



## **Composite Trade Shares Measurement for Trade Openness on Inflation among Selected Developing Countries**

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### **ABSTRACT**

This paper examines the nexus between trade openness and inflation among 42 selected developing countries between 1985 and 2014 using five years averages to validate the Romer hypothesis for the role played by trade openness in influencing inflation. As suggested by Romer hypothesis, trade openness has negative relationship with inflation yet there is no empirical consensus between trade openness and inflation. This paper follows the newly developed measurement proposed by Squalli and Wilson (2011) to consider a multidimensional index, composite trade shares, to measure for trade openness. The results from system GMM estimation indicated the rejection of Romer hypothesis when using Composite trade shares measurement for trade openness but support Romer hypothesis when using the trade shares measurement. The rejection of Romer's hypothesis using the composite trade shares measurement suggests that policymakers need to aware of inflation following greater trade openness. Apart from that, income redistribution and greater government expenditures are important in reducing the negative impact brought by greater trade openness.

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## INTRODUCTION

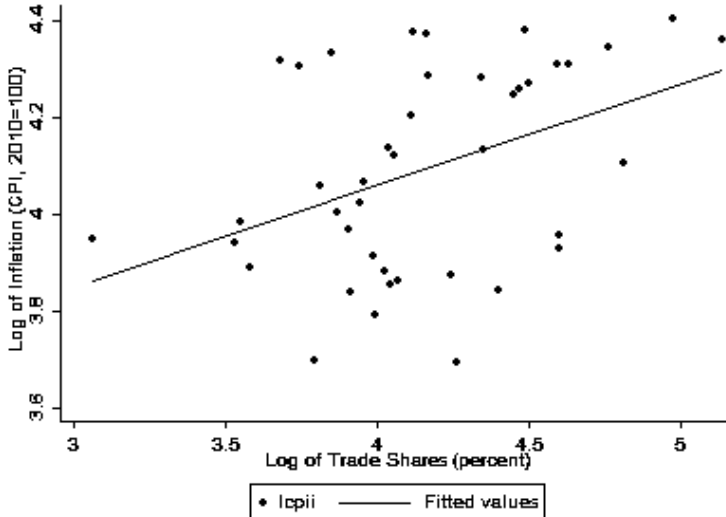
1980s and 1990s were the periods when the trade policy started to change following trade openness among the developing countries (Santos-Paulino 2005). Accordingly, trade openness brings positive externalities to the participating countries. Romer hypothesis which suggest that trade openness is able to bring down the inflation is one of the examples that emphasized on the influential role played by trade openness. Romer hypothesis seems to hold as there has also been significant reduction of inflation since 1990s in the world (Maaghool et al. 2014; Sikdar et al. 2013). However, the inflation rates in the developing countries remains high (Sepehrirand and Azizi, 2016; Fullerton et al., 2015). That explains why the ability to sustain for the desirable price levels becomes as one of the critical macroeconomic challenges in this era according to Thomas (2012). The desire arises from the concern of the negative effects of inflation on nations. For example, the rising of of poverty, wealth inequality, market imperfections, deficit in balance of payments, unemployment, smuggling, and even slowing down of economic growth (Ramzan, 2013).

Given the uncertainty of inflation on nation as a whole, the central banks have regarded price stability as one of their goals to ensure for controllable inflation rates (Fullerton et al., 2015; Qurbanaliera, 2013) for the health of the nations (Aurangzed and Haq, A. U. 2012). In order to ensure their objective is on target, the central banks have to identify the main causes of inflation. One of them is trade openness. According to Sepehrirand and Azizi (2016), increasing of trade openness following the process of globalization, one of the topics greatly discussed is on the relationships between trade openness and inflation.

Since trade openness is an important variable that influence the inflation rates, it is worth to pay attention on its measurements. According to Aliyev and Gasimov (2014), there are various definitions for measuring the degree of trade openness. Traditionally, trade openness is defined as the ratio of total trade (exports and imports) to GDP (Leamer, 1988; Wynne and Kersting, 2007; and Maaghool et al., 2014). Different from most of the studies, this study follows the composite trade shares developed by Squlli and Wilson (2011) that consider the multidimensional nature of trade openness. The reason for the use of the composite trade shares developed by Squlli and Wilson (2011) is that it serves as a better measurement for trade openness since it accounts for more dimensions of trade openness, both internal (domestic) and external (international) dimensions.

