the real exchange rate depends on whether the substitution or the income effect dominates. If the income (substitution) effect dominates then a deterioration of the TOT tends to cause real depreciation (appreciation).
- GM2 (-) Changes in the money supply (expansionary monetary policies) would tend to raise the general price level ($CPI_{Syria}$) and thus leading to an appreciation of the REER.

## *4. Estimation Techniques*

To estimate Equation (1), we employ the ARDL approach to cointegration proposed by Pesaran *et al*. (1996) and Pesaran *et al*. (2001). The unrestricted error correction representation of the ARDL model for Equation (1) is given by:

$$\begin{aligned}\Delta REER_t = {} & \varphi_0 + \sum_{i=1}^{2}\beta_i \Delta Aid_{t-i} + \sum_{i=1}^{2}\delta_i \Delta G_{t-i} + \sum_{i=1}^{2}\gamma_i \Delta GDP_{t-i} + \sum_{i=1}^{2}\mu_i \Delta Open_{t-i} \\ & + \sum_{i=1}^{2}\theta_i TOT_{t-i} + \sum_{i=1}^{2}\omega_i GM2_{t-i} + \varphi_1 REER_{t-1} + \varphi_2 Aid_{t-1} + \varphi_3 G_{t-1} + \varphi_4 GDP_{t-1} \\ & + \varphi_5 Open_{t-1} + \varphi_6 TOT_{t-1} + \varphi_7 GM2_{t-1} + \nu_t \end{aligned} \qquad (2)$$

The null hypothesis of no cointegration ($H0: \varphi_1 = \varphi_2 = \varphi_3 = \varphi_4 = \varphi_5 = \varphi_6 = \varphi_7 = 0$) is tested against the alternative by means of the F-test. This test statistic has a non-standard distribution irrespective of whether the variables are I(0) or I(1). Pesaran *et al*. (1996) provide two sets of asymptotic critical values. One set assumes that all variables are I(0) and the other assumes they are I(1). If the computed F-statistic exceeds the upper bound of the critical value band, the null hypothesis of no long run relationship (or no cointegration) can be rejected. If it is below the lower bound, then the null hypothesis cannot be rejected. If the computed statistics falls within the critical value band, the result of the inference is inconclusive. After confirming the existence of cointegration among the variables, the second stage of the analysis is to estimate the coefficients of the long run relation of the savings equation and the associated error correction models, and make inferences about their values.

This approach assumes that one set of variables are I(0) and the other are I(1). However, as noted by Ouattara (2004), if the order of integration of a variable is greater than one

then the underlying assumptions of the ARDL is violated. Put in different words, testing the order of integration of the variables included in the model is important to ensure that we satisfy these underlying assumptions. For this reason, in this paper, we begin by checking for the order of integration of the variables, prior to proceeding to the ARDL estimation itself.

*Unit Root Test*

Unit root tests are carried using the Dickey-Fuller (DF) and the Augmented Dickey-Fuller (ADF) (Dickey and Fuller, 1979,1981) stationarity tests, which are widely used in the literature. This test involves estimating the following equation:

$$y_t = a + (1-\phi)\delta t + \phi y_{t-1} + \sum_{i=1}^{k} \gamma_i y_{t-i} + \varepsilon_t$$

$$\Delta y_t = a + \rho\delta t + \rho y_{t-1} + \sum_{i=1}^{k} \gamma_i y_{t-i} + \varepsilon_t \qquad \text{where t = 1, 2, ……..., n} \qquad (3)$$

where the null hypothesis is $H_0 : \rho = 1 - \phi = 0$ (the unit root), *k* is the number of lags of the dependant variable and *n* is the number of observations. The results of the unit root test are contained in Table (1).

The unit root results presented in Table (1) show that the order of integration of the variables in our model less or equal to one implying that the underlying assumption for applying the ARDL methodology is satisfied. Thus, we can proceed ahead to check for the existence of the long run relationship.

