

Causes of inflation in Saudi Arabia

Yousef Nazer

School of Economic Sciences
Washington State University, USA

Introduction

In 2008 Saudi's inflation rate reached about 8 percent. A rate relatively high in comparison to the last 10 years, where the inflation rate fluctuated between zero and two percent. This was not the first time that the Saudi's economy witnessed such a high inflation period. A similar case happened back in 1973 when Saudi's inflation rate reached about 34 percent (Hasan, M. & Alogeel, H, 2008). Both periods were associated with an oil price boom, but in 2008 inflation got motivated by a growth in domestic demand and increased in food and rental prices (Al-Hamidy, A. 2010). Whether to blame the supply bottlenecks, remarkable government expenditures, or the given fixed rate regime that Saudi Arabia adopting since 1986, all these lead us to question the causes of inflation in Saudi Arabia. In this study, we examine the causes of inflation in Saudi Arabia and we will analyze whether oil prices, money supply or total import values the major reasons for causing inflation in Saudi Arabia.

Our Analysis suggests that Saudi's inflation is mainly impacted by the money supply and import values prices. In addition the increase in oil prices causes direct relation with Saudi's CPI. The rest of the paper is organized as follows: section 2 provides a brief background; section 3 describes the source of inflation in Saudi Arabia; Section 4 reviews literature and some empirical works; Section 5 briefly explains the data; Section 6 discusses economic model and methodology; Section 7 provides conclusion.

Background

Fiscal and Monetary Policies

In Saudi Arabia, fiscal policy plays a critical role in the economic system. Saudi Arabia implements a countercyclical fiscal policy to maintain price and financial stability. The countercyclical fiscal policy helps the government to maintain growth using the fiscal surplus when oil prices are high; when oil prices are low, the government boosts the economy through fiscal deficit funded by the accumulation of the external surplus when oil prices were high (Al-Hamidy, A. 2010). The remarkable increase in oil price from approximately \$24 in 2002 to beyond \$100 in 2014 has put the Saudi economy in good shape. The public debt ratio to the GDP has fallen from about 100 percent in 1999 to 3.7 percent in 2012. Government expenditure increased from (US \$ 66.7) billion in 2003 to (US \$246.7) billion in 2014. In addition, given the managed fixed exchange rate nature in Saudi Arabia, which has pegged its currency at 3.75/ USD, the Saudi Monetary Agency (SAMA) has chosen an independent monetary policy. This means that the Saudi's interest rate is governed by the US policy rate and SAMA adjusts the Saudi interest rate to the U.S. interest rate to limit interest differential speculation. As a result inflation targeting is not an option for Saudi Arabia due to its fixed exchange rate. Moreover, pegging the Saudi's riyal with U.S. dollar requires a massive accumulation of U.S. dollar as reserve to maintain the fixed exchange rate. This reserve requires an extensive increase in money supply to be created to back up the currency. The problem with the monetary expansion though is that it creates the possibility of causing high inflation in case the increase in money supply gets circulated in the economy. However, Al-Hamid argues that the exchange rate targeting policy works better for Saudi Arabia because the following reasons: "first Saudi Arabia has a resource-based economy with foreign exchange receipts and payments predominantly in US dollars. Second, USD/SAR exchange rate stability is critical to encouraging investments in Saudi Arabia in order to diversify the economy and state budget planning. Third, oil and petrochemicals dominate the export sector, so changes in the USD/SAR rate per se do not