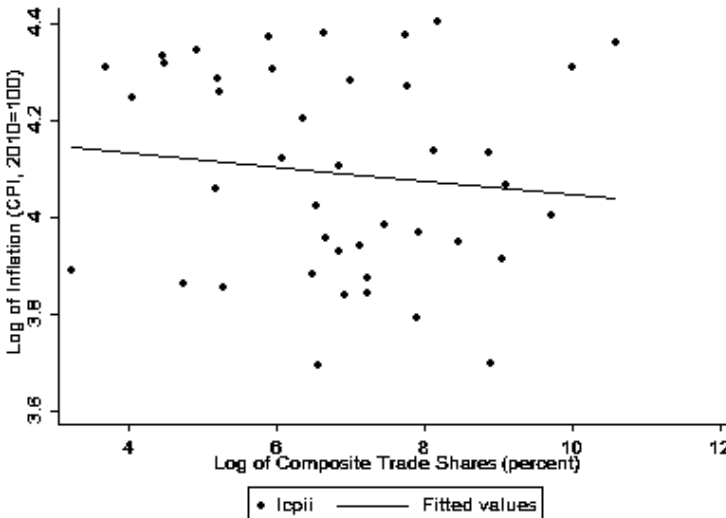
Figure 1 shows trade openness measured by trade shares seems to have a positive relationship with inflation when accounted for from 1985 to 2014. The observed trend seems to against with Romer hypothesis and hence confirmed traditional inflation theory which believed inflation is imported from trading activities through the increase in the import price of the products imported by the nations (Al Khathlan, 2011; Altowajiri, 2011). When trade openness is measured by composite trade shares as in Figure 2, the slope of the curve is relatively flat and the relationship with inflation tends

to be negative which is likely to support Romer hypothesis. Further and more formal empirical analysis is therefore needed to confirm the validity of Romer hypothesis in the context of the developing countries.



Source: World Bank (2016)

Figure 1 Scatter Plot of Trade Shares-Inflation, 1985-2014



Source: World Bank (2016)

Figure 2 Scatter Plot of Composite Trade Shares-Inflation, 1985-2014

The issue that this study intends to address is the relationships between trade openness and inflation. According to Romer's (1993) hypothesis, trade openness is disinflationary. Being disinflationary, the nations would be able to reduce the macroeconomic instability. However, this outcome is against with conventional theory of inflation which predicted a positive relationship between trade openness and inflation since inflation is assumed imported from external environment via trading activities. It is important to highlight that Romer hypothesis was tested under the environment of developed nations. Referring to previous empirical studies on trade openness-inflation, some of the findings are in line with conventional theory of inflation such as Mahmoudzadeh and Shadabi (2012), Samimi et al. (2012), Thomas (2012) and Kurihara (2013) whereas some are supporting Romer hypothesis such as Hanif and Batool (2006), Mukhtar (2012) and Samimiet al. (2011).

A preliminary observation from the scatter plots in the previous section showed that the relationships between trade openness and inflation inconsistent over the different periods. For instance, trade openness negatively influenced inflation in 1980s and 2000s but positively influenced inflation in 1990s. In accordance with Romer's hypothesis, if trade openness is proven to be an important contributor that is able to lower the inflation rates in the case of developing Asia, greater openness in trade sector is the trade policy that is supposed to be adopted so that the objective of having low and stable inflation rates could be achieved through trade openness. Since there is inconsistent relationship observed based on the preliminary observation, this study intends to empirically examine the exact relationship that takes places between trade openness and inflation in the case of the selected developing countries.

The structure of this study is as follows. In Section 2, this study introduces the commonly used trade openness measurements, followed by the newly introduced composite trade shares measurement for testing the relationships with inflation in selected developing countries. Section 3 describes the data and variables used in the study. Section 4 reports and discusses the results of study. Finally, the last section in this study concludes the findings and suggests possible future advancements.

## **LITERATURE REVIEW**

Theoretically, there are several schools of thought explain the phenomenon of inflation to figure out the relationships of inflation with other economic variables. According to Maaghool et al. (2014), one of the most popular views is from Classic and Chicago schools which regarded liquidity growth as the main factor causing inflation. Apart from that, there are Keynesian and neo-Keynesian schools which believed wages or other forms of income as the key factor for inflation. Additionally, there are new classics schools which proposed that the expectations of inflation are to be blamed for causing inflation. Another is from the new Keynesian schools which suggest three main factors for inflation, including total demand; total supply; and inertial inflation. All of these

schools of thought did not pay particular attention on the role played by trade openness in influencing the inflation. It is Romer (1993) who realized the importance of trade openness in influencing inflation outcomes of the countries by using the studies conducted by Barro and Gourdon (1983) and Rogoff (1985) as the basis in explicitly recognizing the role played by trade openness in influencing inflation.