**Table (1) ADF Unit Root Tests**

| Variable | Level | | First Difference | | Conclusion |
|---|---|---|---|---|---|
| | Constant | Constant and trend | Constant | Constant and trend | |
| REER | -0.620 | -3.565* | -5.379** | -5.399** | I(1) |
| Aid | -1.529 | -1.630 | -5.877** | -5.938** | I(1) |
| G | -1.312 | -1.593 | -3.717** | -3.937* | I(1) |
| GDP | -1.334 | -1.927 | -3.859** | -3.815* | I(1) |
| Open | -1.554 | -1.985 | -6.983** | -6.853** | I(1) |
| TOT | -1.453 | -2.454 | -5.843** | -7.157** | I(1) |
| GM2 | -7.615** | -8.066** | | | I(0) |

Notes: ** and * indicate stationarity at the 1 and 5 percent level, respectively.

## *5. Estimation Results*

The computed F-statistics of the joint null hypothesis that there is no long-run relationship among the variables is 4.091 which is greater than the higher bound of the 95 per cent critical value interval[1] (2.476-3.646). This implies a rejection of the null of no long-run relationship**.** The model passes the standard diagnostic tests (serial correlation, normality and heteroscedasticity). The estimates of the long-run coefficients, based on the Schwartz Bayesian Criteria, are summarised in Table (2).

[1] The critical value intervals are computed by Pesaran *et. al.* (1996) where they are reported in Table (F).

**Table (2) Long Run Estimates of the Real Effective Exchange Rate**

| Schwartz Bayesian Criterion ARDL (0, 0, 2, 0, 0, 0, 0) | |
|---|---|
| Regressors | Coefficients |
| Aid | 0.404* |
| GDP | -0.006*** |
| G | 0.024 |
| Open | -1.625*** |
| TOT | 0.104 |
| GM2 | 6.293 |
| Constant | 344.847*** |

Note: ***,* significance at 1 and 10 percent, respectively.

Contrary to the prediction of the "Dutch disease" theory of foreign aid, the estimated coefficient for the aid variable is positive (0.404) and significant at the 10 percent level. This result implies that foreign aid inflows lead to real depreciation in the context of Syria, which corroborates findings by Ogun (1995) for Nigeria, Nyoni (1998) for Tanzania, Sackey (2001) for Ghana, and Ouattara and Strobl (2003) for a panel of CFA franc countries. Put differently, the potential "Dutch disease" effect associated with foreign aid flows is not supported by the empirical evidence, in some cases. The impact of per capita GDP is negative (-0.006) and statistically significant, thus implying that higher income levels tend to appreciate the exchange rate as predicted by the Balassa-Samuelson hypothesis, Balassa (1973). Increases in Government consumption tend to affect positively the real exchange rate. However, the estimated coefficient for this variable is statistically insignificant. This could mean that the Syrian Government spend

equally on tradable and non-tradable goods. The coefficient of openness is negative and highly significant (-1.625). This result suggests that openness leads to an appreciation of the real exchange rate in the context of Syria. This might have resulted from the lifting of tariffs and other trade barriers by the Syrian government and its trade partners to encourage trade with each other, which would tend to decrease the price of tradable goods, thus, leading to the appreciation of the real effective exchange rate. The terms of trade variable affects positively (0.104) the real effective exchange rate, however, the estimated coefficient is not significant. In other words, the income effect and the substitution effect associated with changes in the terms of trade appear to cancel each other. Finally, expansionary monetary policies do not appear to have a significant effect on the real exchange rate of Syria.

The final stage in the ARDL approach is to estimate the error correction model associated with the long run estimates reported in Table (2). The results are reported in Table (3). The error correction coefficient (-1.000) is statistically highly significant, has the correct sign, and its magnitude suggests a high speed of adjustment. The fact that the coefficient of the error correction term is highly significant, further confirms our finding of the existence of a long run relationship among the variables in our model. The $R^2$ (0.58) suggests that the error correction models fit the data reasonably well. Furthermore, the F-statistic for the null hypothesis that "all regressors have zero coefficient" is rejected. It is also important to point out that the underlying error correction model passes the standard diagnostic tests.

The short run results show that aid flows do not generate "Dutch disease" effect. Government consumption and GDP appear to be associated with a depreciation and appreciation of the real exchange rate of Syria respectively. Terms of trade and

expansionary monetary policies do not seem to be significantly influential on the real exchange rate.