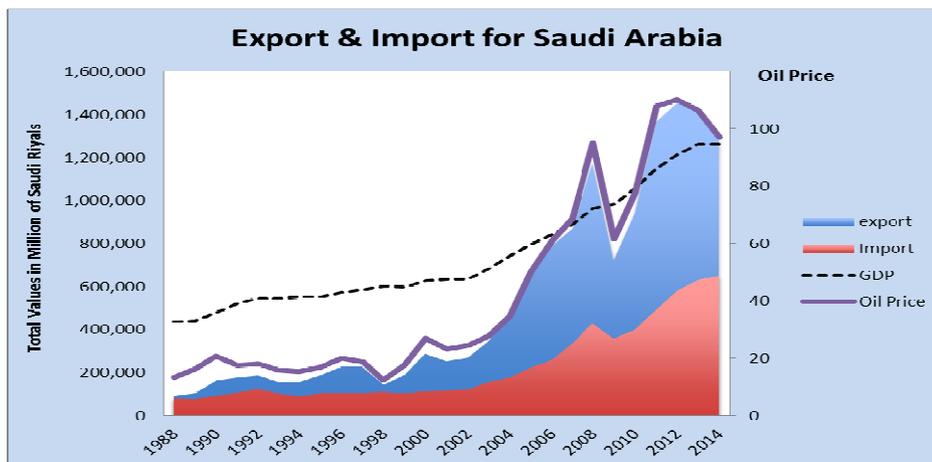
meaningfully contribute to Saudi Arabia's terms of trade" Al-Hamidy (2010). In addition, he concludes that the exchange rate targeting succeed in minimizing the negative and positive trade shocks, and the countercyclical fiscal policy choice has been working well in stabilizing the growth path and reducing global crisis impact, "To the extent that inflation is a monetary phenomenon due to bank credit expansion, prudential monetary measures work well (Saudi Arabia's policy stance before the global credit crisis included higher reserve requirements and prudential guidelines on bank credit as well as fiscal restraint). Some commentators argued that high real interest rates would have curbed inflation but this argument does not hold in Saudi Arabia, where consumers are not heavily borrowed and the ratio of bank credit to GDP is modest at around 50% (average for 2008 and 2009)" Al-Hamidy (2010).

The Source of inflation on Saudi Arabia

Import

The monetary expansion due to the pigged currency and high oil prices may seem harmless on causing the inflation rate to rise significantly in Saudi Arabia. However, that does not mean that oil prices have no impact on causing inflation rate to increase in Saudi Arabia. Several sources found that the oil prices shock causes Saudi import values to go up, which in return cause inflation rate to increase through imported goods and services. In particular, Hasan, M. & Alogeel, H. (2008) found that in the long run, inflation in trading partners is the main factor affecting inflation in Saudi Arabia and Kuwait. In addition, imports in Saudi Arabia are less volatile in comparison to export when oil prices fluctuate.

Figure 1 shows the relation between total values of export, import and oil prices over the period 1988-2014. It clearly shows that export values were impacted significantly when oil prices fluctuated. This seems very natural for a country that relies on oil revenue, through exporting oil, as its main source of income. However, what is interesting is that import values are less affected by oil prices when it drops. This is true because Saudi Arabia depends on import considerably despite how high or low oil prices. As a result, import values can increase the rate of inflation through trading partners.



New Sectors Contribution to GDP

The high revenue from oil exports has been used in developing other sectors to contribute significantly to Saudi's GDP. Enormous economic cities have been built to provide more economic diversifications and create more jobs for Saudis. Further, the government has been launching major investments in many sectors in general such as education, health and security. In addition, major projects in petrochemical and chemical products have been taken place to contribute to global market. For example, Ras Altanura integrated refinery and petrochemical project that would become

one of the world largest petrochemical facilities of its kind. Further, the private industry has been contributing more to the Saudi's economy through privatization and private investments in telecommunication, airlines and energy sectors. Figure 2 shows the ratio of oil sector and the ratio of non-oil sector to Saudi GDP.