Romer (1993) believed that trade openness served as a constraint on inflationary behavior of the policymakers and had a favorable impact on inflation rates by reducing the inflation rate. Romer (1993) who incorporated trade openness into inflation rates had provided detailed discussion on the theoretical background of trade openness in influencing the inflation rate of a country. Romer (1993) believed that trade openness limits the incentive to inflate among policymakers. This is because trade openness places constraints on the monetary expansion behavior and hence, prevents the depreciation of the exchange rates which will eventually have an impact on price level. Starting Romer (1993), trade openness started to be regarded as an important variable that explains the condition of inflation.

Some studies obtained findings that support Romer hypothesis which predicted a negative relationship between trade openness and inflation. The study by Sachida, Carneiro, and Loureiro (2003) confirmed the hypothesis that there exists a negative relationship between trade openness and inflation in 152 countries between 1950 and 1992 using various estimations such as the fixed effect, random effect and maximum likelihood estimations. They have proven that the result holds regardless of the samples of countries and time and hence concluded that the countries with greater openness in trade have a less inflation rate. Gruben and McLeod (2004) also found Romer's (1993) hypothesis as true and it is especially strong during the 1990s by using a dynamic panel approach of GMM method which cover the years from 1971 to 2000.

On the other hand, other studies obtained findings that against with Romer hypothesis which means there is a positive relationship between trade openness and inflation. For instance, Samimi et al. (2012) found the existence of a positive relationship between openness and inflation using the panel data approach which consisted of two sample periods (1990 to 1999 and 2000 to 2009) and two categories of countries (developed and developing countries) when using the standard trade measurement. The findings contradicted Romer's (1993) findings. Besides trade openness, lag of inflation and money supply had a positive influence on inflation while government expenditures and income per capita had a negative influence on inflation.

The comparison made between developing and developed countries shows that there are limited studies which focus specifically on trade openness and inflation in developing countries (such as in the study by Yiheyis, 2013 and Munir et al., 2015). Likewise, studies that cover a relatively long periods of study (1985 to 2014) using the dynamic panel data approach are limited. Majority of the studies that focused on developing countries only captured a short period of study in which the author believes is unable to reveal the true relationships between trade openness on inflation, income

inequality, and economic growth. This is due to the fact that trade openness has started rapidly in 1980s among developing countries.

## MEASUREMENTS FOR TRADE OPENNESS

As suggested by traditional trade theory, international trade or openness to trade plays an important role in influencing the growth of a nation. Nevertheless, in recent years, there is a debate among scholars in conceptualizing and measuring trade openness. According to Squalli and Wilson (2011), trade openness means different thing to different people For instance, Krueger (1978) defined it as the open economy that adopted friendly export-oriented policies. Harrison (1996) regarded trade openness as the neutral incentives arrived between import substitution policies which are inward orientation and exports promoting policies which are outward orientation. Meanwhile, Anderson and Neary (1992) refer it as the level of trade distortions that occurs due to tariff and nontariff barriers (NTBs). Recently, Dowrick and Golley (2004) defined trade openness as “revealed openness”. Besides that, they also introduced another concept of openness which they termed it as “policy openness” (which covers the scope of trade barriers such as non-tariff barriers and average tariff level).

This shows that there is no clear cut definition on trade openness (Yanikkaya, 2003). In a very recent work, Squalli and Wilson (2011) pointed that trade openness is commonly measured in terms of its share of the income for a given nation, that is, in the form of export plus import over GDP or in terms of export or import alone over the GDP. This is supported by Sakyi et al. (2015), Dehesa (2007) and Liu et al. (1997), to name a few. Sakyi et al. (2015) regarded trade openness itself is an issue since it has various measurements but agreed that the share of total trade in GDP, also known as nominal trade shares, as the standard measurement for trade openness. Squalli and Wilson (2011) asserted that trade openness refers to open economies which have comparatively high trade shares to overall economic activities and substantial interaction to the world. This is different from trade liberalization which concern trade protection through tariffs and non-tariff barriers (NTBs) (Goldberg and Pavcnik, 2004). Tariffs and non-tariff barriers (NTBs) are two kinds of trade barriers that prevent the process of freer trade regime and are regarded as governmental intervention in international trade via trade policy (Shafaeddin, 2005). Thus, it is obvious that trade openness is different with trade liberalization in term of its dimension of measurement. Caution is therefore needed in using these two terms. Table I summarized the existing measurements for defining standard trade openness.

