

DETERMINANTS OF BILATERAL TRADE BETWEEN CHINA AND YEMEN: EVIDENCE FROM VAR MODEL

Abdullah A. S. Mudhish 

College of Economics and Trade, Hunan University, China

abdullahcn@hnu.edu.cn

Zhang Ya Bin

The Dean, College of Economics and Trade, Hunan University, China

Abstract

This study investigates determinants of bilateral trade between China and Yemen providing empirical assessment of the extent to which economic fundamentals impact and influence the volume of trade between the two countries with a focus on the impact of GDP growth on exports and imports. Applying the Vector Autoregression (VAR) model, this study estimates the effect magnitude of economic growth both in China and Yemen on their bilateral trade in addition to the analysis of the impact of other control variables included in the study. The results of the Vector Auto regression VAR model imply that China real GDP positively impacts Yemen exports to China while Yemen real GDP is a determinant of Yemen imports from China. While real bilateral exchange rate has ambiguous impact on exports and imports, the real oil price negatively impact trade between the two countries.

Keywords: China, Yemen, Exports, Imports, Trade, Vector Autoregression, GDP, Exchange rates, Oil price

INTRODUCTION

China witnessed huge economic growth and expansion during the last two decades and it has become the world's second largest economy, and after its accession to World Trade Organization WTO in 2001, China has become the world's largest exporter according to most recent trade statistics. Yemen and China have long been strengthening their economic ties and

cooperation and bilateral trade. As a matter of fact, China and Yemen economies are complementary to each other in the sense that China is labor and capital intensive country while Yemen is resource intensive so they both benefit from each other through bilateral trade. Yemen exports oil and raw materials to China and imports ready-made products, machinery, clothes and other commodities. As countries benefit and gain from International trade, huge empirical research has been conducted to analyze economic factors influencing foreign trade transactions across countries.

However, most of the empirical work in this research area has focused on developed and industrial countries with little attention given to developing economies and least developed countries LDCs. This study contributes significantly to the existing empirical research by investigating factors affecting bilateral trade between China as an emerging economy and Yemen as a developing country. According to recent trade statistics, China imports from Yemen exceeded 3.2 billion US dollars most of which were crude petroleum.

This study proceeds as follows: section 2 presents literature review relevant to the study, section 3 presents data, econometric methodology, and results of the analysis; and section 4 concludes.

LITERATURE REVIEW

Based on a survey of the literature review, much of the research on international trade have focused on developed countries with very few studies conducted on developing countries and the least developed countries LDC. Al-Noah, Abdulsalam (2016) found significant impact of GDP growth on Yemen's exports to China as well as on imports but didn't find significance of the impact of cultural cooperation on bilateral trade between the two countries. Oil diplomacy has been touted widely in Beijing at high-level internal seminars in late 2001 and early 2002. For China, Oil Diplomacy will be a critical component of dealing with oil producing countries, particularly those in the Middle East such as countries in the Gulf Cooperation Council (GCC), and Yemen (Xu, X. 2000)

Mothana, O. S. (2005) have examined the mutual trade relations and looks at the behavior of trade flows between Yemen and member countries of the European Union (EU) and United States of America (USA) during the period of 1991 to 2004. In addition, this study tries to identify the comparative advantage of Yemen relative to EU and USA and the possibilities of increasing the Yemen's export to the above mentioned trade partners. According to the results of the empirical analysis it found that, Yemen has a comparative advantage in relation with EU and USA in a few of commodities (about 5 to 7 commodities), like petroleum and petroleum products (SITC-33), fish and other sea food (SITC-03) etc. On the other hand, China and

Yemen economies are complementary to each other in the sense that Yemen is a good market for made in China products. In order to catch up with this worldwide process, they are intensifying their efforts to enlarge their economic contacts. As a rising economic power, China's population of 1.3 billion and its booming economy make it a tremendous business opportunity for the Arab world. What is even more important is that, being a developing state, China shares some of the same problems and difficulties that the Arab countries are facing: for example, the challenge of how to keep a balance between political stability and economic reform. China's experience in successfully managing these problems is a possible example for Arab states (Liang Xiang J. 2004).

Thorbecke, W. (2015) has investigated whether China's exports to the United States are an outlier. Gravity model results indicate that these exports have exceeded their predicted values by more than \$100 billion in every year since 2005, and that both processed exports produced within regional value chains and ordinary exports produced using domestic inputs far exceed their predicted values. Exports of parts and components from South Korea and Taiwan, the two leading supply chain economies, to China are also outliers. Cointegration evidence indicates that exchange rates throughout the supply chain impact China's exports. While the Chinese Renminbi (RMB) has appreciated since 2005, exchange rates in supply chain countries have depreciated and contributed to China's outsized exports to the United States. A lot of previous studies on international trade have focused on GDP to proxy for income and exchange rates as main determinants and factors to affect countries' exports and imports. Therefore, based on the literature review, the present study focuses on China and Yemen GDP and also on their bilateral exchange rate of the Chinese Yuan and Yemeni Rial CNY/YER.