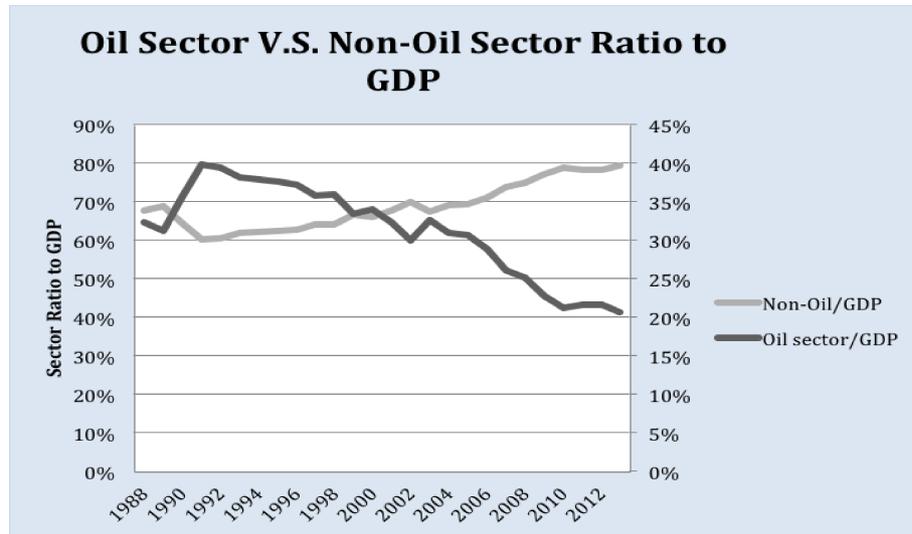


Figure2: Oil and non-oil sector

ratio to Saudi GDP

As we can see, the oil sector ratio to GDP becomes weaker over time whereas non-oil sector ratio to GDP is increasing consistently since 1990s. The development of the new industries is associated with higher costs through wages and spending on production facilities. Such costs can contribute in increasing the rate of inflation, especially in raw materials, cement and other construction inputs.

Housing and Food Prices

According to Al-Hamidy (2010), housing and food prices are the main reasons for driving inflation in Saudi Arabia in 2008. As we can see in the graph below, rent and food average costs, especially fresh fruits and vegetables, have increased significantly since 2005. Al-Hamidy (2010) suggests that rent prices were driving by both demographical pressure and lack of supply for real estate development. Also, he adds up that food prices increased as a result of global droughts and increases domestic demand in the commodity-exporting countries. Figure 3 and 4, show the significant increase in the cost of rent and food in Saudi Arabia. There are a number of factors affecting the pressure on rent price in Saudi Arabia. First, Private homes have been reaching unrealistic values, which make it very difficult for many people to afford buying new houses due low income.

Most real estate is under the control of monopolists who are raising property prices remarkably in major cities such as Riyadh, Dammam and Jeddah. As a result, people heavily moved toward rental properties as and only choice to live under the existing housing values. In addition, the housing industry suffers from lack of mortgage institutions and weak regulations that can provide at least a fundamental structure and tools to evaluate the value of homes and properties according to its real market value. The housing industry needs more intervention from both private and government agencies to provide a structural base market which becomes subject for free market forces, and more regulations that can lead to less monopoly power. Such a step will provide awareness and will increase the knowledge for both homeowners and real estate developers to compete in a competitive market.

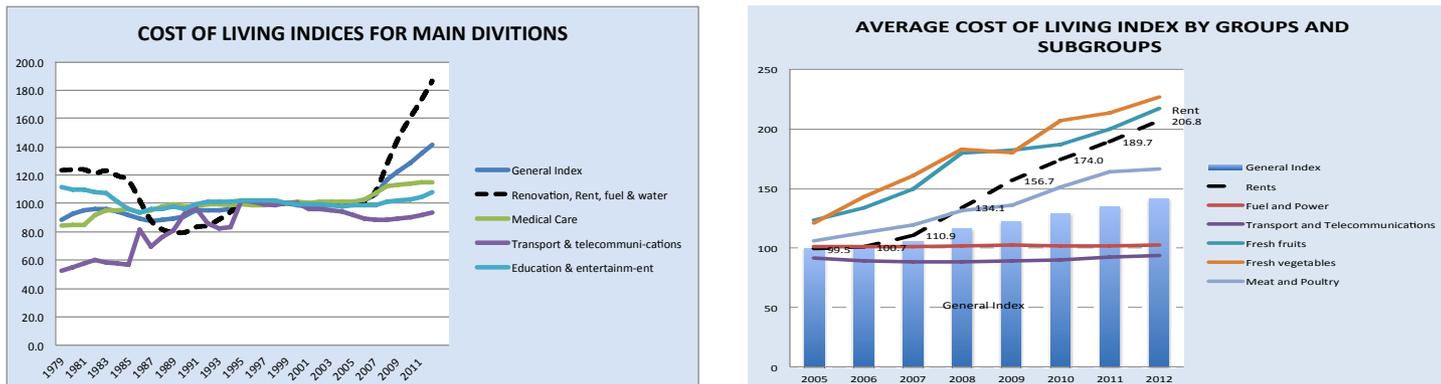


Figure 3&4: Average cost of living index by group and subgroups
Source SAMA

Brief Review of Literature and Empirical Works

Positions on the cause of inflation are various in the literature. Most economists consider the cause of inflation as result of two main factors: first the Demand-Pull factor, which happens if there is a significant increase in the aggregate demand for goods and services more than a country’s production capacity. Second, the Cost-Push Inflation occurs when price of production inputs increase, usually a rapid wage increase or rising in the cost of raw material prices, an increase in oil price is a main factor in causing raw material to increase.

