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Inflation and Trade Freedom: An Empirical Analysis

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Abstract: Trade freedom means omitting tariff barrier and non-tariff barrier. In this paper, the effect of trade freedom on inflation in 15 countries of Middle East and North Africa in the period 1996-2009 using GMM is investigated. The results show that trade freedom has had meager and significant effect on the inflation rate of these countries. Hence, the conclusion is that trade freedom has small inflation expense.

JEL classification: F10, E31, C23
Key words: Trade freedom · Inflation · GMM · MENA region

INTRODUCTION

Economic freedom is an excellent aim that economists have been paying attention for a long time in the literature of economy. Sometimes this concept was discussed like an obstacle for obtaining social justice, but after the failure of centralized programming system it is remarked as an aim for the global economy in the guise of words like economic freedom, globalization or a part of adjustment program. Economic freedom is one of confirmations of social freedom that it is very notable for the economists to measure. After the numerous studies (which were administered by economists) two indexes were defined for economic freedom degree that the most famous of them are calculating by Fraser Institute and Heritage Foundation. They are complex index and have been calculated by algebraic process with different ways from sub index and have been published every year. In both of them trade freedom is a very important part of economic freedom index that shows countries policy for omitting barriers in international trade. Trade freedom index is a part of economic freedom that measures reduction in tariff and non-tariff barriers (the methodology of Heritage index, 2009[1]).

In the present paper we used trade freedom calculated by Heritage Foundation. This is the weighted mean of tariff barriers and non-tariff barriers (Heritage, 2009). The positive effect of openness on growth and possible link between them has been an important factor in stimulating an unprecedented wave of trade reforms in many countries and they have committed to some kind of trade freedom over the last 30 years [1].

Because of this, the effect of trade freedom and openness on macroeconomics variables has been object of attention by economists. We expected that increasing trade freedom index due to reduction in tariff and non-tariff barriers will result into the reduction of inflation [2], but regional observations shows increasing in economic freedom and increasing in inflation were synchronic [3, 4]. Because of this, the effect of trade freedom or openness on inflation is been under consideration by economists. These investigations didn't have similar results that we are going to explain in the background review. This paradox is the excuse of cross section's study. The present paper uses the panel data of 15 countries (MENA region) with GMM using of Gordon theory during 1996-2009. These countries belong to developing countries and they are geographically located next to each other. In the meantime they have similar trade from the point of view of exporting produce (most of them are exporting natural resources) and similar policy trade for increasing in freedom trade(because in all of them trade freedom index in the end of period were bigger than first of period and bigger than average of this index too). The statistical data from these countries have been obtained from World Bank website[2], 2011 and Heritage, 2009[3].

[1]http://www.heritage.org/index

[2]http://www.worldbank.org/

[3]Djibouti, Malta, Iraq, Lebanon, Gaza and United Arab Emirates have been removed from the area (21 countries) because of statistical data deficiencies

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The remainder of this paper is structured as follows: Section 2 provides literature review. Section 3 outlines the data and the econometric methodology. Section 4 presents our findings. Finally, Section 5 summarizes our findings and concludes the paper.

Literature Review: Is the trade freedom effective on inflation? The investigations for answering this question has been started from many years ago and the various results have been gained. Romer [2] was a pioneer in this subject. He showed trade freedom had a negative effect on inflation but it wasn't strong in OECD countries. After Romer others investigated this subject in different cross sections and periods but the results are not similar to each other.

Lane [5] in his investigation searched this relationship with Romer's data on 114 countries. He generalized the result of Romer and showed increasing in openness led to reduce in expected inflation, in addition he believed when the size of countries are in control the Romer's result has been generalized for OECD. Sachida and *et al* [6] consulted the effect of openness on inflation with panel data in 152 countries was negative. Jin [7] in two different papers investigated the openness effect on inflation using VAR in Korea and Japan. He showed a shock to openness has negative effects on the price level but no longer-run effects. The negative price effect of openness was also consistent which the general belief that increasing openness reduces tariffs, so to have lower import prices, in South Korea, before the crises of 1997-1998 and in Japan the openness effect on inflation was ineffective in the both long time and short time.

