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THE NEXUS BETWEEN INFLATION AND TRADE OPENNESS IN AZERBAIJAN: AN EMPIRICAL INVESTIGATION

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Abstract

The Romers' hypothesis postulates the inverse relationship between inflation and trade openness. This study investigates the hypothesized relationship between inflation and openness in the context of transitional economy, Azerbaijan. For the aforementioned purpose, a time series data has been analyzed to find out the nexus between inflation and openness in the presence of control variables, economic growth and supply of money. The long-run estimates of the cointegration regression show that trade openness has a positive and significant effect on inflation whereas economic growth has a significant negative effect on inflation. Thus, it can be inducted from the findings of the study that greater openness does not ease inflation and the findings of the study do not verify the Romers' hypothesis in Azerbaijan.

Keywords: Inflation, Trade openness, Romers' hypothesis, Economic growth, Azerbaijan

INTRODUCTION

Inflation refers to persistent rise in the general price level in the economy. Inflation everywhere attract the attention from the policy makers as it leads to uncertainty and may badly affect the economic pace of the economy. Krugman (1996) argued that structure rigidities in developing countries are one of the sources of the inflationary situation in the developing countries.

Moreover, structure rigidities comprises of vulnerability to supply shock, rigidity in nominal prices, narrow tax rate and underdevelopment of financial sector in developing countries. The cost of high inflation rate can be gauged as a decrease in the pace of the economic growth of the economy as it discourages private investment and leads to uncertainty in the financial sector of the economy. Thus, high inflation makes the economy uncompetitive in the international market (Haq et al., 2016). Besides, high and unexpected inflation leads to wastage of scarce resources as inflation is responsible for inefficient transactions and speculation (Krugman, 1991).

If high inflation is unbearable in any economy, the question arises how to get rid of it. Some of the economists, for instance, Triffin and Grudel (1962) are of the view that openness of the economy to the rest of the world is one of the ways to tackle inflation. They postulated that openness of the economy leads to cheaper availability of commodities. Jin (2000) argued that openness would reduce prices in the domestic market as it has a positive impact on domestic production. While, researchers such as Okun (1981) and Sanyal (1996) opined that greater openness will decrease fluctuations in price level as openness makes possible greater availability of the commodities.

In the economic literature regarding the relationship between inflation and openness a well-known hypothesis is put forwarded by Romer (1993). The Romers' hypothesis postulates an inverse relationship between inflation and openness. He emphasized that increase in the money supply brings inflation and this inflation could be upset by openness of the economy to the rest of world. The increase in money supply is likely to depreciate the exchange rate whereas it is more experienced in small open economies so, the authorities has less incentive to go for expansionary monetary policy, consequently this controls inflation. The opponents of this hypothesis such as Evans (2007) states that authorities may lose grip on inflation in an open economy than in a closed one. Evans (2007) argued that open economy may get inflation from the rest of world in the form of raw material and manufactured imports. As a consequence, the monetary authority might levy inflation to balance the money growth. Similarly, Kirkpatrick and Nixon (1973) also opined that openness may not lower inflation domestically, as there are trade barriers especially import restrictions.

The economy of Azerbaijan is one of the transitional economies in the CIS countries. Since its independence Azerbaijan focused more on its trade with the rest of world to sustain economic growth with price stability. However, the researcher did not find any research study who has addressed the nexus between inflation and trade openness in Azerbaijan. Thus, this study adds the case of Azerbaijan to the existing literature regarding the nexus between inflation and trade openness. This study will analyzed the quarterly time series data from 1993 to 2016

for the said purpose. The rest of the paper is structured in such a way that next section of the paper shed light on literature review and this section is followed by research methodology. The fourth section of the paper presents results, its interpretation, and results discussion while the last section of the paper concludes the study.

LITERATURE REVIEW

The relationship between inflation and openness is addressed in numerous research studies. For instance, Triffin and Grudel (1962) investigated the relationship between openness and inflation and found that openness leads to inflation in selected European countries. Kirkpatrick and Nixon (1973) argued that openness may lead to lower inflation if and only if barriers to trade are alleviated especially import restrictions. Similarly, in a study conducted by Rogoff (1985) found that greater openness result in less surprise inflation. He further argued that monetary expansion not only responsible for inflation domestically but also leads to depreciation of the domestic currency and negative terms of trade.

