Remittances and Inflation: Evidence from O.P.E.C Countries

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Abstract

The aim of this paper is to investigate the impact of remittances outflows on inflation for a panel of 14 OPEC countries during the period 1980-2012. Using bias-corrected least-squares dummy variable (CLSDV) estimator, empirical results reveal that remittance outflows have no effect on inflation rate while trade openness and current account deficits have a positive impact. Further, oil price appears to not have any effect on inflation in OPEC countries.

***Keyword*:** Remittances, O.P.E.C, Inflation, CLSDV
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1. Introduction

For decades, explaining and fighting inflation has been a challenge for both scholars and central bankers. Inflation may hurt the economic and social stability by reducing the value of investments and increasing the costs of living.

There is vast literature explaining the sources and the determinants of inflation in order to detect the main factors behind its occurrence and to suggest adequate policy responses for fighting it. While some authors (Ubide 1997, Domac and Elbirt 1998, Chhiber *et al.* 1998, De Brouwer and Ericsson 1998, Leo 2007, Diouf 2008) have focused on the source of inflation using single country specific data, some others (Barnichon and Peiris 2007, Andersson *et al* 2009, Crowley 2010, Kandil and Morsy 2011) have investigated the issue for a group of countries or regions. In both cases the evidence is mixed and it produced conflicting results.

The aim of this paper is to contribute to the development of this literature by exploring the possible economic consequences of remittances as a new variable on inflation rate. Generally speaking, remittances flows are private transfers of money between countries which could affect the level of prices in hosting and receiving countries as well. Literature examined the impact of remittances on the inflation rate is recent and very limited.

To the best of our knowledge, only few papers have investigated this topic. The most recent study was conducted by Narayan *et al.* (2011) to inspect the determinants of inflation for 54 developing countries using a panel data set for a short period ranging from 1995 to 2004. The authors have used the Arellano and Bond panel dynamic estimator (GMM) and the Arellano and Bover and the Blundell and Bond system generalized method of moments estimator (SGMM). In addition to the usual economic variables that may affect inflation, the authors included remittance inflows and multiple institutional variables. The results revealed that remittances inflows increase inflation in developing countries (included in the sample). Furthermore, openness, debt, current account deficits, the agricultural sector, and the short-term U.S. interest rate appeared to have a significant positive effect on inflation. An interesting result showed that progress in democracy decreases inflation.

Another recent study was conducted by Termos *et al.* (2013) to investigate the impact of remittance outflows on inflation in the Gulf Cooperation Council Countries (GCC). They used three panel estimations techniques including ordinary least squares (OLS), fixed effects (FE) and Anderson–Hsiao (AH) estimator. The empirical analysis exposed that the remittance outflows reduce the inflation pressures in the GCC sending countries. They concluded that remittance outflows in the GCC countries play a role of stabilizers.

The purpose of this study is to develop the literature on the inflation-remittances relationship for oil exporting countries with special focus on OPEC countries. OPEC is an interesting case study. In fact, with globalization, the movement of labor forces around the world increased considerably, especially to rich countries seeking a higher salaries and wages. In some oil rich countries such as in Kuwait, Qatar and United Arab Emirates, the stock of immigrants of local population reached a critical level: 68.8%, 86.5%, and 70% respectively. Basically, the rise of oil prices generates a rise in inflation as well as a rise in remittances outflows[1,2]. During, high periods of high oil price, remittance outflows could absorb the excess of money in OPEC countries and could play a role of stabilizer. While the share of remittance outflows increased during the past years, one could expect a strong relationship between inflation and remittances. Do remittance outflows decrease/increase inflation rate?

To answer this question, we used a sample of fourteen OPEC member countries observed during the period 1980-2012. The estimation technique is based on bias-corrected least-squares dummy variable (CLSDV) estimator, a new technique developed by Bruno (2005a; 2005b). Results reveal that remittance outflows in OPEC countries have no effect on inflation rate while trade openness and current account deficits have a positive impact. We also found that oil prices do not have any inflationary belongings.

[1] Generally, as we have seen in several OPEC countries during the past few years, an increase in oil price is followed by an increase in government spending in projects and improvement of infrastructure. In this case, the number of foreign workers increase which in turn also increase the volume of remittance outflows in oil rich countries. According to recent study of the World Bank (WDI 2012), the value of remittances outflows from O.P.E.C countries reached 67 billion dollars in 2010.

[2] In the opposite scenario, a decrease in oil prices led automatically to a fall in remittance outflows because the demand for foreign workers falls.

The rest of the paper is organized as follows. In section 2, we present the econometric model and describe the estimation method. In section 3, we discuss empirical results and section 4 concludes.

2. Literature Review

Literature on the determinants of inflation has produced mixed and conflicting results either for single countries or for panel study.

For example, for country specific study, Ubide (1997) studied the determinants of inflation in Mozambique and showed that the marked tightening of monetary policy in 1996 was the ultimate reason for the control of inflation in 1996, and hence seems to correspond to a change in the fundamental trend of inflation that may have long lasting effects. Chhiber *et al* (1998) investigated the determinants of inflation in Zimbabwe from both structural and monetarist perspectives. They showed that inflation was influenced by nominal money growth, foreign prices, exchange rate, unit labor cost and real income. Domac and Elbirt (1998) studied inflation in Albania using monthly data from January 1993 to September 1997. They decomposed inflation into four components: seasonal, cyclical, trend and random. By applying co-integration and error-correction techniques they found that in the long run, inflation is positively related to both money supply and the exchange rate, while it is negatively related to real income. To fight inflation and promote the competitiveness of exports, the authors suggest reducing both the budget deficit and, concomitantly, reducing credit to the government are crucial in fighting inflation.