Three types of trade openness measurements developed by Squalli and Wilson (2011) are considered in this study, including trade shares (TS), world trade shares (WTS), and composite trade shares (CTS). Having three measurements for trade openness is informative since it is expected to alter the strength of the relationships between trade openness with inflation in different dimensions. Accordingly, TS captures

only the domestic dimension while WTS only concerns the global dimensions. By combining these two into a single measurement, CTS has the advantage of able to capture the multi-dimensional of trade openness and hence able to provide a better understanding of trade openness condition of the nation. As suggested by Romer (1993) hypothesis, trade openness is expected to have negative relationships with inflation. Table II listed the trade openness measurements used in Squalli and Wilson (2011).

Table 1 Existing Standard Measurement for Trade Openness

Measurement	Definition
$M_i / GDP_i$	Import trade shares
$X_i / GDP_i$	Export trade shares
$(X + M)_i / GDP_i$	Standard trade shares
$1 - [(X + M)_i / 2GDP_i] \times 100$	Adjusted trade shares
$M_i / GDP_i - (1 - GDP_i / \sum_{i=1}^k GDP_i)$	Adjusted trade shares
$(X + M)_i / rGDP_i$	Real trade shares

Source: Extracted from Squalli and Wilson (2011), Table 1, page 1746.

Table 2 Trade Openness Measurements Used in Squalli and Wilson (2011)

Measurement	Definition
$(X + M)_i / GDP_i$	Standard Trade Shares (TS)
$(X + M)_i / \sum_{j=1}^n (X + M)_j$	World Trade Shares (WTS)
$N (TS \times WTS)$	Composite Trade Shares (CTS)

## EMPIRICAL MODEL

Romer's hypothesis suggested that monetary variable and trade openness are found to be the sources of inflation. However, this does not mean the sources of inflation are limited to monetary variable and trade openness. Totonchi (2011) stated that public expenditures are also another source of inflation under the demand pull theory of inflation by the Keynesian school of thoughts. Besides the demand pull theory of inflation, there is the cost push theory of inflation which is related to wage price. Wage is the payment made by any firms who hire labors for production processes. It is the cost borne by firms; hence, an increase in wage is expected to give rise to the outcome of inflation. Income per capita is another factor influencing inflation and the Balassa Samuelson effect which explains the relationship between income per capita and inflation. The long run price level only achieves the equilibrium when the level of income per capita is sustainable (Andersson, Masuch, & Schiffbauer, 2009).

Hence, this study included trade openness (*TO*) as the main variable of concern in addition to income per capita (*YPC*), monetary variable as represented by money supply (*MS*), and government expenditures (*GE*) as control variables for examining the Romer's hypothesis.

$$\log INF_{it} = \alpha + \beta_1 \log TO_{it} + \beta_2 \log YPC_{it} + \beta_3 \log MS_{it} + \beta_4 \log GE_{it} + \varepsilon_{it} \quad (1)$$

From Equation (1),  $\log INF_{it}$  refers to the dependent variable of study for inflation while  $\log TO_{it}$ ,  $\log YPC_{it}$ ,  $\log MS_{it}$ , and  $\log GE_{it}$  are all represents for the independent variables of study.  $\log TO_{it}$  is the main variable of interest in the study for trade openness. The remaining independent variables such as GDP per capita ( $\log YPC_{it}$ ) money supply ( $\log MS_{it}$ ), and government expenditures ( $\log GE_{it}$ ) are the control variables in this study.

## Data

This study covered the panel data from 1985 up to 2014 using five years averages and involved forty-two selected developing countries as listed in Table 3 based on data availability. This study focused particularly among developing countries since developing countries have been actively pursuing greater trade openness compared to developed countries since the 1980s. At the same time, developing countries have been experiencing inflation. World Bank data sets are the main source of all data analysed in this study.