Ashra (2002) determined the channels that how openness would decrease inflation in the domestic economy. First, openness allows better allocation of resources to the productive sectors and hence, increases the capacity utilization. Second, openness enhances efficiency through low input costs due to procurement of production domestically and internationally. Last but not the least, openness brings foreign direct investment and as a consequence stimulates economic growth thus, leads to low pressure on price level in the domestic economy. This statement is validated in the findings of Hanif and Batool (2006), Wynne and Kersting (2007), and Badinger (2009) who in their studies find out a significant inverse relationship between inflation and openness.

However, there are panel studies which confirmed the positive association between inflation and openness. For example, Tauci et al. (2009) carried out panel study for selected developing countries to investigate the effect of openness on inflation. The results of their study confirmed the positive effect of openness on inflation in the selected developing countries. In the same way, Mahmoudzadeh and Shadabi (2012) examined the impact of openness on inflation in selected countries in Middle East and North Africa (MENA) region and concluded that openness leads to high inflation.

In time series context, there are studies whose results verified the Romers' hypothesis. For example, Mukhtar (2010) found an inverse relationship between inflation and openness and confirmed the Romers' hypothesis. Similarly, Samimi et al. (2012) also confirmed the Romers' hypothesis. Whereas, Jafari et al. (2011) determined inverse relationship between inflation and openness in the long run and concluded that this mentioned relationship is insignificant in the

long run in Iran. On other hand there are studies whose results nullified the existence of Romers' hypothesis. The study conducted by Zakaria (2010) did not confirm the Romers' hypothesis that an inverse relationship exist between inflation and openness. In similar way, the study of Kurihara (2013) also nullified the presence of inverse relationship between inflation and openness. Besides, some studies, for instance, Lartey (2012) opined that in the presence of optimal monetary policy the trade openness increases consumer welfare.

Afzal et al. (2013) explored the relationship between inflation and trade openness in tri-variate analysis over period from 1972 to 2010 in case of Pakistan. In this study, the trade openness is proxy with export to GDP ratio, import to GDP ratio and trade to GDP ratio. They applied ARDL to determine the long run relationship between inflation, economic growth, and trade openness. The Results of the study documented that trade openness is not responsible for lowering inflation in short run but also in the long run in Pakistan. The results also captured the positive effect of economic growth on inflation and the researchers referred that this is in line with Phillips curve and Okun's law. The researchers recommended that the authorities can combat the inflation through more trade openness favored policies and also suggested that economic growth has to be added as a source of inflation as some studied did not include it to explain the determinants of inflation in Pakistan.

In a similar fashion, Feleke (2014) conducted the time series study over period from 1970 to 2011 for the Ethiopian economy. He applied auto regressive distributed lag(ARDL) model to examine the short run and long run effect of openness on inflation in Ethiopia. His findings contradicted the Romers' hypothesis as trade openness effect on inflation is insignificant not just in short run but also in long run.

Atabay (2016) conducted a time series study for the Turkish economy to determine the nexus between inflation and openness. The results of the study showed a negative association between inflation and openness thus, this study confirmed the existence of Romers' hypothesis in the Turkish economy.

Haq et al. (2016) examined the relationship between inflation and openness. They measured openness of the economy through trade to GDP ratio and KOF index of globalization. The later index is the economic openness of the economy to the rest of world and is being determined by the KOF institution. They referred trade to GDP as conventional index of openness whereas KOF index is being referred as a comprehensive index of openness. Besides, they employed different methods to examine the inflation-openness nexus. Their study results concluded that not just the measurement of openness matter for holding the Romers' hypothesis but also the methods matter too.

