Investigating the Co- Movement and Causality between Iran and Germany

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Abstract

This study investigates the economic interdependence between Iran and her main historical trade partner, Germany. We want to see whether the business cycles are transferring from Germany to Iran via trade? By using SVAR model we have found that for period of 1990-2006, Germany have had a slight effect on Iran's economy. Iran is the importer of capital and industrial goods from Germany, and the changes in her import conditions would have effect on domestic product and the supply side. However, we have found that the cycles and fluctuations in Iran have mainly been caused by her own domestic conditions. The trade barriers and control have reduced the effect of the fluctuations from Iran's trade partner to move into Iran's economy.

Keywords: Co- Movement, Germany, SVAR, Trade.

1- Introduction

As the economies are becoming more integrated and the globalization phenomena, the regional as well as international business cycles have attracted more economists' attention. The crises in south East Asia and recent recession in the USA and their widespread effect have shown how the countries and regions are interrelated to each other and moving together.

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In view of this situation, we examine the linkages and co-movement of outputs, prices, interest rates, and money supplies between Iran and Germany.

2- Literature Review:

The economists have mentioned different channels which could cause co-movement between countries: bilateral trade, production sharing, similarity in industrial structure, monetary union, financial integration, total trade, gravity variables, market flexibility and so on. However, for the case of Iran, it seems that the main channel has been the trade. With an ever increasing share of international trade, potentially it has an important effect on business cycles, within as well as between the countries. According to Perez & Osborn and Artis (2003) an international business cycle is the bilateral relation between short-run growth rates in different countries during a period of time. Regarding the source of the shocks for business cycles, they can be divided into two main categories: supply shocks and demand shocks. Industrial shocks, oil shocks and technological shocks are supply shocks; while monetary and aggregate demand shocks are among the demand shocks. According to Kose & Yi (2002), if the economies are having increasing trade and the source of shocks would have been demand shocks, one could expect more co-movement in business cycles; while if the shocks are from supply side then it depends on the kinds of trade; i.e. intra- industry or inter-industry.

Frankel and Rose(1998), have developed a model known as F&R in which they have shown the bilateral trade has positive effect on the co-movement in business cycles, Clark and Van Wincoop(1999), have found that more trade means more business cycles relations. Others such as Gruben(2002), Kose & Yi(2006), Gruben & Kose & Millis(2002) have found a positive relationship between trade and business cycles in their empirical studies.

3- Iran's Major Trade Partner:

For the period of 1990-2006, major trade partners' of Iran had been: Germany, UAE, Italy, Japan, France, UK, China, Swiss, Belgium, Russia, India, South Korea, and Brazil. Fig 1 shows the mean share of trade with these countries. It means that we calculate the cumulative amount of trade in

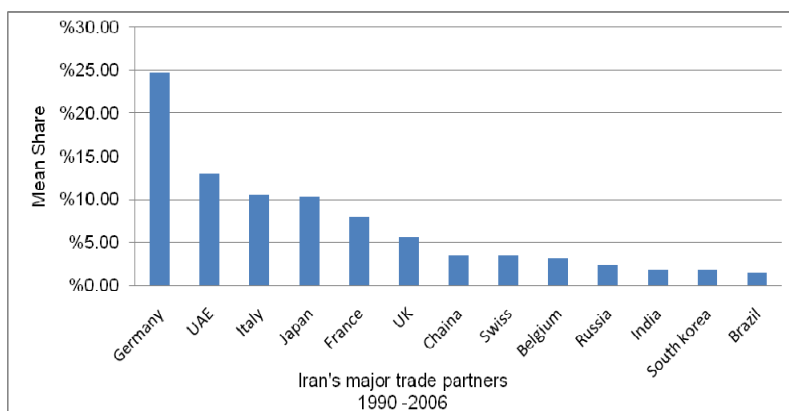the 1990-2006 and then divided it to total trade at that period, so we have mean shares.

Fig1: Iran's Major Trade Partners

Source: Authors' Calculation

As can be seen, for the period under study the main trade partner of Iran had been Germany. Next comes UAE, but it should be mentioned that due to restrictions and sanctions, UAE had the role of re-exporting point for some of the EU countries and the USA. The imports of Iran were mainly capital intensive and high-tech goods; while the export of Iran was mainly raw mineral, oil and agricultural products.

During the past recent years countries such as China, India, and Turkey have been very active and their exports to Iran have risen sharply, and on the other hand the shares of the countries such as Germany, UK, and France have declined. And as mentioned, the situation of UAE is exceptional in a sense that it was working as an indirect channel for the importation of goods from other countries.

