

Relationship between Inflation and Foreign Trade

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Abstract The substantial increase in global economic integration during recent decades initiated a heated debate on the impact of foreign trade on inflation. As understanding this impact is of crucial importance for the optimal design and conduct of monetary policy, the topic has attracted significant interest not only among academics but also policy makers. One of the key determinants of the sensitivity of inflation is foreign trade changes. This paper therefore helps explain the fact that empirical studies fail to find a robust relationship between foreign trade and the inflation. Foreign Trade affects the sensitivity of inflation to both the marginal cost and the relative international prices. Relationship between inflation and foreign trade in Egypt is a mutual relationship. Because each one affects the other, and Egypt has a high inflation rates and regarding to foreign trade statistics shows that imports are higher than exports.

I. INTRODUCTION

Since the seminal paper by Romer (1993), the question of the impact of trade openness on inflation and the inflation – output trade-off has received much attention in macroeconomic literature. The results of this research are far from conclusive. Empirical and theoretical studies identified a number of factors which affect the relationship between trade openness and the sensitivity of inflation to output fluctuations. They include goods- and labour-market structures (Bowdler and Nunziata, 2010; Daniels and VanHoose, 2006), political regime (Caporale and Caporale, 2008), exchange rate regime (Bowdler, 2009), trade costs (Cavelaars, 2009), capital mobility (Daniels and VanHoose, 2009), the importance of imported commodities in production (Pickering and Valle, 2012) and exchange rate pass-through (Daniels and Van Hoose, 2013),

For more than 50 years, several studies have estimated the relationship between inflation and trade openness. Some of them found negative relationship and some of them positive. Triffin and Grubel (1962) tested the hypothesis that both the degree of openness and the degree of economic integration affected the balance of payments deficits and inflationary pressures, confirmed that high degree of economic integration with more open economies tended to experience lower inflation in 5 advanced European Economic Community countries. Iyoha (1973)'s study is one of the very first studies on the relationship between inflation and openness in less developed countries. He estimated ordinary least-squares regression method of 33 less developed countries and analyzed the relationship for both yearly and 5-year averaged data from 1960-61 through 1964-65 and resulted a negative relationship between inflation and the degree of openness measured by the import-income ratio. According to Iyoha, "if rapid inflation in fact discourages domestic capital accumulation and if increased capital accumulation is needed for development, it will turn out that an outward-looking trade policy resulting in more openness is optimal" Romer (1993) used a Barro-Gordon type of model for a cross-section of 114 countries and tested a prediction of models in which the absence of pre-commitment in monetary policy leads to inefficiently high inflation. According to Romer (1993), "the larger and hence less open, an economy is, the greater is the incentive to expand, and so the higher is the equilibrium rate of inflation. Thus, models of inefficiently high inflation arising from the absence of pre-commitment predict an inverse relationship between openness and inflation". Lane (1997) examined the time-consistent inflation rate to the degree of trade openness of an economy. Lane (1997) expanded the Romer (1993)'s explanations on the negative relationship between openness and inflation rate. He used the 15-year (over 1973-1988) average of annual data and undertakes only a cross section analysis of 114 countries using OLS. In his paper, he found the openness effect is strengthened when country size is included as a control variable, which suggests that openness is not just working through a terms of trade effect. The strength of the empirical evidence suggests trade openness should be taken seriously as a determinant of average inflation over the long-run.