Few papers address the cause of inflation in Saudi Arabia. Hasan, M. & Alogeel, H. (2008) used the Error correction model (ECM) to determine both short and long run factors that cause inflation in both Saudi and Kuwait economies, and they found that inflation in trading partners is the main reasoning in driving inflation in Saudi Arabia and Kuwait. With significant, but lower contribution from the exchange rate pass through positive demand shocks and excess money supply. Eisa (2002) found that oil production shocks put pressure on real exchange rate movement in Saudi Arabia. Lizardo and Mollick (2010) conclude that an increase in oil prices cause significant depreciation to the US dollar against net oil exporter currencies.

In addition, Mohamed Ramady (2009) argued that inflation impact the economy through three channels: fiscal, political and economic. At fiscal level, inflation could be positive or negative, and governments with huge debt benefit from unanticipated inflation because inflation will cause their debt to lose its value in real terms: when inflation rise, currency will lose its purchasing power, as a result, debt has less value in real terms. However, Ramady said that such an effect will be offset in the long run: “Governments can find it difficult to maintain fiscal discipline during inflationary periods as citizens demand compensatory increases in salaries, subsidies, and welfare payments to offset their decaying purchasing power” (Ramady, 2009). Also, inflation can cause political pressure due to the social cost of inflation which will act as tax on holding money and disadvantage for fixed income payment such as pensions. People with low income will suffer, and unemployed are going to be worse. In economic terms, high inflation causes uncertainty, which is associated with various expectations. Business environments are negatively affected by uncertainty, which impacts economic growth. According to Ramady (2009), “High rates of inflation can jeopardize growth by deterring productive investment, perverting market incentives, encouraging wage hikes, and disrupting activity through strikes or more serious political unrest” (Ramady, 2009).

The data

The object of this paper is to investigate the impact of oil prices, money supply and import values on Saudi's inflation. Our data cover the period 1989-2014. For inflation, we use the Saudi CPI index. We consider both Saudi money supply (M1) and the U.S. Treasury Bill interest rate (TB) to represent the impact of Saudi monetary policy in our model. The Saudi interest rate data is unavailable to cover the study period. However, we performed a correlation test between the Saudi interest rate and U.S. treasury bill for 3-months, and we found very high correlation between the two variables.

Pearson Correlation Coefficients, N = 18		
Prob > r under H0: Rho=0		
	SA	TB
SA	1.00000	0.97419
		<.0001
TB	0.97419	1.00000
	<.0001	

Figure 2: Correlation result between Saudi interest rate and U.S. 3 months Treasury bill rate.

As a result, we are using T. Bill rate to capture the monetary policy impact on our model. To represent the impact the GDP and inflation, we include Real GDP (GX). Finally, import values (IM) to show the impact of trading partners' inflation on Saudi Arabia.

Statistical tests:

6.1 Unit Root Test

Before estimating the model, we test for the stationarity of our model variables. If level variables are non-stationary, it can lead to spurious results when the levels of the variables are used for estimation purposes. We are going to use Dickey-Fuller's (1979) and Phillips-Perron's tests to test for stationarity and to determine the order of integration of the variables. In addition, in case we found the level variables are non-stationary. The Dickey-Fuller's and Phillips-Perron's Unit root tests can be used for running a regression using first difference of series against the series of lagged once.

Table 1 : Unit Root Test DF and Phillips-Perron

Variable Levels	Type	Dickey-Fuller Unit Root Tests		Phillips-Perron Unit Root Test
			Tau	Tau
LNCPI			-0.70	-0.1653
Δ CPI	Trend		-2.07	-2.8846
LNM1	Trend		-0.58	-0.1737
Δ M1			-4.46	-4.4444
LNOP	Single Mean		-0.13	-0.3613
Δ OP			-4.55	-5.1829
LNIM	Trend		-1.59	-1.3273
Δ IM			-4.05	-4.1937
LNGX	Trend		-2.25	-1.9935
Δ GX			-3.98	-4.7641
LNTB	Single Mean		-0.24	0.0701

ΔTB	-2.73	-3.5447
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* Significant rejection at the 0.05 level.