Table 3 Lists of Selected Developing Countries in the Study

Sample of Countries
Algeria, Belize, Bhutan, Bolivia, Botswana, Brazil, Burkina Faso, Burundi, Cameroon, Central African Republic, Chad, Colombia, Costa Rica, Cote d'Ivoire, Dominica, Dominican Republic, Ecuador, Egypt, Arab Rep., El Salvador, Fiji, Gabon, Ghana, Grenada, Guatemala, Honduras, Indonesia, Kenya, Madagascar, Malawi, Malaysia, Mauritius, Mauritania, Mexico, Morocco, Nepal, Niger, Nigeria, Pakistan, Panama, Philippines, Senegal, South Africa, St. Lucia, St. Vincent and the Grenadines, Thailand, Togo, Tunisia, Turkey, Vanuatu

As for the descriptive statistics, Table 4 shows the statistics on the mean, maximum, minimum, and standard deviation for all the variables. As indicated by Table 4, the dependent variable, inflation (CPI) for the sample countries has a mean index of 62.08 with a maximum index of 141.98 and a minimum index of 0.000006 and an index of standard deviation at 34.50. The main variable of interest, composite trade shares (CTS), has a mean percentage of 3430.31 with a maximum percentage of 54299.48 and a minimum percentage of 5.39 and with a standard deviation percentage of 7697.80.

Table 4 Descriptive Statistics for Trade Openness and Inflation (Composite Trade Shares)

	Inflation (CPI)	Composite Trade Shares	Income per capita	Broad money	Government expenditures
Mean	62.08	3430.31	1.77	31.85	4.65
Maximum	141.98	54299.48	9.32	1463.29	107.39
Minimum	0.000006	5.39	-6.53	-13.45	-13.27
Standard Deviation	34.50	7697.80	2.33	145.64	8.09
Observations	252	252	252	251	225



As for other control variables, income per capita has a mean percentage of 1.77 with a maximum percentage of 9.32 and a minimum percentage of -6.53 and a standard deviation percentage of 2.33. Broad money has a percentage value of 31.85 with a maximum percentage of 1463.29 and a minimum percentage of -13.45 and a standard deviation percentage of 145.64. Government expenditures have a mean percentage of 4.65 with a maximum percentage of 107.39 and the minimum percentage of -13.27 and a standard deviation percentage of 8.09.

## Variables Description

Inflation ( $\log INF_{it}$ ) is the main concern in this study. This study uses the Consumer Price Index (CPI) with 2010 as the base year for inflation. The use of CPI is more advantageous than other proxies such as PPI which focuses only on inputs or raw materials of production and does not account for finished goods and services (Haile, 2017). The data for inflation is obtained from World Bank.

Trade openness ( $\log TO_{it}$ ) is the main variable in this study and is defined as total of exports and imports over GDP according to World Bank (2016). Three types of trade openness measurements developed by Squalli and Wilson (2011) are considered in this study, including trade shares, world trade shares, and composite trade shares. Having three measurements for trade openness is informative since it is expected to alter the strength of the relationships between trade openness with inflation in different dimensions. Accordingly, TS captures only the domestic dimension while WTS only concerns the global dimensions. By combining these two into a single measurement, CTS has the advantage of able to capture the multi-dimensional of trade openness and hence able to provide a better understanding of trade openness condition of the nation. As suggested by Romer (1993) hypothesis, trade openness is expected to have negative relationships with inflation. The data for trade openness is obtained from World Bank.

GDP per capita ( $\log YPC_{it}$ ) accounts for national sizes. Romer (1993) also included GDP per capita as one of the control variables for Romer hypothesis. The data for trade openness is obtained from World Bank.

Given the fact that monetary variable has influential role in determining the inflation rates, this study included  $\log MS_{it}$  which is money supply of M2 to represent for broad money. M2 is defined as the total of currency outside the banks, demand deposits other than central government, time deposits, savings deposits and foreign currency deposits of resident sector according to World Bank (2016). The data for money supply is obtained from World Bank.

This study also included  $\log GE_{it}$  which is defined as government expenditures for purchases according to World Bank (2016) and is measured by public expenditures growth rates. The data for government expenditures is obtained from World Bank.

## Methodology

This study applied two commonly used GMM estimations, namely system GMM and difference GMM estimations to examine the validity of Romer hypothesis that concerns the negative relationships between trade openness and inflation. Econometrically, the preferred estimation is system GMM estimation over difference GMM estimation due to the weakness of difference GMM that suffers from the problem of losing valuable observations which leads to poor performance since the results becomes bias and no longer precise according to Hou and Chen (2013).