The proposed model of the study

The aim of the study is to figure out the nexus between inflation and trade openness in case of the Azerbaijan. From the literature discussed above, this study identified the model of the study as shown in Equation (1):

Inflation = f (Trade openness) *(1)*

However, domestic economic growth and supply of money worked as elementary variables identified by numerous researchers, the later variable will examine the effect of monetary policy on inflation in Azerbaijan. Hence, inflation is the function of economic growth (EG), supply of money (BM) and trade openness. Moreover, this study will consider ration exports to GDP and ratio of imports to GDP as index for trade openness as most of the studies considered trade to GDP ratio as an index for trade openness. Thus, the extended model which has to be estimated for the study is written as in Equation (2) as follows:

$$INF_t = \beta_0 + \beta_1 EG_t + \beta_2 XO_t + \beta_3 MO_t + \beta_4 BM + \varepsilon_t \qquad (2)$$

Whereas INF represents the annual growth rate of inflation and EG is the annual growth rate of real GDP as a proxy for economic growth. Similarly, XO and MO represent exports to GDP and import to GDP ratio as a proxy for trade openness of the Azerbaijan. The ratio of broad money to GDP works as a proxy for supply of money. This is indicated by BMin Equation (2).

RESEARCH METHODOLOGY

Different econometric methods are being adopted by researchers to verify the inverse relationship between inflation and openness. If we confined ourselves just to time series methods even one can observed that different methods are employed by researchers. For instance, Zakaria (2010) applied generalized method of moments (GMM) over period from 1947 to 2007 in case of Pakistan whereas Mukhtar (2010) adopted the concept of cointegration method. Mukhtar (2010) found the long run relationship between variables through cointegration and determined long run estimates by applying vector error correction model (VECM). Jafari et al. (2011) examined the long run relationship through bounds testing approach known as autoregressive distributed lag (ARDL) model and found out the short run and long run estimates so that he concluded that an inverse relatiuo0nship exists between inflation and openness in short run whereas this relationship is insignificant in the long run in Iran.

Thus, the study at hand will also apply cointegration regression to verify Romers' hypothesis in case of transitional economy of Azerbaijan. However, the researcher will determine first the cointegration through Johansen cointegration test (Johansen, 1988; Johansen and Juselius, 1990). However, time series data mostly is trended and does not

possess constant mean and variance over time so it is recommended to test whether data is trended or not. If data is trended then, the data is having unit root and one cannot apply ordinary least squares (OLS) as the estimates obtained OLS from will not reliable, this refers to spurious regression in econometric terminology. This study will apply Augmented Dickey-Fuller (ADF) test introduced by Dickey and Fuller (1979) to examine the unit root problem in the time series data. One of the ways to get rid of unit root is differencing of the time series data and if data becomes free from unit root by differences so we need a technique to find out long run relationship. As mentioned earlier that this study will apply Johansen cointegration as the Johansen cointegration considers the data at difference. However, it will not lose any long run relationship between variables if existed.

Once the data is made free from unit root problem and long run relationship is being determined then, this study will employ dynamic ordinary least squares (DOLS). A cointegration regression developed by Stock and Watson (1993). This method has certain advantage over other cointegration regression as it takes into account leads and lags of independent variable thus, correcting the problems such as autocorrelation, simultaneous bias and small sample bias between regressions.

This study has collected quarterly data on inflation, economic growth, exports openness, imports openness, and supply of money from different sources over the period from 1993 to 2016.Azerbaijan became a member of the IMF and World Bank in 1992and joined the World Trade Organization (WTO) in 1993 as an observer. The Azerbaijan economy experienced a remarkable average economic growth; on the other hand, the average inflation rate in these years remains around six percent. Thus; in this study, quarterly data from 1993 to 2016 were analyzed to investigate the nexus between inflation and trade Openness in Azerbaijan. Data on economic growth, (EG), exports openness (XO), imports openness (MO), and supply of money (BM) has been collected from world development indicators (WDI), World Bank (WB) online database. Whereas data on inflation (INF) has been gathered from the World data info website, a project of eglitis-media Oldenburg Germany.