**Table (3) Error Correction Model for the REER**

| Regressors | Coefficients |
|---|---|
| DAid | 0.404* |
| DGDP | -0.006*** |
| DG | 0.655*** |
| DG (-1) | 0.756*** |
| DOpen | -1.625*** |
| DTOT | 0.104 |
| DGM2 | 6.293 |
| Constant | 344.847*** |
| ECM (-1) | -1.000*** |

Note: *** and * represent significance at the 1 and 10 percent level, respectively.

To check the robustness of our results we carried out stability tests on the parameters of the long run results. For this purpose the plot of the cumulative sum (CUSUM) and the cumulative sum of square (CUSUMSQ) are shown in Figures (2) and (3) in appendix. The plots show that none of the straight lines (drawn at the 5 percent level) is crossed, thus indicating no evidence of any significant structural instability.

## *6. Concluding Remarks*

This paper aimed to examine whether or not foreign aid inflows generate "Dutch disease" effects in Syria for the period of 1965-1997. Statistically, based on the ARDL approach, foreign aid inflows lead to real depreciation rather than appreciation, both in the short and long run. Consequently, the hypothesis that aid inflows lead to "Dutch disease" is rejected in the context of Syria. With regard to the other variables, the results show that per capita GDP and openness lead to real appreciation in the long run as well as the short run. Government consumption seems to lead to real appreciation in the short run but in the long run its impact is insignificant. Finally, terms of trade and monetary expansion do not appear to have any significant effect on the real exchange rate of Syria.

The main policy recommendation to be drawn from this study is that because aid flows are associated with the depreciation of the real exchange rate the Syrian Government can continue to receive aid without fear of harming its export competitiveness. Aid can be used to finance supply sides improvements which would sustain higher exports volumes (and quality).

A limitation of this paper, however, is that it does not address the issue of heterogeneity of aid flows. Recent literature on aid effectiveness has tried to distinguish the effects of different types of aid, for example it has been argued that if project aid is accompanied by an equivalent value of imports then it will not have "Dutch disease" effects. This issue could be a topic for further research subject to data availability.

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## Appendix

### Table (1) Summary Statistics

| *Variable* | *Mean* | *Std. Dev.* | *Min* | *Max* |
|---|---|---|---|---|
| Real Effective Exchange Rate | 28.93 | 37.12 | 4.01 | 105.17 |
| Aid | 4.79 | 4.45 | -0.11 | 17.91 |
| Real GDP per Capita | 3651.76 | 946.64 | 1803 | 4772 |
| Government Consumption | 17.73 | 3.71 | 11.40 | 24.49 |
| Openness | 150.87 | 45.36 | 79.70 | 230.47 |
| Terms of Trade | 157.34 | 46.38 | 79.70 | 241.12 |
| Growth of Money | 19.47 | 8.58 | 7.97 | 45.79 |