Under system GMM estimation, there are one-step; two-step; and two-step with robust standard errors models. Among them, two-step with robust standard errors model is the preferred model since its standard errors has been corrected and two-step model is theoretically more robust than one-step model according to Roodman (2006). Hence, the discussions of the results of this study are based on system GMM in two-step with robust standard errors model. In addition, for the purpose of diagnostic checking, this study applied the Sargan test and serial correlation test to ensure the validity of over identifying restrictions and handle the autocorrelation problem.

## RESULTS AND DISCUSSIONS

Based on the preferred system GMM estimations in the two-step with robust standard errors model as shown in Table 5, trade openness as represented by composite trade shares (CTS) is found to be significant and positively related to inflation. A coefficient of 0.24 implies that a one percent increase in composite trade shares causes a 0.24 percent rise in inflation. This contradicts Romer's hypothesis. Only a few empirical studies have found a positive and significant effect of trade openness on inflation namely, Kim et al. (2015), Samimi et al. (2012), and Yiheyis (2013). Kim et al. (2015) provided possible reason for the positive relationship between trade openness and inflation by citing Loayza and Raddatz (2007) who believed that following greater trade openness among developing countries, their vulnerability to crises also increased due to their non-diversified sources of income and unstable policies. Hence, trade openness actually reinforces rather than reduces inflation among developing countries. This is different from the results obtained using the difference GMM since the coefficient of composite trade shares with inflation is statistically insignificant.

Table 5 Dynamic Panel GMM Results (Composite Trade Shares)

Variables	System GMM		
	One-step	Two-step	Two-step with robust standard errors
Lag inflation	0.56 (0.03)***	0.58 (0.03)***	0.58 (0.10)***
Composite trade shares	0.31 (0.04)***	0.24 (0.04)***	0.24 (0.08)***
Income per capita	0.02 (0.02)	0.02 (0.00)***	0.02 (0.01)***
Broad money	-0.01 (0.05)	-0.02 (0.01)	-0.02 (0.05)
Government expenditures	-0.02 (0.02)	-0.03 (0.01)***	-0.03 (0.02)**
Constant	-0.01 (0.27)	0.49 (0.25)**	0.49 (0.51)
Sargan test, p-level	0.00***	0.17	-
AR(1) test, p-level	-	0.62	0.77
AR(2) test, p-level	-	0.26	0.28
Number of Instruments	19	19	19
Number of Observations	157	157	157
Number of Groups	42	42	42

Note: Standard errors in parentheses. \*\*\*, \*\* and \* indicates statistical significance at the 1%, 5% and 10 % levels respectively

Among the other variables, it is interesting to note that income per capita, lag of inflation, and government expenditures exhibited a statistical significant relationship with inflation, leaving broad money as the only control variable that had an insignificant relationship with inflation.

As indicated by the Sargan test, the two step model has not rejected the null hypothesis of over identifying restrictions since it has a p-value which is greater than 0.05, hence confirming the validity of the instrument. As indicated by the two step with robust standard error system GMM estimations, AR (1) has a p-value which is greater than 0.05, and this indicates that there is no autocorrelation problem.

### Robustness Checking

In order to check for the robustness of the main results, this study used trade shares (total exports plus imports divided by GDP) as an alternative measurement for trade openness. Based on the preferred system GMM estimations in the two-step model with robust standard errors as showed in Table 6, trade openness as represented by trade shares (TS) is significant and negatively related to inflation. Trade shares have the coefficient of -0.57 which implies that a one percent increase in trade shares causes inflation to drop 0.57 percent. This is in line with Romer's hypothesis and different from the results obtained using the composite trade shares measurement.

Table 6 Dynamic Panel GMM Results (Trade Shares)

Variables	System GMM		
	One-step	Two-step	Two-step with robust standard errors
Lag inflation	0.68 (0.03)***	0.67 (0.02)***	0.67 (0.09)***
Trade shares	-0.62 (0.08)***	-0.57 (0.04)***	-0.57 (0.09)***
Income per capita	0.02 (0.02)	0.02 (0.00)***	0.02 (0.01)***
Broad money	0.06 (0.04)	0.06 (0.02)**	0.06 (0.05)
Government expenditures	-0.02 (0.02)	-0.02 (0.01)**	-0.02 (0.02)
Constant	4.10 (0.39)***	3.94 (0.17)***	3.94 (0.53)***
Sargan test, p-level	0.00***	0.03**	-
AR(1) test, p-level	-	0.82	0.92
AR(2) test, p-level	-	0.22	0.24
Number of Instruments	19	19	19
Number of Observations	157	157	157
Number of Groups	42	42	42

Note: Standard errors in parentheses. \*\*\*, \*\* and \* indicates statistical significance at the 1%, 5% and 10 % levels respectively

For the control variables, both income per capita and lag of inflation exhibits positive and statistical significant relationships with inflation. However, both the government expenditures and broad money variables failed to exhibit any significant relationships with inflation.