Sachida et al (2003) used a data of 152 countries for the 1950-1992 period by applying panel data and found that the higher the gains, in terms of product, in generating an inflationary "surprise", the greater the incentives will be for the government to effect such a "surprise". The authors verified Romer (1993)'s study with an extension; they also proved that the negative relationship between openness and inflation is not specific to a group of countries, nor is it specific to a certain time period. Thus, countries in which there was an increase in trade openness, also observed a reduction in their rates of inflation. Ashra (2002)'s study is based on a panel data model for 15 developing countries which are from Latin America, South Asia and East Asia for 3 year periods; 1980-97, 1980-89 and 1990-97. He analyzed with different groupings to investigate the potential difference. He used exports plus imports as a percentage of GDP as a measure of openness for all the countries in the panel. He found exports and imports of goods and services had a significant influence on the inflation rate. The exports were observed be positively associated with inflation rate whereas imports were observed to 1980s, the openness–inflation relationship is more significant among less indebted countries. More open economies also tend to have less variable inflation, though only in the 1990s. According to IMF(2006)'s World Economic Outlook that entitle as "Globalization and Inflation, measures of trade and financial integration are highly correlated. In this report, IMF stated that more open economies tend to experience lower inflation rates. have a negative impact. Gruben and McLeod (2004) used dynamic panel estimations of five-year averages for inflation and import shares over the period 1971-2000. They argued

Romer (1993) and Terra (1998)'s hypothesis and resulted a negative openness-inflation correlation strengthened in the 1990s across all country groups. And contrary to Terra's (1998) hypothesis, except during Bowdler and Nunziata (2006) extended Boschen and Weise (2003)'s study and found that increased openness reduces the probability of an inflation start, both directly, and indirectly through restricting the role of general elections in triggering inflation starts. Mukhtar (2010 and 2012) examined Romer (1993)'s hypothesis for Pakistan. He applied multivariate co-integration and VECM techniques for the period of 1960 to 2007. His findings showed that there is a significant negative long run relationship between inflation and trade openness. Batra (2001) argues that protectionism is not inflationary, at least in the US. Alfaro (2005) found that openness does not play a role in restricting inflation in the short run but fixed exchange rate regime does with a panel data set of developed and developing countries between 1973 and 1998. Kim and Beladi (2005) estimated the relation between trade openness and price level for 62 countries and analyzed a negative relation for developing countries but a positive relation for advanced economies such as the U.S., Belgium, and Ireland. Evans (2007) found a positive relationship between openness and inflation rate: higher degree of openness in a country is associated with a higher equilibrium inflation rate. He also examined how the level of imperfect competition, both within a country and between countries, affects the relationship between openness and inflation. Zakaria (2010) examined the relationship between trade openness and inflation in Pakistan using annual time-series data for the period 1947 to 2007 and found a positive relation.

Feleke (2014) examined his study for Ethiopia using annual time series data over the period 1970/1971- 2010/2011 by applying auto regressive distributed lag(ARDL) model for inflation and indicated that the role of trade openness on reducing inflation is insignificant both in the long run and short run, in the contrary to Romer (1993) hypothesis play a role in restricting inflation in the short run but fixed exchange –rate regime does with a panel data set of developed and developing countries between 1973 and 1998.

II. INFLATION and FOREIGN TRADE in EGYPT

2.1. Inflation in EGYPT

Consumer prices in Egypt jumped 10.3 percent year-on-year in April 2016, following a 9 percent rise in the previous month. The inflation rate accelerated for the first time since November last year, reaching the highest in four months, after the central bank devalued the currency by nearly 13 percent in March. Policymakers also hiked the interest rate by 150 bps in order to diminish anticipated inflationary pressure. Core inflation rate also accelerated to 9.5 percent from 8.4 percent. Inflation Rate in Egypt averaged 8.96 percent from 1958 until 2016, reaching an all time high of 35.10 percent in June of 1986 and a record low of -4.20 percent in August of 1962. Inflation Rate in Egypt is reported by the Central Bank of Egypt.