**Figure 1 Trend in REER** *(base 1995)* **and Real Aid flows to Syria 1965-1997**

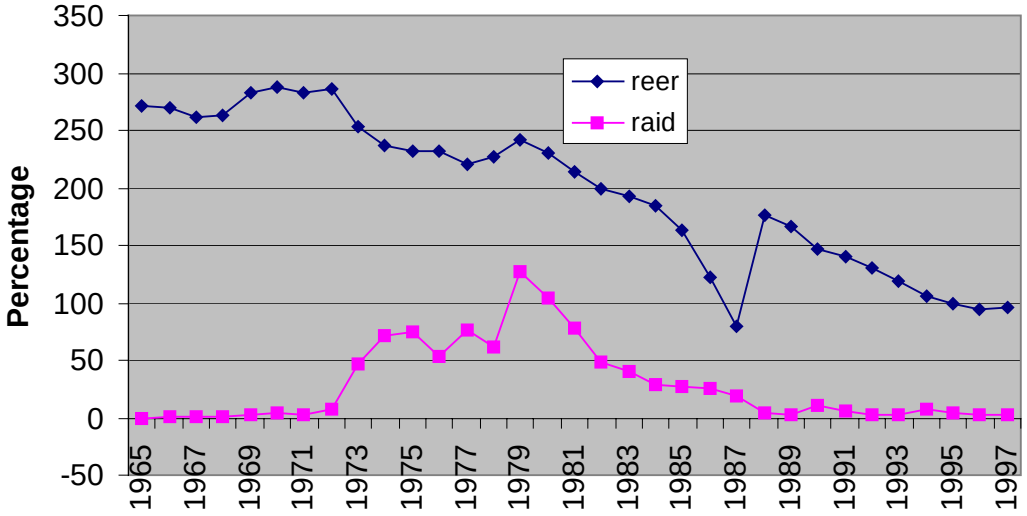



**Figure (2)**

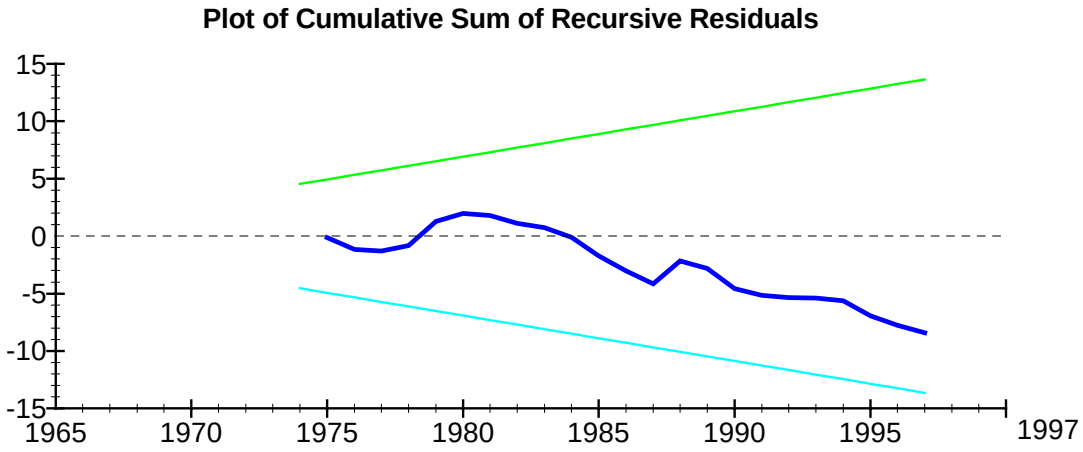
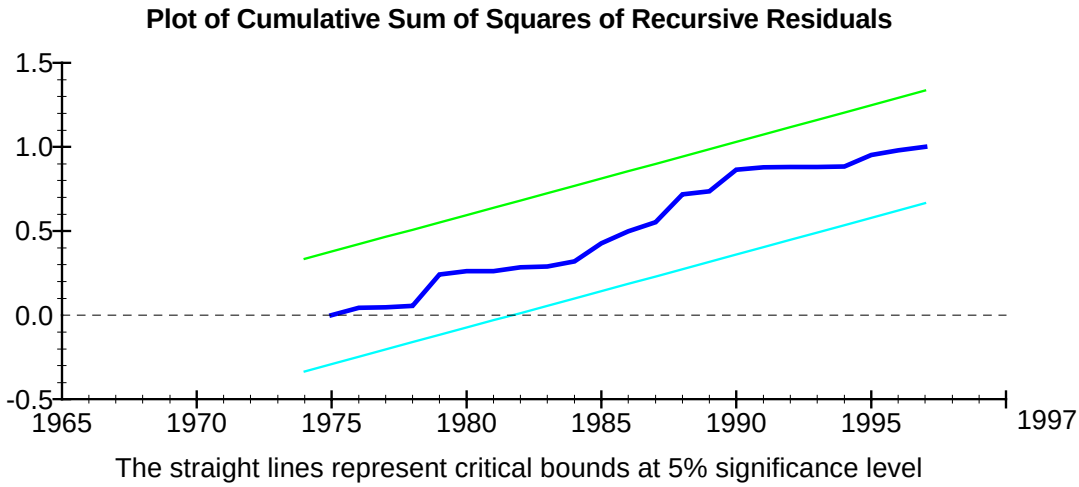


**Figure (3)**


Plot of Cumulative Sum of Squares of Recursive Residuals
1.5
1.0
0.5
0.0
-0.5
1965
1970
1975
1980
1985
1990
1995
1997
The straight lines represent critical bounds at 5% significance level