For the purpose of diagnostic checking, As indicated by the Sargan test, the two step model has rejected the null hypothesis of over identifying restrictions since it has a p-value which is smaller than 0.05, hence rejecting the validity of the instrument. As for the autocorrelation test, AR (1) has a p-value which is greater than 0.05 and this indicates that there is no autocorrelation problem in the two step model with robust standard error under the system GMM estimation.

## CONCLUSION

Based on a total of forty-two selected developing countries from 1985 up to 2014 using five years averages, this study has found positive and significant relationships between trade openness and inflation when adopted the newly developed composite trade shares measurement in system GMM estimation. However, the relationships between trade openness and inflation become negative and significant when this study uses the alternative trade shares measurement in system GMM estimation.

The rejection of Romer's hypothesis as suggested by the composite trade shares measurement suggests that policy makers need to be aware of inflation following greater international trade openness among the developing countries. Inflation targets set by central bankers should be continued to ensure that greater trade openness does not result into greater inflation. Both income distribution and fiscal policy are also important in influencing the outcome of inflation of these countries since income per capita and government expenditures have significant influence on inflation. Hence, income redistribution and greater governmental expenditures help in reducing the adverse impact from greater trade openness.

## REFERENCES

- Al Khathlan, K. (2011), "Inflation in the Kingdom of Saudi Arabia: The bound test analysis", *African Journal of Business Management*, Vol. 5 No. 24, pp. 10156-10162.
- Altowajri, H. A. (2011), "Determinants of Inflation in Saudi Arabia", *World Review of Business Research*, Vol. 1 No. 4, pp. 109-114.
- Anderson and Neary (1992), "Trade Reform with Quotas, Partial Rent Retention, and Tariffs", *Econometrica*, Vol. 60 No. 1, pp. 57-76.
- Andersson, M., Masuch, K. and Schiffbauer, M. (2009), "Determinants of inflation and price level differentials across the euro area countries", Working Paper no. 1129, European Central Bank.
- Aurangzeb and Haq, A. U. (2012), "Determinants of Inflation in Pakistan", *Universal Journal of Management and Social Sciences*, Vol. 2 No. 4, pp. 89-96.
- Aliyev, K. and Gasimov, I. (2014), "Openness-inflation nexus in South Caucasus economies", MPRA Paper No. 62761, Munich Personal RePEc Archive, Munich.
- Dehesa, G. (2007), *What do We Know about Globalization: Issues of Poverty and Income Distribution*, Blackwell Publishing, Malden.
- Dowrick, S. and Golley, J. (2004), "Trade openness and growth: Who benefits?", *Oxford Review of Economic Policy*, Vol. 20 No. 1, pp. 38-56.
- Fullerton, T. M. Martinez, M. Smith, W. D. Walke, A. G. (2015), "Inflationary dynamics in Guatemala", *Journal of Economics & Political Economy*, Vol. 2 No. 4, pp. 436-444.