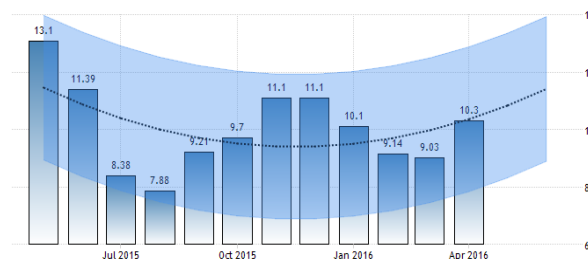


Figure 1 EGYPT inflation rate

In Egypt, the headline Consumer Price Index (CPI) measures the change in the cost of a fixed basket of goods and services that are purchased by a representative sample of households from urban areas, which include Cairo, Alexandria, urban Lower Egypt, urban Upper Egypt, Canal cities and Frontier governorates. The most important categories in the headline CPI are Food and Beverages (40 percent of total weight); Housing, Water, Electricity, Gas and other Fuels (18.4 percent); Medical Care (6.3 percent) and Transportation (5.7 percent). Clothing and Footwear account for 5.4 percent of total index and Education for 4.6 percent. Hotels, Cafes and Restaurants represent 4.4 percent of total weight and Furnishings, Household Equipment and Routine Maintenance of the Dwelling for 3.8 percent. Miscellaneous Goods and Services account for 3.7 percent, Communications 3.1 percent, Recreation and Culture 2.4 percent and Tobacco and Related Products 2.2 percent. This page provides - Egypt Inflation Rate - actual values, historical data, forecast, chart, statistics, economic calendar and news. Egypt Inflation Rate - actual data, historical chart and calendar of releases - was last updated on May of 2016.

Inflation rates in Egypt are shaped by a mix of external and internal factors. Global food and energy prices are the most important imported inflation drivers. Internal factors, on the other hand, include the pace of economic growth, changes in nominal incomes, growth of the money supply, changes in foreign exchange and interest rates as well as the efficiency of internal trade markets.

Egypt has 'stagflation' situation."

The rise in the cost of production on one hand, and structural changes in the Egyptian economy on the other hand, represents necessary and sufficient conditions

The occurrence of stagflation in the Egyptian economy due to lower levels of economic growth, Egypt has high unemployment rates and low global food prices. Despite this decline, Egypt's average inflation remained higher than most of its trading partners and peer countries.



Figure 2 Stagflation scenario

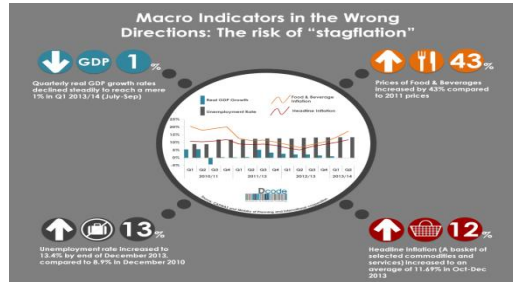


Figure 3 Macro indicators in wrong directions
(The risk of stagflation)

2.2. Egypt GDP Growth Rate

The Gross Domestic Product (GDP) in Egypt expanded 4.50 percent in the second quarter of 2015 over the same quarter of the previous year. GDP Growth Rate in Egypt averaged 3.81 percent from 1992 until 2015, reaching an all time high of 7.30 percent in the first quarter of 2008 and a record low of -4.30 percent in the first quarter of 2011. GDP Growth Rate in Egypt is reported by the Central Bank of Egypt.

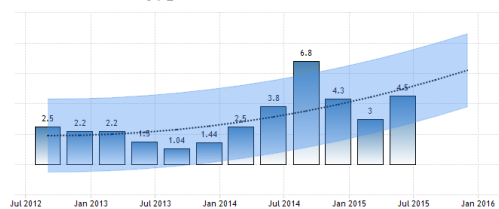


Figure 4 EGYPT GDP annual growth rate

Egypt has one of the most developed and diversified economies in the Middle East. Until 2010, Egyptian economy was growing an average 5 percent a quarter as a result of several economic reforms attracting foreign investments. During that time, the economy and the living standards for majority of population improved. Yet, living conditions for the average Egyptian still remained poor and large income disparities continued to grow, leading to the public discontent. The 2011 revolution, which brought down President Hosni Mubarak regime, have caused economic slowdown as political and institutional uncertainty and rising insecurity continue to hurt tourism, manufacturing, and construction. This page provides - Egypt GDP Growth Rate - actual values, historical data, forecast, chart, statistics, economic calendar and news. Egypt GDP Growth Rate - actual data, historical chart and calendar of releases - was last updated on May of 2016.