METHODOLOGY

Variables construction and Vector Autoregressive VAR Model

In order to improve the results and estimation, the data are converted into real terms using GDP deflator to convert nominal GDP into real GDP for both countries in constant 2010 US dollar, and using consumer price index CPI to change nominal exports and imports into real exports and real imports with 2010 as the base year.

Most of the previous studies and empirical literature on trade analysis have used real GDP in constant prices as well as real exports and real imports instead of nominal data. The bilateral nominal exchange rate is also converted into real exchange rate to account for price differential between both countries using CPI to deflate the data. Data for real GDP in constant 2010 US dollar is readily available from World Bank database of the World Development Indicators WDI.

The World Bank defines real GDP as GDP at purchaser's prices which is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources. Data are in constant 2010 U.S. dollars. Dollar figures for GDP are converted from domestic currencies using 2010 official exchange rates. The Consumer Price Index CPI of a country is an indicator of the price level in that country; the percentage change of CPI at the current period of time over the same period of the previous year is a measure of inflation in that country.

The World Bank defines CPI as Consumer price index reflecting changes in the cost to the average consumer of acquiring a basket of goods and services that may be fixed or changed at specified intervals, such as yearly. The Laspeyres formula is generally used and CPI data are period averages.

Variables calculation

For the calculation of real GDP, the nominal GDP is deflated by GDP deflator index equal to 100 at the base year 2010,

$$Real\ GDP_t = \frac{Current\ GDP_t}{gdp\ deflator_t}$$

For the calculation of real exports and real imports, Consumer Price Index CPI of Yemen has been used to deflate the nominal data according to the following equations:

$$Real\ Exports_t = \frac{Nominal\ Exports_t}{CPI_t}$$

And,

$$Real\ Imports_t = \frac{Nominal\ Imports_t}{CPI_t}$$

With CPI index is equal to 100 at the base year 2010.

For the calculation of the real bilateral real exchange rates RER, the nominal exchange rate is used and deflated by the price differential, the CPI ratio between the two countries according to the following equation:

$$RER_t = NER \times \frac{CPI_{ye_t}}{CPI_{cn_t}}$$

Where, NER is the nominal exchange rate, CPI_{ye} and CPI_{cn} are Consumer Price Indices for Yemen and China, respectively. The Real Exchange Rate RER is an index with the real and the nominal exchange rates are identical at the base year 2010. Therefore, the RER is the nominal

exchange rate adjusted for price differences in two partner countries and is used extensively in empirical trade research instead of the nominal rate.

Estimation of the imports and exports equations using Vector Autoregression VAR model

The empirical research suggests that most of the economic variables and time series data are autoregressive and the lag of the independent variable affect the current value of the dependent variable in a vector of autoregressive $AR(p)$ stochastic process with p as the number of lags. Therefore the Vector Autoregressive VAR model has been developed by economists to estimate the relationship among autoregressive economic time series and is widely used in recent applied economic research. The selection of lags in the estimation procedure is done by the mechanism of minimizing Akaike Information Criteria AIC. In what follows, the VAR model is used to estimate only the exports and imports equations, excluding the total trade model.

In the estimation of the determinants of Yemen exports to China, only China real GDP is included in the model, excluding Yemen GDP, because as is specified in the empirical and previous studies only the income of the importing country is a determinant of the exports of its bilateral trade partner; that is as China income increases, Yemen exports to China will increase. Because Yemen Exports to China are mostly composed of crude oil and petroleum, the oil price in the international market is used as an additional explanatory variable in the exports equation. It is assumed that as oil prices fluctuates and are unstable, exports of oil rich countries will decline. Further, the dummy variables to proxy for international crises have been removed from the model because Yemen is a small developing economy and hence it is assumed that Yemen economy is not heavily affected by international shocks. The exports equation can therefore be stated in the following model using Vector Autoregression mechanism:

$$\log REXP_t = \alpha + \beta_0 \log REXP_{t-1} + \beta_1 \log RGDP_{CN_t} + \beta_2 \log RER_t + \beta_3 \log ROILP_t + \varepsilon$$

Where, all variables are in logarithmic form, and

REXP: real exports to China

REXP_{t-1}: real exports to China lagged one period

RGDP_{CN}: the real GDP of China

RER: bilateral real exchange rates

ROILP: the real oil price proxied by the price of UK Brent price index with 2010 as the base year (2010=100).