- Gruben, W. C. and Mcleod, D. (2004), "The openness–inflation puzzle revisited", *Applied Economics Letters*, Vol. 11 No. 8, pp. 465-468.
- Goldberg and Pavcnik, (2004), "Trade, Inequality, and Poverty: What Do We Know? Evidence from Recent Trade Liberalization Episodes in Developing Countries," NBER Working Paper no. 10593, The National Bureau of Economic Research.
- Hanif, M. N. and Batool, I. (2006), "Openness and inflation: A case study of Pakistan" MPRA Paper No. 10214, Munich Personal RePEc Archive, Munich.
- Hou, N. and Chen, B. (2013), "Military expenditure and economic growth in developing countries: evidence from system gmm estimates", *Defence and Peace Economics*, Vol. 24 No. 3, pp. 183-193.
- Kurihara, Y. (2013), "International trade openness and inflation in Asia", *Research in World Economy*, Vol. 4 No. 1, pp. 70- 75.
- Liu, X., Song, H. and Romilly, P. (1997), "An empirical investigation of the causal relationship between openness and economic growth in China", *Applied Economics*, Vol. 29 No. 12, pp. 1679- 1686.
- Loayza, N. V. and Raddatz, C. (2007), "The Structural Determinants of External Vulnerability", *The World Bank Economic Review*, Vol. 21 No. 3, pp. 359-387.
- Maaghoor, M., Monfaredi, A. and Poormehri, S. (2014), "Globalization of economy and its impact on inflation in economic cooperation organization countries ECO", *Advances in Environmental Biology*, Vol. 8 No. 25, pp. 831-835.
- Mahmoudzadeh, M. and Shadabi, L. (2012), "Inflation and trade freedom: An empirical analysis", *World Applied Sciences Journal*, Vol. 18 No. 2, pp. 286-291.
- Mukhtar, T. (2012), "Does trade openness reduce inflation? Empirical evidence from Pakistan", *Journal of Economic Cooperation and Development*, Vol. 33 No. 2, pp. 33-52.
- Qurbanalieva, N. (2013), "An empirical study of factors affecting inflation in Republic of Tajikistan", MPRA Paper No. 51888, Munich Personal RePEc Archive, Munich.
- Ramzan, Fatima, K. and Yousaf, Z. (2013), "An analysis of the relationship between inflation and trade openness", *Interdisciplinary Journal of Contemporary Research in Business*, Vol. 5 No. 3, pp. 215-229.
- Romer, D. (1993), "Openness and Inflation: Theory and Evidence", *The Quarterly Journal of Economics*, Vol. 113 No. 2, pp. 649-652.
- Roodman, D. (2006), "How to Do xtabond2: An Introduction to "Difference" and "System" GMM in Stata", Working Paper Number 103, Center for Global Development.
- Sachsida, A., Carneiro, F. and Loureiro, P. R. A. (2003), "Does Greater Trade Openness Reduce Inflation? Further Evidence Using Panel Data Techniques", *Economics Letters*, Vol. 81 No. 3, pp. 315-319.
- Sakyi, D., Villaverde, J. and Maza, A. (2015), "Trade openness, income levels, and economic growth: The case of developing countries, 1970–2009", *The Journal of International Trade & Economic Development*, Vol. 24 No. 6, pp. 860-882.

- Samimi, A. J., Ghaderi, S. and Sanginabadi, B. (2011), "Openness and inflation in Iran", *International Journal of Economics and Management Engineering*, Vol. 1 No. 1, pp. 42-49.
- Samimi, A. J., Ghaderi, S., Ghaderi, K. and Ghaderi, S. (2012), "Openness and inflation: A case study for MENA", *Universal Journal of Management and Social Sciences*, Vol. 2 No. 1, pp. 50-56.
- Samimi, A. J., Ghaderi, S., Hosseinzadeh, R. and Nademi, Y. (2012), "Openness and inflation: New empirical panel data evidence", *Economics Letters*, Vol. 117 No. 3, pp. 573-577.
- Santos-Paulino, A. U. (2005), "Trade liberalization and economic performance: Theory and Evidence for developing countries", *The World Economy*, Vol. 28 No. 6, pp. 783-821.
- Sepehrivand, A. and Azizi, J. (2016), "The effect of trade openness on inflation in D-8 member countries with an emphasis on Romer theory", *Asian Journal of Economic Modelling*, Vol. 4 No. 4, pp. 162-167.
- Shafaeddin, S. M. (2005) "Towards an Alternative Perspective on Trade and Industrial Policies", *Development and Change*, Vol. 36 No. 6, pp. 113-1162.
- Sikdar, A., Kundu, N. and Khan, Z. S. (2013), "Trade openness and inflation: A test of Romer hypothesis for Bangladesh", MPRA Paper No. 65244, Munich Personal RePEc Archive, Munich.
- Squalli, J. and Wilson, K. (2011), "A new measure of trade openness", *The World Economy*, Vol. 34 No. 10, pp. 1745-1770.
- Thomas, C. (2012), "Trade openness and inflation: Panel data evidence for the Caribbean", *International Business and Economics Research Journal*, Vol. 11 No. 5, pp. 507-516.
- Totonchi, J. (2011), "Macroeconomic Theories of Inflation", 2011 International Conference on Economics and Finance Research. Vol. 4, pp. 459-462.
- Wynne, M. A. and Kersting, E. K. (2007), "Openness and inflation", Staff Paper No. 2, Federal Reserve Bank of Dallas, Dallas.
- Yanikkaya, H. (2003), "Trade openness and economic growth: a cross-country empirical investigation", *Journal of Development Economics*, Vol. 72 No. 1, pp. 57-89.