2.3. Foreign trade in Egypt

Egypt’s trade profile is characterized by huge trade deficits. The economy is highly dependent on oil exports, which is its major source of foreign income together with tourism receipts and US financial and military aid. It has to import most of its food, other commodities and equipment, since both its agricultural and industrial sectors are not well-developed.

Since the 1990s, the government has pioneered several economic reforms through foreign donor aid. However, measurable benefits of these economic reforms are yet to be seen.

2.4. Egypt Balance of Trade

Egypt recorded a trade deficit of 2866 USD Million in May of 2016. Balance of Trade in Egypt averaged -717.91 USD Million from 1957 until 2016, reaching an all time high of 235.50 USD Million in January of 2004 and a record low of -5056.10 USD Million in August of 2014. Balance of Trade in Egypt is reported by the Central Agency for Public Mobilization and Statistics.

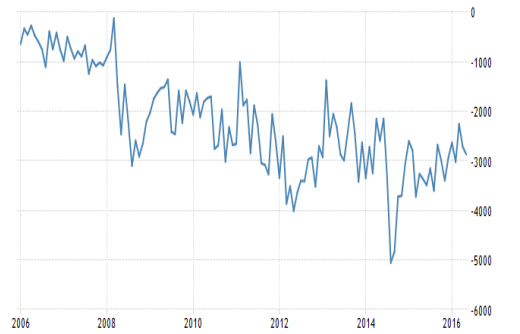


Figure 5 Egypt Balance of Trade

Egypt has been recording trade deficits since 2004, as imports have grown at a faster rate than exports, mostly due to a rise in petroleum and wheat imports. The major exports are oil and other mineral products, chemicals, agricultural products, livestock and textiles. Egypt imports mineral and chemical products, agricultural products, livestock and foodstuff, machinery and electrical equipment and base metals. Main trading partners are the European countries (38 percent of total exports and 31 percent of total imports) and the Arab countries (28 percent of exports and 13.5 percent of imports). Others include: United States, China and India. This page provides - Egypt Balance of Trade - actual values, historical data, forecast, chart, statistics, economic calendar and news. Egypt Balance of Trade - actual data, historical chart and calendar of releases - was last updated on August of 2016.

2.5. Egypt Exports

Exports in Egypt increased to 2078 USD Million in May from 1889 USD Million in April of 2016. Exports in Egypt averaged 536.02 USD Million from 1957 until 2016, reaching an all time high of 2991.20 USD Million in June of 2008 and a record low of 12.63 USD Million in July of 1959. Exports in Egypt are reported by the Central Agency for Public Mobilization and Statistics.

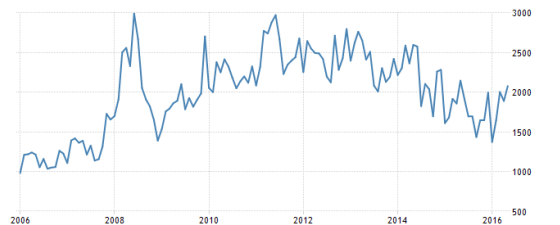


Figure 6 EGYPT EXPORTS

In Egypt, exports account for about a quarter of GDP. The major exports are oil and other mineral products (32 percent of total exports), chemical products (12 percent), agricultural products, livestock and others fats (11 percent) and textiles (10.5 percent, mainly cotton). Other exports include: base metals (5.5 percent), machinery and electrical appliances (4.5 percent) and foodstuff, beverages and tobacco (4 percent). Major export partners are Italy, Spain, France, Saudi Arabia, India and Turkey. Others include: United States, Brazil and Argentina. This page provides - Egypt Exports - actual values, historical data, forecast, chart, statistics, economic calendar and news. Egypt Exports - actual data, historical chart and calendar of releases - was last updated on August of 2016.