**Tau critical -3.00 and -3.60 for constant and time trend respectively.

*** Significant rejection at the 0.1 level.

Tau critical -2.62 and -3.24 for constant and time trend respectively.

**** Δ =The first difference. Both DF and Phillips-Perron Δ tests are both stationary for all variables.

Table 1 shows that all level variables are non-stationary. As a result, we cannot use level variables in our model estimation. However, the first difference series are stationary, and It indicates that all variables are integrated of order one.

6.2 Johansen Cointegration Results

A set of variables, all of which are stationary only after differencing, may have linear combinations that are stationary without differencing (Granger' 1981). In such cases, variables are said to be cointegrated. The cointegration provides a formal framework for testing and estimating long-run relationships among economics variables. The Johansen's (1988) approach in particular is used for determining multiple cointegration relationships. If there is at least one vector that is cointegrated with other variables then we can conclude that these variables are cointegrated and we can use their level variables in our model estimation.

Table 2 Cointegration Rank Test Using Trace

H0: Rank=r	H1: Rank>r	Eigenvalue	Trace	5% Critical Value	Drift in ECM	Drift in Process
0	0	0.7003	99.0121	93.92	Constant	Linear
1	1	0.6285	68.8902	68.68		
2	2	0.5758	44.1346	47.21		
3	3	0.4288	22.6959	29.38		
4	4	0.2839	8.6955	15.34		
5	5	0.0138	0.3480	3.84		

Table 2 shows the Trace statistics result which confirms that there are two cointegrating vectors which means we can use level variable in estimating our model.

Multiple Regression Analysis Result

Table 3 Multi Regression Model for Saudi Inflation

Parameter Estimates					
Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > t
Intercept	1	6.13026	1.70526	3.59	0.0018
LN(M1)	1	0.23954	0.1051	2.28	0.0338
LN(OP)	1	-0.01265	0.05562	-0.23	0.8224
LN(IM)	1	0.12547	0.06734	1.86	0.0772
LN(GX)	1	-0.27651	0.12719	-2.17	0.0419
LN(TB)	1	0.00165	0.0167	0.1	0.9223

Table 3 shows the parameter estimates for our model, Alpha =10%

$$\ln CPI = \ln m1 - \ln op + \ln im - \ln gx + \ln tb$$

The result in Table 3 shows statistical significance in our Saudi inflation model. There is a positive relation between Saudi's CPI and both money supply and import values in Saudi Arabia. In addition, the results indicate a negative response between CPI and real GDP.

The result for our model is expected and several papers showed a similar conclusion, despite the fact of coefficient values. In addition, it seems that oil prices are not statistically significant. However, we can carry one more step to investigate further by taking consideration of the dynamic effects. Such step requires the use of the Causality test.

Causal Direction

Because we are interested in checking the dynamic effects that cause CPI changes, we perform the causality test. This test will show us which variable causes the dynamic change in other variables.

Table 4: Granger-Causality Wald Test			
H_0	DF	Chi-Square	Pr > ChiSq
Oil Prices do not cause CPI	1	12.48	0.0004
CPI does not cause Oil Prices	1	0.01	0.9332

Granger-Causality Wald Test			
Test	DF	Chi-Square	Pr > ChiSq
Imports do not cause CPI	1	11.05	0.0009
CPI does not cause Imports	1	0.96	0.3261

Granger-Causality Wald Test			
Test	DF	Chi-Square	Pr > ChiSq
Money Supply does not cause CPI	1	6.04	0.0140
CPI does not cause Money Supply	1	0.01	0.2664

Table 4 reports causality tests results. The results show that CPI is dynamically affected by oil prices, import values and money supply.

7 Conclusion

This paper investigates the impact of money supply, oil price, import values, U.S. interest rate, and Saudi Real GDP on Saudi CPI. First we followed the process of testing the credibility of our variables. The Unit Root Test shows that all level variables are non-stationary, however, the first difference shows that all variables are stationary and integrated of order one. Next, we have used Johansen's cointegration test, and we have found that our variables are cointegrated. As a result, we can use the level variables in our estimate. Using a multiple regression model, we found positive statistical evidence between CPI and money supply, and import values, and a negative relation between CPI and real GDP in Saudi Arabia. To carry on our analysis and investigation further, we performed the causality test to confirm one way causality. The causality tests show that money supply, import values and oil prices cause Saudi's CPI, but not the other way around.

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