Daniels and VanHoos [8] in using the effect of openness on the output- inflation trade off and intend to sacrifice ratio, showed inverse relationship between openness and inflation was not necessarily the case. Badinger [9] contemplated relationship between inflation and openness and financial freedom and size of the countries. He showed that openness and financial freedom have a negative and measurable effect on inflation and his results is approaching to Lane's results when he considers the population and the state of countries, but this relationship is not robust for the OECD countries.

Even though in these investigations that show the effect of trade freedom on inflation is negative, but there are other investigations that don't approve this effect. For example Terra [3] investigated this relationship and showed it isn't robust. Terra's result showed the relation only for the countries that had a big outside debt. Gruben *et al*. [10] approved the results of Terra in their research and showed that trade freedom in 90's has had a stronger anti-inflationary effect on economies with floating exchange rate system. Alfaro [4] examined Romer's subject since 1973 - 1998 in a panel data model. His findings show that trade that is more open has not had a restrictive role on inflation in the short time. Table 1 has shown the outline of these investigations.

Despite all of these approaches, the results are not the same. It may be because of their differences in countries or differences on the methods. In present paper MENA region has been researched because of the reason that we mentioned in the previous part. The methodology of research is offered below.

- Methodology of research is offered below.

Model Specification and Data Description: As mentioned before, in this study, trade freedom is presented by using the index which has been calculated by Heritage foundation. To calculate this factor, Heritage uses the average weight of tariffs rate or tariffs average, non-tariff barriers like shares and justification and corruption in custom services like bribe and stealing [11]. Nontariff barriers have a great role in trade policies of the countries, but they are quite qualitative. To include them in economic freedom index, we consider the rate of their existence and present them numerically in NTB which is introduced in equation (1). The more the rate of these barriers and corruption, NTB_s the number is greater and so, tread freedom rate reduces. Trade freedom average in the year of the end of the research (2009) was more than its average in the year of its start (1996). Figure (1) shows the comparison of the inflation [12] and trade freedom. As it can be seen in this diagrams in the years in which trade freedom average has a constant trend, inflation has a relative constant trend and in the years of the change in trade freedom degree, inflation has changed too, but the movement speed of these two variables is neither constant nor similar.

Trade freedom index is calculated yearly by Heritage foundation and by using the equation (1). In fact this index combines the ratio of the custom tariffs of the country with non-tariff barriers. Non-tariff barrier include six parts: quantitative restrictions, price restrictions, cycle restriction, investment restrictions, custom restrictions and direct intervene of the government which is shown by NTBs.

Table 1: Headline of background

Year	Countries	During	Method	Result
Romer (1993)	112countries	1973-1989	OLS	-
Lane (1997)	114countries	1973-1988	OLS	-
Terra (1998)			OLS	-(not robust)
Sachsida and *et al* (2003)	152 countries	1950-1992	Panel Data	-
Gruben and McLeod (2004)	Gruben and McLeod	1981-1996	Panel Data	-
Alfaro (2005)	Alfaro	1973-1998	Panel Data	+
Jin (2006)	Korea			
Japan	1960-1997	VAR	-	
effectiveness				
Danielsand7 VanHoos (2006)	_____	Theoretical analysis	+	
Badinger (2009)	91 countries	1985-2004	Panel Data	-

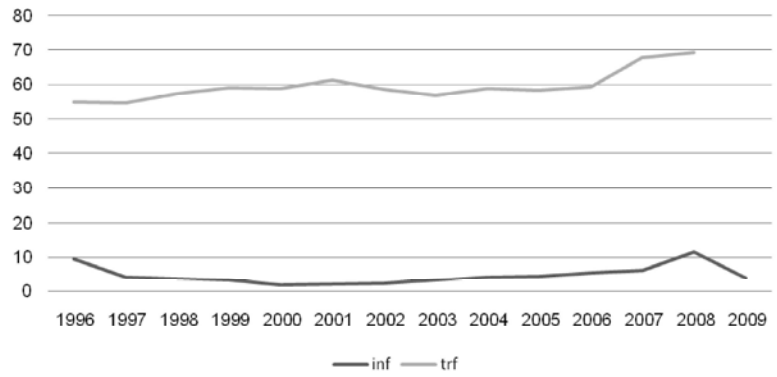

Fig. 1: The comparison between inflation average and trade freedom average in 1996-2009

$$Trade\ Freedom_i = \frac{Tar\ iff_{\max} - Tar\ iff_i}{Tar\ iff_{\max} - Tar\ iff_{\min}} \times 100 NTB, \quad (1)$$

The first component of the above-mentioned equation is the average weight of the tariff trading and the second component is non- tariff barriers which can have a number between Zero and twenty. When the number is closer to Zero, there is lesser trade restriction.