Similarly, the imports equation has been estimated using VAR model. In the equation of Yemen imports from China, only Yemen real GDP is included because it is supposed that as Yemen

income increases, its imports from China will increase. Dummy variables representing international crises have been removed because as stated above Yemen is a small developing economy and is not vulnerable to international shocks. Oil price as an additional control variable is included in the imports model because any movement in the oil prices either up or down will have a bearing on Yemen's foreign currency revenues from the external sector which in turn will impact Yemen demand for imports from China.

The VAR model of the imports equation can be written as follows:

$$\log RIMP_t = \alpha + \beta_0 \log RIMP_{t-1} + \beta_1 \log RGDPYE_t + \beta_2 \log RER_t + \beta_3 \log ROILP_t + \varepsilon$$

Where,

RIMP: real imports from China

RIMP_{t-1}: real imports lagged one period

RGDPYE: the real GDP of Yemen

And other variables are as described above.

ANALYSIS AND RESULTS

Results of the Vector Autoregression estimation

The results of the exports equation using Vector Autoregression estimation mechanism are shown in the table below:

Table 1. Vector Autoregression Estimation Output (Export)

1. The Exports Model		
Independent variable: log real exports		
Regressor	Coefficient	P-value
log REXP L1	3.68 (2.08)	0.0021*
log RGDPEN	31.58 (8.07)	0.0001*
log RER	1.45 (0.69)	0.0370**
log ROILP	-1.27 (0.44)	0.0040*

Note: * and ** indicate significance at 1% and 5% levels of significance. Standard errors are between brackets. $R^2 = 0.67$

The estimation results of the exports equation show that China GDP has positive impact on Yemen exports to China and it is statistically significant. This is consistent with most empirical findings in the literature. As China GDP increases by one unit, Yemen exports to China increases by 31%. However, oil price in the international market negatively impacts Yemen exports to China, this is mainly due to the fact that Yemen is a small oil exporting country and is a price taker and fluctuation of the oil price represents a shock to Yemen economy. The impact of the bilateral real exchange rate is positive and significant, an appreciation of bilateral exchange rate by one unit increases exports to China by 1.45 per cent. The one period lag of the real exports positively affects the current period exports by 3.68 per cent and is significant. The value of the R square is 0.67 indicating that explanatory variables can explain 67 percent of the variation in the dependent variable.

The results of the import equation using vector Autoregression model are shown in the table below:

Table 1. Vector Autoregression Estimation Output (Import)

1. The Imports Model		
Independent variable: log real imports		
Regressor	Coefficient	P-value
log RIMP L1	2.15 (3.56)	0.0004*
log RGDPYE	9.15 (2.03)	0.0006*
log RER	-1.12 (4.15)	0.0410**
log ROILP	-3.48 (2.85)	0.0053*

Note: * and ** indicate significance at 1% and 5% levels of significance. Standard errors are between brackets. $R^2 = 0.55$

The results of the imports model show that the one period lagged value of the imports positively impacts the imports of the succeeding period and is significant. Yemen GDP positively enhances its imports and this is consistent with the economic theory that high income raises demand for imported goods from abroad. In the case of Yemen and China as Yemen GDP

increases one unit, its imports from China increase by 9 per cent. The coefficient on the bilateral real exchange rates is negative indicating negative impact on imports, this is mainly due to the fact that Yemen currency has depreciated against the Chinese Yuan in the period under study and this depreciation has made imported Chinese goods relatively expensive to the average consumer, hence devaluation of the currency restricts imports. The sign on the coefficient of oil prices is negative and significant indicating negative impact on imports.

CONCLUSION

Bilateral trade between China and Yemen is very important to benefit both countries and this can be seen from the expansion of exports and imports in the last decade, therefore, China and Yemen have potential to more increase their trade volume. The negative impact of the exchange rates and oil prices is due to the existence of dollar as a vehicle currency for bilateral trade; hence the two countries can adopt Chinese Renminbi RMB as an international currency to be used instead of dollar. Yemen GDP has negative impact on trade because of fluctuating economic growth which results from political instability and civil war in the country, therefore, China can help Yemen solve its political tension in order to achieve economic stability and further enhance bilateral trade between the two countries. There is a scope for future research to explore more variables and factors affecting bilateral trade between China and Yemen using recent and higher frequency data such as monthly in order to reach further results and uncover new trade impact horizons.

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