RESULTS AND DISCUSSION

Before presenting the results of the study it would be better to talk about inflation, economic growth, and trade openness of Azerbaijan over the years. Figure 1 is representing the trend in these mentioned variables since 2000. The Azerbaijan economy since 2000 till 2016 experienced a remarkable average economic growth which is over 10 percent whereas the average inflation rate in these years remains around 5.8 percent. The economic growth rate revolves around 10 percent per year between 2000 and 2004. It reaches its maximum value of

more than 34 percent in 2006 and since then it was declining till 2011 and in 2011 it was 0.06 percent. It reaches to its average level of 5.6 percent in 2013 but since then it is on the decline and even Azerbaijan experienced a negative economic growth in 2016. The economy of Azerbaijan was very stable between 2000 and 2004 as inflation rate (INF) was very nominal. The INFalmost touched the double digit in 2005 and reached its maximum value in 2008 which was 23.47 percent. As for trade openness is considered between 2002 and 2004 the ratio of imports to GDP (import openness) was more than the ratio of exports to GDP (export openness). Since then, export openness (XO) is greater than import openness (MO). The MO experienced continues declining since 2005 and dropped to its minimum value of almost 20 percent of GDP in 2010. However, since then it is on continues increase and it remained at 43.67 percent of GDP in 2016. The XO experienced its maximum value in 2007 which was 68 percent of GDP and marked its minimum value (34.8 percent of GDP) in 2015. If we closely observe the XO and INF when there is upward movement in XO in the same years we also witnessed an upward movement in INF. Similarly, a falling movement in XO is followed is INF too in same years.

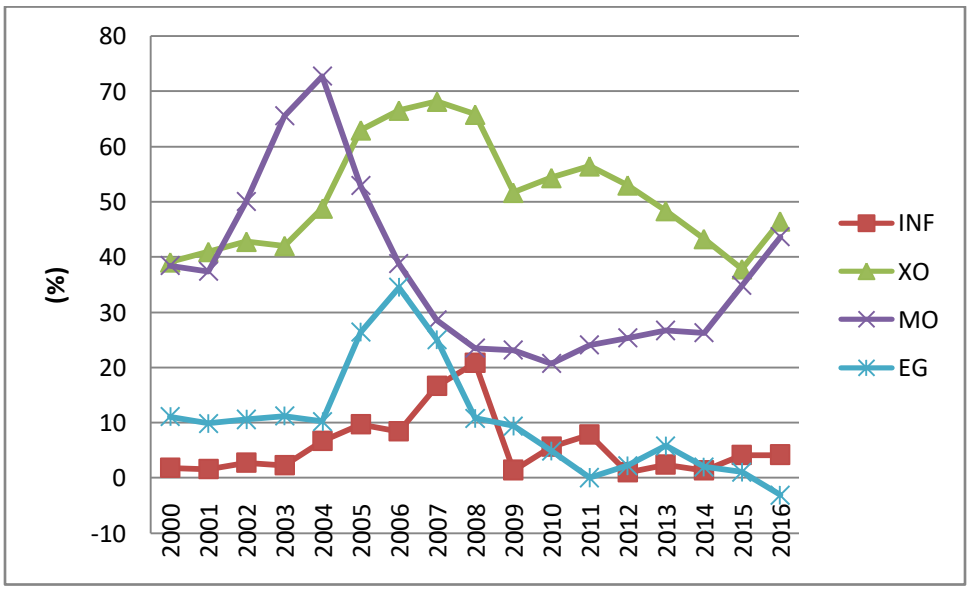

Figure 1 Inflation, Economic growth, Trade openness in Azerbaijan

The results of unit root test are given in Table 1. All the selected variables of the study are having unit root problem at level so this means that variables are trended and one can't apply OLS. However, the results are indicating that all variables are free from unit root problem at their first difference. Thus, the decision is made that all selected variables of the study are integrated of order one.

Table 1 Result of ADF Unit Root test

Variables	Level (t-stat.)	Prob.	First diff. (t-stat.)	Prob.	Decision
INF	-2.05	0.27	-5.56	0.00	I(1)
EG	-2.20	0.21	-3.31	0.02	I(1)
XO	-1.64	0.45	-4.86	0.00	I(1)
MO	-1.97	0.29	-4.97	0.00	I(1)
BM	-1.46	0.55	-3.26	0.02	I(1)

After knowing the order of integration, this study moves on to find the long run relationship between variables. The results of Johansen cointegration are provided in Table 2. The results of trace and max-eigen value statistics confirming the presence of one cointegration vector in the long run. These results suggest that a long run relationship exists between variables of the study. Thus, the results of Johansen cointegration indicate that the researcher can move on long run estimates obtained though cointegration regression.