About the other component of this diagram which shows the average trend of inflation, it should be said that its rate in each country is estimated yearly by using the Consumer Price Index (CPI) that the yearly average of the area is presented. Inflation rate is the percentage of the changes in the index of the prices of every period in comparison to the previous period. And the effective factors are studied in different economics schools and in most of them the cash growth is a considerable factor. But the school of New Keynesian has introduced the most perfect inflation theory by Gordon. In this theory, inflation is the total supply changes resultant, total demand and inflation inertia. For the index of total supply changes, the changes of GDP are used. Inflation inertia is the result of different and complicated factors which are effective in inflation continuity. For the indication of this factor, previous period inflation is used and trade freedom rate is added to the inflation function.

Gordon model includes all the effective variables on inflation so it is a good description for price level changes. In this model, three factors including total supply, total demand and inflation inertia cause inflation. Inflation input, is calculated by consumer price index and control variables are cash volume (M2) real GDP(y), previous period inflation rate ($inf_{(-1)}$) and trade freedom (TRF) as a target variable is added to the function. Mathematical form of this correlation is presented in function (2).

$$\inf = f\left(m_2^o, y^o, \inf(-1), trf\right) \quad (2)$$

As it can be seen in this function, inflation has appeared as a dependent variable with a lag in the right side of the equation. The existence of this dependent variable among descriptive variables of the equation is an obvious reason for using dynamic panel data model.

$$\inf_{it} = \beta \circ + \beta_1 m_{2it}^{\circ} + \beta_2 \overset{\circ}{yit} + \beta_3 \inf_i (t-1) + \beta_4 trf_{it} + U_{it} \quad (3)$$

For function (2), econometric model is introduced in estimation (3). In this function, i denote cross-sections and t denotes time.

And in it:

$$U_{it} = \mu_i + V_{it} \quad (4)$$

Since U_{it} is a function of μ, so certainly $inf_{i(t-1)}$ is a function of μ_i too. Therefore, there is descriptive variable which is correlated to residual and cause the OLS estimator to be bias and inconsistent. Using the generalized method of the moments can remove the relation in such a way that instruments matrix defined such that descriptive variable have no dependency on residual.

Another necessary description about this assumed model is the linear-logarithmic estimation in using econometric method generally prefers to another economic models. One of the advantages is that the estimation parameters in logarithmic model can simply be considered as the percentage changes and more important, is that logarithmic change of variables reduces the changeability of inputs and reduces the variance inconsistency. Under the given explanation and by following the usage of this model advantages, function (5) is studied have as a logarithmic model.

$$\log(C_{pi}) = \beta_0 + \beta_1 \log(M_2) + \beta_2 \log(yit) + \beta_3 \log\left(Cpi_{i(t-1)}\right) + \beta_4 (tr_{it}) + \varepsilon_{it} \quad (5)$$

Real GDP is according to the US dollar and is extracted from World Bank website [12]. Cash volume and consumer price index is extracted from this resource too. Model (6) is specified by using the moments generalized method.

$$\log(cpt_{i,t}) = \beta_0 log(cpt_{i,t-1}) + \beta_1^{'} X_{i,t} + \varepsilon_{i,t} \quad (6)$$

X_{it} is a matrix which is composed of cash volume logarithm, GDP logarithm and trade freedom index. Model (6) is used for measuring the effect of trade freedom on inflation. The results of this estimator will be represented in the next chapter.

Model Evaluation and Analysis: Theoretical bases show that making the trade freer has a decreasing effect on inflation. Other studies on Romer relation, don't confirm the perennial existence of this negative effect. Our estimations show that in Middle-East and North of Africa, there was no converse relation in the studying period. Certainly this effect rate is small but significant.