4- The Model and Data

The theoretical model of this study is based on the model which first introduced by Galf (1992) and then developed by Kim & Bordo (1998) and Diboogolu (2000). The identification of the SVAR-impulse response functions requires a number of zero constraints, and these constraints are based on economic theory and knowledge of institutional relationships. We assume only short-run restrictions, and in the long- run the model is fully flexible. For example, we assume that the Iranian economy has no initial impact on German economy. The rest of assumptions are based on theoretical macroeconomic considerations.

We have focused on the interdependence relationship between selected variables of Iran and Germany's. The period under investigation is from 1990 to 2006 and the data is in the seasonal form. The software used is Eviews.

Variables used in this model are Germany's real GNP in the log form (LYG), inflation with the CPI index for Germany(ING), domestic interest rate for Germany (RG) and Iran's real GNP in the log form (LYI), inflation with the CPI index for Iran (INI) and money supply in the log form for Iran (LM$_1$R)and exchange rate in the log form (RIAL/ MARK & Euro).The exchange rate calculated with Mark and then (1999)with euro. The main data employed in this study come from IMF International Financial Statistics (IFS) and WDI. All the variables are seasonally adjusted and all of them have been checked for non-stationary. The best lag according Schwarz criteria was one. Granger test was used so as to identify the exogenous variables the results show that Germany' s GNP and exchange rate known as exogenous. It means that this variables do not effect each other systematically. But these variables have influence in one period and in VAR estimate Germany's production have a significant t student (2.93).

The huge volume of Germany's export to Iran could be the reason why it has been shown as exogenous. Also, exchange rate variable is reported exogenous probably because of state intervention and controls in this market which have limited the fluctuations of the exchange rate. According to the Granger test Germany's interest rate and inflation are shown to be

endogenous. As an explanation of these two variables being endogenous we expect due to the large volume of German's export to Iran when the price level in Germany fluctuates it would have effects on the relative prices and hence Iran's economy. During the period under investigations Iran has imported capital as well as intermediate goods from Germany; the fluctuations in the interest rate in Germany have had effects on investment and from the channel of export to Iran.

5- Structural VAR

Introduction of the limitations matrix:

Method of the Bernanke & Sims is used for the description of the limitations matrix. The number of the endogenous variable in this system is five, so we introduce the matrix with five rows and five columns. In order to describe these limitations in the first and second row, it is assumed that Iran's economy has no basic effect on Germany's economy.a_2 coefficient is considered in order to represent short-term effects of Germany's inflation on the Germany's real interest rate. Changes in the productions level, influences inflation, therefore we chose a_5 coefficient. Changes in production level and changes in inflation influence money supply, so we inter a_8 and a9.

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\begin{bmatrix} rg \\ ing \\ lyi \\ ini \\ lm1 \end{bmatrix} = \begin{bmatrix} a_1 & a_2 & 0 & 0 & 0 \\ 0 & a_3 & 0 & 0 & 0 \\ 0 & 0 & a_4 & 0 & 0 \\ 0 & 0 & a_5 & a_7 & 0 \\ 0 & 0 & a_6 & a_8 & a_9 \end{bmatrix} \begin{bmatrix} \varepsilon^{rg} \\ \varepsilon^{ing} \\ \varepsilon^{lyi} \\ \varepsilon^{ini} \\ \varepsilon^{lm1} \end{bmatrix}
$$

Impulse response:

Figure 1 &2&3&4 presents Impulse response functions, which are estimated during twenty periods. In presenting the results of this study, we focus on those parts of impulse response that are relevant to the main question of the paper: the potential business cycle transmission between Iran and Germany. In Each figure we see the variable in response of different shocks, for example in Fig 1 we have Iran's production (LYI) in response of five shocks. Shocks are:

Shock number1: interest rate of Germany (RG)
Shock number2: the shock of the Germany's inflation(ING)
Shock number 3: the shock of the Iran's production (LYI)
Shock number 4: the shock of the Iran's inflation (INI)
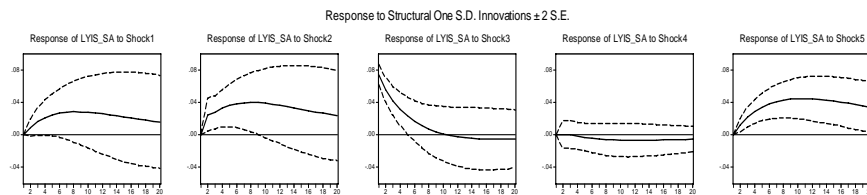Shock number 5: the shock of the money supply (LM_1)

