The impact of oil shocks on the G-7 countries GDP growth

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Abstract

This study examines the impact of oil shocks on the G-7 countries using the time series data from 1975 to 2007. The pooled model was employed; from the results we found that oil shocks has no negative impact on the G-7 countries, due to the flexible labor markets, improvements in monetary policy and smaller share of oil in production, Indirect Tax Analogy, and flexible inflation targeting regimes.

Keywords: Oil prices, G-7 Countries, GDP growth, Pooled Model.

JEL classification: A1, E3, Q4.

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1. introduction

Since the discovery of oil in the US during the 19 century oil was a major source of disturbance on the global economy. The changes in oil prices were an important subject for many writers that examine the impact on oil price shocks on the economy in different aspects. Despite the efforts that made by many developed countries to reduced is dependency on petroleum, oil remains an important energy source, that petroleum is an important raw material for many products, the world fuel and transportation depends on petroleum, petroleum represent the back bone of the world industry.

The aim of this study is to examine the affect of oil shocks on the economic growth on the G-7 countries namely Canada, Germany, France, Italy, Japan, United Kingdom, and the United States of America. These countries represent the largest oil importers and the largest industrialize nations in the world.

The 1973 oil shock has inflationary effects and a huge impact on the macroeconomy in the US (Gisser & Goodwin, 1986). Similar results are found by Hamilton & Herrera (2004) and Naccache (2010). Oladosu (2009) found that oil shocks will cause the US GDP to fall. Rodríguez (2008) found that oil price have a negative impact on output in main manufacturing countries namely France, Germany, Italy, and Spain.

Also that the oil prices will reduce Japan's output, in addition 30% to 50% of the reduction in Japan's output during the oil shocks is caused by the tight monetary policy induced by the oil shocks (lee et. al, 2001) & (Cunado & Gracia, 2004).

While Barsky & Kilian (2004) showed that the impact of oil shocks in the US macro economy is relatively small. Schubert & Turnovsky (2009) found that the oil importing developing countries can reduce the effect of oil prices on their output by increasing the flexibility of their production technology.

2. Methodology

In this study we will use five variables namely the gross domestic product as a dependent variable, government final consumption expenditure, private consumption expenditure, total trade of goods and services, and the oil price as an independent variables from the period 1975 to 2007. All the variables are taken from the World Bank data base, with the expectation the oil price data that is taken from the OPEC data statistics.

Table 1: The Definition of the Dependent and the Independent Variables

The variable	Definition of the variable	Amount
GDP	**Gross domestic products in current prices**	**Millions of US dollars**
TRADE	**Total trade of goods and services in current prices**	**Millions of US dollars**
GOVEX	**Government final consumption expenditure in current prices**	**Millions of US dollars**
PRVACON	**Private final consumption expenditure in current prices**	**Millions of US dollars**
OIL	**OPEC Oil prices**	**US dollar per barrel**

The pooled regression model will be implemented in this study; this approach is used when the pooled groups are relatively similar. The fixed effect model controls the correlation between the variables. This model measures the intercept for each group by creating a dummy variable for each group also to control the difference between the group, this dummy is also called the least squares dummy variable. The random effect model leverage the difference in the variance of the error term to the model groups together assuming constant intercept and slopes. To determine which model is suitable for this study we used the Hauseman test, the Hausman test basically tests whether the unique errors are correlated with the regressors (Green, 2008, chapter 9). If the Chi-square is significant that means we reject the null hypothesis indicating that the fixed effect model is more appropriate than the

random effect model. Table 2 shows the Hausman test results, the Chi-square is significant at 5% level indicating that the fixed effect model is the appropriate model for this study.

Table 2: The Houseman Test Results.

Correlated Random Effects - Hausman Test Pool: POOL01 Test cross-section random effects			
Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	23.148293	5	0.0003

3. Empirical Results and Discussion of Results

Before running the fixed effect model the unit root test will be implemented to examine the stationarity of the variables in the model. The Phillips and Perron unit root test is used; this unit root test can help to reduce the correlation effect in the model.

Table 3: Phillips-Perron (PP) Unit Root Test Results

Variable	Level		First Difference	
	Intercept	Intercept and Trend	Intercept	Intercept and Trend
GDP	1.06108	1.66382	43.8371***	40.7434***
TRADE	0.00357	0.18952	38.1092***	42.2212***
GOVEX	0.66005	2.26336	45.1570***	35.3373***
PRVACON	1.00892	1.88591	42.6100***	38.6237***
OIL	0.10176	0.10944	13.8994***	11.1110***

Note: *** denotes significance at the 1% level and ** at the 5% level

From the Phillips and Perron unit root test results above in table 2, we found that all the variables are stationary at the first difference so we can continue to use the fixed effect model in this study.

Table 4: Fixed Effect Model Results (GDP model)

Country	TRADE	GOVEX	PRVACON	OIL
Canada	4.795672***	6.311701***	9.797098***	0.817328
France	9.350979***	12.17127***	18.61969***	1.184406
Germany	12.24836***	16.57810***	25.47730***	1.282370
Italy	8.044708***	10.60106***	16.18438***	1.026367
Japan	22.49666***	31.25343***	48.84118***	1.237857
UK	10.86765***	14.25306***	21.83799***	1.624662
USA	56.14792***	73.90391***	113.5096***	8.130770***

Note: *** denotes significance at the 1% level and ** at the 5% level

From the fixed effect model results we found that total trade has a significant impact on the gross domestic product in the G-7 countries. Since trade plays more than 70% from total GDP in Canada and Germany, 53% in Italy and the United Kingdom, and 27% in the United States of America and Japan. So it's clear that the increase in total trade in these countries will definitely increase economic growth in the G-7 countries.

Also we found that the government final consumption expenditure has a significant positive impact on the gross domestic product in the G-7 countries.

The private consumption has a positive significant impact on the gross domestic product in the G-7 countries; because the increase in private consumption it means that the demand of goods and services is higher, this will encourage domestic producer to increase their output to meet the higher demand increasing economic growth in the end.

The most important findings in this study is the relationship between the oil price and the gross domestic product. We found that the increase in oil prices will have no significant impact on growth in the G-7 countries; with the exception the United States of America that oil shocks has a significant positive impact on its gross domestic product. Since the US is an important trade partners with major oil exporting countries such a Saudi Arabia, Kuwait, Qatar, UAE, and Bahrain. The increase in oil prices will increase its foreign revenues and the GDP in the oil exporting countries increasing their demand for imports from its main trade

partners such as US therefore increasing US total exporting causing its GDP to increase. While the other G-7 namely Canada, France, Germany, Italy, Japan, and the United Kingdom oil shocks has no impact on their gross domestic product due to several reasons; more flexible labor markets, improvements in monetary policy and smaller share of oil in production, Indirect Tax Analogy, and flexible inflation targeting regimes.

4. Conclusion

This study investigates the impact of oil shocks on the gross domestic products in the G-7 countries, using time series data from 1975 to 2007 covering all the oil shocks. The pooled model is implemented in this study, using the fixed effect model. From the results we found that oil shocks has no negative impact on the gross domestic product in the G-7 countries due to the flexible labor markets, improvements in monetary policy and smaller share of oil in production, Indirect Tax Analogy, and flexible inflation targeting regimes.

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