Table 2: The results Dependent variable: Log(CPI)

Independent variable	Coefficient	T statistic	Prob
Intercept	0.1456	2.11	0.036
$Log(m_2)$	0.0103	8.26	0.00
Log(y)	-0.0057	-2.02	0.04
$Log(Cpi_{(-1)})$	0.936	100.17	0.00
Trf	0.0004	4.22	0.00
J-test statistic		3.83×10^{-19}	
R^2		0.96	
DW		1.4	

The estimation of model (6) has been accomplished for 15 countries from Middle-East and the north of Africa which have complete statistical inputs. These countries include: Algeria, Iran, Jordan, Tunisia, Palestine, Kuwait, Bahrain, Saudi Arabia, Oman, Libya, Morocco, Yemen, Tunisia and Egypt.

Short Run Term: The estimation results in these countries which are accomplished by GMM method are shown in Table (2). These coefficients show the effects in short run period.

As it can be seen, the effect of trade freedom on inflation is nugatory and in the short time it is 0.0004. Control variables coefficients are significant and according to the theory. According to the estimation most effect on inflation is related to the inflation inertia factor. The highest coefficient (0.936) and t statistic confirms this analysis. The next important factor is the countries cash volume which as it is expected is positive (0.0103) and has a considerable significance. Increasing in real GDP reduces inflation and since these countries don't have high development, this variables coefficient is not big (-0.0057), although it is completely significant and according to the theory.

J statistic in table above (3.83×10^{-19}) confirms the significance of this correlation and the D.W test is appropriate.

Long Run Term: In this estimation the coefficient of $Log(Cpi_{(-1)})$ is 0.94 and less of one. So, the dependent variable is stationary. We can result in this regression the long time relation exists. For calculating of long run elasticity the short run coefficients have to be divided on (1-0.94). As a result the increasing in cash volume, led to 0.16% increase in inflation and one percent impure production increase, reduces inflation for 0.09 percent, one degree increase of trade freedom, has 0.0006 percent increase in inflation the fact that trade freedom increase inflation, is inconsistent with Romer's result but its positive effect rate is very small.

Removing custom barriers like tariffs and non-tariff barriers like limiting laws and corruption rate in customs determine the trade freedom degree. In these countries, trade freedom policy is adopted although it has no constant trend but in all of them, in the last year of the period, trade freedom degree was more than its beginning. But trade freedom not only didn't reduce inflation but also increased inflation slightly. How can we explain it?

First, trade freedom generally reduces or removes tariff and non-tariff barriers. The researches in this field showed shock therapy was uncommon. It means in a few countries omitted in non-tariff barriers and movement to fairly uniform tariffs happened quickly. Most developing countries tended to freer gradually. In the first step they began with the barriers embodied in rationing and exchange controls, proceeded to nontariff measuresand finally reduced tariffs. It means in the early stages of adjustment, minor tended to reducing in tariff barriers led to the minor net reduction of incentives to produce import substitutes, especially when currency depreciation is considered. Hence, the reducing effect on inflation is a little far exception Andriamananjara and Nash [11]. In other hands, increasing in trade freedom increases foreign currency demand. If foreign currency rate is freed under the government currency policies, this causes the national money value reduction, export increase, import the necessary condition for this task does not exist. First, when income distribution is not balanced, all people respond to increasing in this import goods price and so import reduction does not occur.

The second reason is price elasticity of export goods. Price elasticity of these goods should be more than one then export should affected by nautical money value reductions and significant increase in demand and consumption occur. But export goods of these countries don't have this characteristic.

CONCLUSION

In this paper, the effect of trade freedom on inflation is examined. According to some previous studies, like Romer's it was expected that. This effect to be decreasing but some other studies (Terra 1998) consider Romer's idea not strong enough. The result of examining the effect of trade freedom on inflation and trade capacity role from impure production on inflation in Middle-East and in the north of Africa in the period between 1996 to2000 showed that making the trade freer has a small and significant but increasing effect on inflation. For trade capacity from GDP on inflation the same result was achieved. In other word, in this area, trade freedom increase or making the trade openers don't reduce inflation, although it has a significant effect and disagrees with Romer's idea. This result can be because of special situation and economical attribute of this area. These countries generally export natural source and raw materials. It means freer trade can be ineffective on their net export. But in the other investigations in this area the effect of trade freedom on employment and operation productivity are positive Naceur *et al* [12]. So, according to small coefficient of trade freedom in inflation function (it means small inflation expense), using freedom policy in trade can be suggested.

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