Fig1: Response of Iran's Production to the Shocks

In Figure 1, the impulse response graph shows that Germany's interest rate (RG or shock1) has a positive impact on Iranian GDP (LYI). Figure1 also shows the impulse response that Germany's inflation(ING or shock 2) has positive impact on Iranian GDP. As an explanation, we expect due to the large volume of German's export to Iran when the price level in Germany fluctuations it would have effects on the relative prices and hence Iran's GDP. During the period under investigations Iran has imported capital as well as intermediate goods from Germany; the fluctuations in the interest rate in Germany have had effects on investment and from the channel of export to Iran.
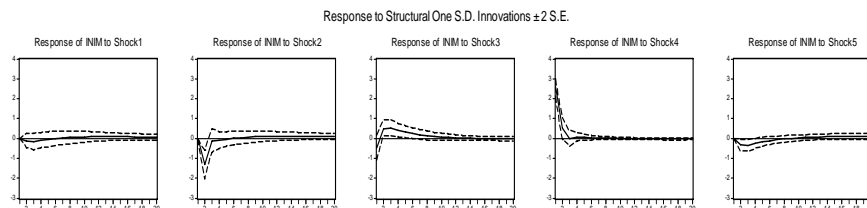

Fig2: Response of Iran's Inflation rate to the Shocks

In Figure 2, the impulse response graph shows that Germany's interest rate (shock1) and inflation (shock2) has no significant effect on the Iranian inflation rate.
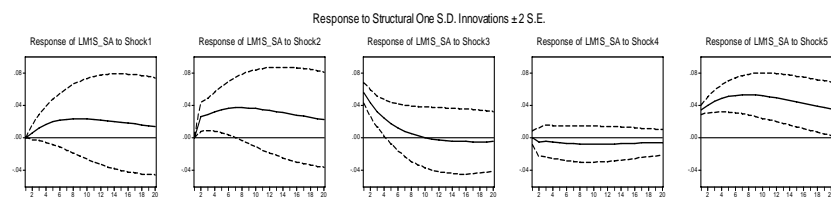
Response to Structural One S.D. Innovations ± 2 S.E.

Figure3: Response of Iran's Money Supply to the Shocks

In Figure3, the impulse response graph shows that Germany's interest rate (shock1) and inflation (shock2) has positive impact on Iranian money supply (LM_1).
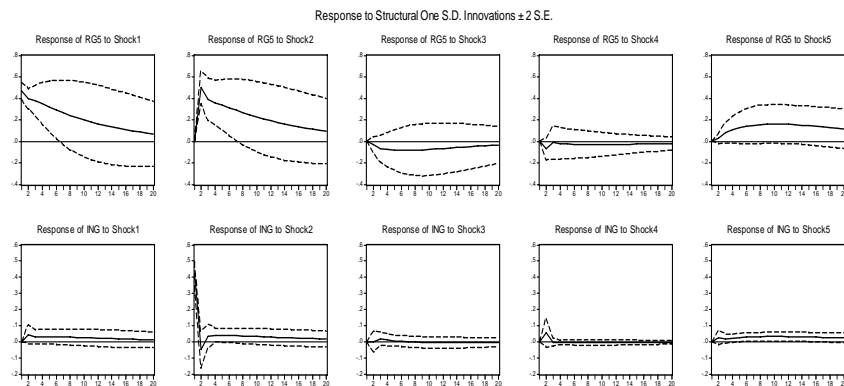
Response to Structural One S.D. Innovations ± 2 S.E.

Figure4: Response of Germany 's Inflation and Interest Rate to the Shocks

In Figure 4 the impulse response graph shows that Iranian variable (LYI& INI& LM_1) has no significant impact on the Germany's interest rate and inflation rate, it acknowledge the initial assumption about Iranian economy has no initial impact on German economy.

6- Conclusion

In this study Structural VAR model was designed in order to investigate the relationship between Iran and Germany, and as was expected, there is no co- movement relationship between Iran's economy and Germany. But this economy has not been completely without effect for Iran. There are modest effects of price transmission from Germany to Iran. However, the largest outside effects on Iranian economy may be due to fluctuation in oil prices and sanctions. In 2006 The ratio of trade between Iran and Germany divided by Iran's GDP is about 0.01%,that is why with fluctuations in Germany 's economy we have not seen great impact into Iran's economy the main cause of fluctuations in Iran economy 's have rooted into domestic events, conditions and decisions. But because Iran imports of industrial and capital goods from a country like Germany, change to the importing condition cause changes in the domestic production and affect the supply side.

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