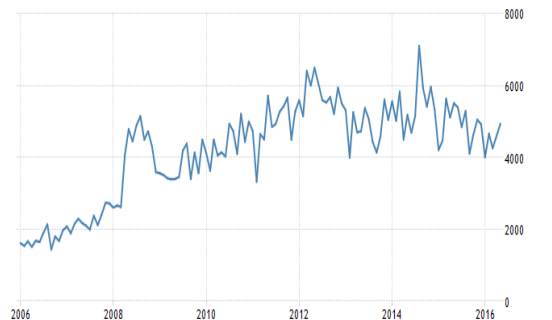


Figure 7 EGYPT IMPORTS

2.6. Egypt imports

Imports in Egypt increased to 4944 USD Million in May from 4606 USD Million in April of 2016. Imports in Egypt averaged 1251.06 USD Million from 1957 until 2016, reaching an all time high of 7111 USD Million in August of 2014 and

a record low of 33.05 USD Million in July of 1957. Imports in Egypt is reported by the Central Agency for Public Mobilization and Statistics

Egypt imports mainly mineral and chemical products (25 percent of total imports), agricultural products, livestock and foodstuff (24 percent, mainly wheat, maize and meat), machinery and electrical equipment (15 percent) and base metals (13 percent). Other imports include raw hides, wood, paper-making products, textiles and footwear (9.5 percent), artificial resins and rubber (6 percent) and vehicles and aircraft (5.5 percent).

Main import partners are Germany, Italy, China, Turkey, Saudi Arabia, Kuwait and Lebanon, United States and India. This page provides - Egypt Imports - actual values, historical data, forecast, chart, statistics, economic calendar and news. Egypt Imports - actual data, historical chart and calendar of releases - was last updated on August of 2016.

2.7 Foreign Trade commodity Structure in Egypt:

According to the latest studies the top 5 Products exported by Egypt are Crude Petroleum (18%), Petroleum Gas (10%), Refined Petroleum (8.6%), Gold (4.5%), and Nitrogenous Fertilizers (3.4%).

And the top 5 Products imported by Egypt are refined Petroleum (9.5%), Wheat (7.5%), Crude Petroleum (3.3%), Semi-Finished Iron (3.2%), and Petroleum Gas (2.9%).

The top 5 Export destinations of Egypt are Italy (8.0%), United States (7.9%), India (6.4%), Germany (4.7%), and Saudi Arabia (4.6%). Also the top 5 Import origins of Egypt are China (10%), United States (6.7%), Russia (6.6%), Ukraine (6.4%), and Turkey (5.1%).

III. Empirical analysis of relationship between Inflation and Foreign Trade

This paper employed a VAR model with two variables. it used the monthly inflation rate to measure the inflation in Egypt expressed in inflation variable and use total volume of foreign trade to represent trade in Egypt, expressed in Trade variable. All data comes from the website: www.TRADINGECONOMICS.com. The data ranged from January 2010 to December 2016. And this paper use monthly data. The sample has a capacity of 84; conform to the requirements of the empirical test.

3.1 Descriptive statistics and Stationarity Test

The Inflation and Trade are both time series variable, we need to test time series stationarity. Test results are shown in Table 1.

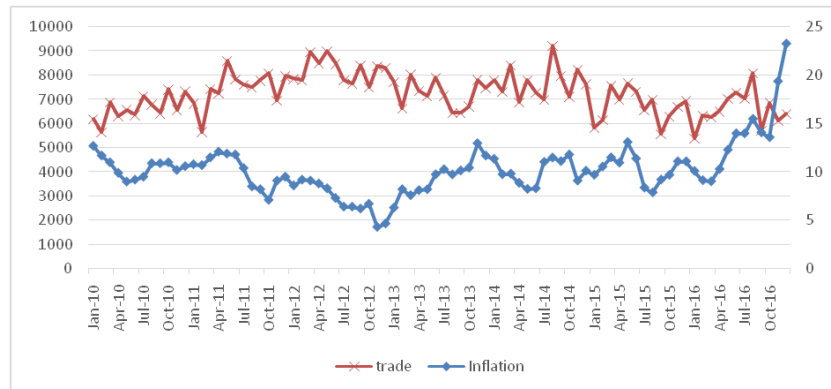


Figure 8 Descriptive statistics

Table 1 Unit Root Test Results

Variable	The original series threshold (1%)	The original series P	The first-order difference series threshold (1%)	The first-order difference series p
Inflation	-3.511262	0.9746	-3.512290	0.0000
Trade	-3.512290	0.0167	-3.513344	0.0000