Table 2 Co-integration Test: Long Run Relationship

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Max-Eigen Statistic	0.05 Critical Value
None *	0.380233	89.63264*	69.81889	44.97065*	33.87687
At most 1	0.188946	44.66199	47.85613	19.68559	27.58434
At most 2	0.140281	24.97641	29.79707	14.20810	21.13162
At most 3	0.078151	10.76830	15.49471	7.649145	14.26460
At most 4	0.032638	3.119157	3.841466	3.119157	3.841466

Note: * denotes rejection of the hypothesis at the 0.05 level of significance

The long run results of DOLS are given in Table 3. All explanatory variables are found to be significant factor of inflation in Azerbaijan except supply of money. It can be seen from the table that economic growth has negative and significant effect on inflation whereas trade openness (XO and MO) both are positive and significant contributor of inflation in Azerbaijan. The magnitude of export openness as well as import openness is almost same and it can be deduced from long run estimates that the positive impact of trade openness on inflation can be tackle by economic growth. These results are indicating that Azerbaijan can reduce inflation through maintaining sound economic growth. The average growth rate of the economy was around 10 percent between 2000 and 2004 and Azerbaijan experienced a very low inflation in

those years. In last couple of years economic growth is on down turn while inflation remained positive so, if Azerbaijan maintained good economic growth it will have low level of inflation. The positive effect of trade openness on inflation is in line with past studies such as Haq et al. 2014 found a positive effect of trade openness on inflation in case of Sri Lanka. Similarly, Zakaria (2010) also found positive effect of trade openness on inflation in Pakistan. This finding of the study also resembles with the findings of Jafari et al. (2011). Thus, the results of the current study do not verify the existence of Romers' hypothesis in Azerbaijanm instead validating the idea of Terra (1998) that trade openness leads to inflation. This study finds an insignificant effect of supply of money on inflation so it can be deduced from this finding that inflation is not a monetary phenomenon in Azerbaijan.

There are certain reasons that trade openness does not lower inflation in Azerbaijan. First, Azerbaijan export base is very weak as petroleum products constituting large portion of the exports of Azerbaijan. The reason that why openness did not reduce inflation in Azerbaijan is that their export base is weak. Secondly, Azerbaijan imports are spread over the range from raw materials to final consumer goods. Thirdly, lack of skills and competitive environment at industrial level is another reason that especially export openness is responsible for inflation in Azerbaijan. This study recommends that fiscal and monetary policy coordination is need of the day to reap fruits of the trade openness. Azerbaijan requires broadening its exports base and encouraging private investment in export sector. Similarly, Azerbaijan needs to encourage competitive business environment to lessen the cost of production and bring efficiency in production.

Table 3 Long Run Results of DOLS

Dependent Variable: INF				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
EG	-15.87275	3.193172	-4.970841	0.0000
XO	7.934522	1.472542	5.388317	0.0000
MO	7.902631	1.600700	4.936986	0.0000
MS	-2.166392	1.710290	-1.266681	0.2110
Constant	-115.1727	23.49381	-4.902258	0.0000
R^2	0.986854	Adjusted R^2	0.977574	

CONCLUSION

The effect of trade openness on inflation is not established in the literature and numerous studies are devoted to trigger out this relationship. This study also adds the case of Azerbaijan to this existing literature. The inverse relationship between inflation and trade openness is

referred as Romers' hypothesis in the literature. In order to achieve the main objective of the study, this study utilized economic growth and supply of money as control variables based on literature. The results of unit root test identified that variables of the study are integrated of order one. The Johansen cointegration test results show that variables are in long run relationship. The long-run estimates of DOSL suggested that the Romers' hypothesis is not valid in case of Azerbaijan. The results highlighted the negative and significant effect of economic growth on inflation. Moreover, the results also show that inflation is not a monetary phenomenon in Azerbaijan as the supply of money does not come out with a significant contributor to the inflation in Azerbaijan. However, it is recommended that monetary and fiscal policy coordination is very essential in Azerbaijan to tackle inflation. Thus, in future research, more research is needed to apply and test the effect of monetary and fiscal policy on inflation in Azerbaijan economy.

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