Table 2 Granger Causality Test Result

Lag Period	Null Hypothesis	Observed Number	F-Statistic	Probability
2	DINFLATION does not Granger Cause DTRADE	81	2.47811	0.0907
	DTRADE does not Granger Cause DINFLATION		0.43778	0.6471

From the above test results, level test to the sequence Inflation and Trade showed the p value is greater than threshold under the 1% confidence level, and it can't refuse no unit root hypothesis. So Inflation and Trade are non-stationary series. Next, get the stationarity test on new sequence which is first order difference, and the p values are close to zero, under the confidence level of 1%, it rejects the null hypothesis.

3.1 VAR Model

This section will have first-order difference sequence and used DInflation and DTrade to replace the original sequence Inflation and Trade, the VAR model is established with the adjusted sequence. The model algebraic expression is following:

$$\begin{aligned} \text{DINFLATION} = & C(1,1)*\text{DINFLATION}(-1) \\ & +C(1,2)*\text{DINFLATION}(-2) \\ & +C(1,3)*\text{DTRADE}(-1) \\ & +C(1,4)*\text{DTRADE}(-2) + C(1,5) \end{aligned}$$

$$\begin{aligned} \text{DTRADE} = & C(2,1)*\text{DINFLATION}(-1) \\ & +C(2,2)*\text{DINFLATION}(-2) \\ & +C(2,3)*\text{DTRADE}(-1) \\ & + C(2,4)*\text{DTRADE}(-2) + C(2,5) \end{aligned}$$

3.2 Stationarity Test of the VAR Model

After the establishment of VAR model, this section is to implement stationary test on the model. The results are in **Error! Reference source not found.** All reciprocal value of the root is within the unit circle, so the VAR model is stable.

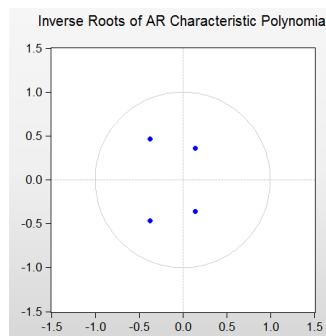


Figure 9 Inverse Roots of AR Characteristics Polynomial

3.3 Granger Causality Test

According to

Table 2, under the confidence level of 10%, it can't refuse the trade is the granger cause of the inflation, but rejected the inflation is not the granger reason of the trade.

3.4 Empirical results

Through these tests, it can be concluded that the VAR model established was stable, and can draw from the granger causality test that inflation is the granger reason of trade in Egypt. The estimation results indicate that there do exist relationships between the inflation and trade. And the results indicate that there is a long-term stable equilibrium relationship.

IV. Conclusion

An insight into Inflation, GDP growth rate, foreign trade, exports, imports, commodity structure, regional structure of foreign trade in Egypt, and the suitable policies to solve the inflation problems was provided.

As an empirical analysis of relationship between inflation and foreign trade, this paper employed a VAR model with two variables and used the monthly inflation rate to measure the inflation in Egypt expressed in inflation variable and use total volume of foreign trade to represent trade in Egypt, expressed in Trade variable.

Test results, level test to the sequence Inflation and Trade showed the p value is greater than threshold under the 1% confidence level, and it can't refuse no unit root hypothesis. So Inflation and Trade are non-stationary series.

After that stationarity test on new sequence were obtained which is first order difference, and the p values are close to zero, under the confidence level of 1%, it rejects the null hypothesis.

First-order difference sequence and used DInflation and DTrade to replace the original sequence inflation and trade, the VAR model is established. The analysis demonstrated that both inflation and foreign trade have a mutual relationship. Egyptian government activities to improve the economy, and the policies should be taken were declared to solve the inflation problems can be concluded in using: Monetary Policy, Fiscal policy, Trade policy Subsidies, Quotas and increasing foreign investments.

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