De Brouwer and Ericsson (1998) have used quarterly data, covering 1976 Q3-1993 Q3 for Australia. By using different estimation techniques (cointegration, general to specific modeling, dynamic specification, model evaluation and testing, parameter constancy, forecasting and exogeneity), they found that continued low inflation through the 1990s appears to turn on sustained low growth rates in unit labor costs and import prices.

In the Brazilian context, Dureval (1998) studied the dynamic of chronic inflation in Brazil during the period 1968-1985 by the use of ECM. The long run, results reveal that

domestic prices are determined by the exchange rate and world prices. Further, the author did not find evidence of money supply-led-inflation nor that money is a nominal anchor. However, he found that inflation increases when the rate of devaluation of the exchange rate increases and inflation decreases when output growth goes up. Sumaila and Laryea (2001)[3] investigated the determinants of inflation in Tanzania. Their results show that inflation is influenced more by monetary factors and to a lesser extent by volatility in output or depreciation of the exchange rate in the short run and long run as well. The authors recommend policymakers to tighten monetary and fiscal policies. They also advised the government to increase food production to ease some of the supply constraints in the long run.

Leo (2007); studied the determinants of inflation in Iran for the period 1988/89–2005/06. By performing error correction model, he found that money has a prominent role in determining the equilibrium price level in the long run and short run. However, empirical results reveal no evidence of a structural change in the relationship between money and inflation. The author's results suggest that controlling money growth is the most important policy for fighting inflation in Iran. Diouf (2008) investigated the determinants of inflation in Mali for the period 1979 Q1–2006 Q1. Using cointegration techniques and general-to-specific modeling, the empirical results show that inflation in Mali has both monetary and imported sources in both the short and the long term. To fight inflation, the author suggests the implementation of effective new policies to reduce food shortages and improve food security in Mali.

For the case of grouped countries, Barnichon and Peiris (2007) examined the sources of inflation in nineteen Sub-Saharan Africa countries during the period 1960 to 2003. Using heterogeneous panel cointegration estimation techniques (GMM), they found that output gap and the real money gap both contain robust and considerable information regarding the evolution of inflation. Further, the authors showed that the real money gap plays a larger role in inflation processes than the output gap. In the European context, Andersson[4] *et al*. (2009) used dynamic panel estimations for the period 1999-2006. The results show that inflation differentials vis-à-vis

[3]Ussif Rashid Sumaila and Samuel A. Laryea (2001) Determinants of inflation in Tanzania. Bergen: Chr. Michelsen Institute (CMI Working Paper WP 2001:12)

[4]Andersson M, Masuch K And Schiffbauer M (2009) Determinants Of Inflation And Price Level Differentials Across The Euro Area Countries Working Paper Series. No 1129 / December 2009.

the euro area is primarily driven by different business cycle positions and to some extent by changes in product market regulations. While external factors such as differences in nominal effective exchange rates, energy intensity and the fiscal stance play a minor role. Crowley (2010) inspected the relationship between factor input costs and inflation in the Middle East, North Africa, and Central Asia (MENACA) during the period 1996-2009 using different panel regression models. He found that inflation followed a perfect uniform pattern in all countries of the MENACA during the period under study. The same result was confirmed even when testing different cross sections of countries and when different estimators were included. The empirical analysis suggested that the pattern of inflation is explicated mainly by previous inflation, the strength of the US dollar, US inflation. Further, in some countries monetary and exchange rate policies and nonfuel commodity prices played an important role. This study came out with a number of controversial results that diverge from many works in related literature. For the author, the key one was that the changes in energy prices were statistically insignificant. This means that energy prices have no impact on inflation. This result was also confirmed using different models according to the variables used and subsets of countries. Ben Ali and Ben Mim (2011) evaluated the effect of both monetary and non-monetary determinants of inflation for a sample of 8 MENA countries over the period 1980-2009. The authors estimated multiples models (i.e. OLS, Fixed Effect, Random effect, GMM and SGMM) including different potential variables that may have an impact on inflation. Those potential variables were divided into 5 groups according to their kind namely structural, business-cycle-related, openness-related, external sector and monetary variables. The results revealed a clear persistence of inflation dynamics in these countries. Further, the world inflation and NEER have significant and positive effects on inflation. Moreover, a growth in money supply generates inflation. However, a strange result suggested that government spending has a negative impact on inflation. Recently, Kandil and Morsy (2011) explored the determinants of inflation in the GCC countries, using vector error- correction model including domestic and external variables that may affect inflation. The empirical analysis revealed that inflation in major trading partners seems to be affecting external variables the most. Further, oil returns increased inflation by allowing credit and spending expansions.

3. Data and Methodology

In our study, we used an unbalanced panel data for fourteen OPEC countries including Algeria, Angola, Ecuador, Gabon, Indonesia, Iran, Iraq, Kuwait, Libya, Nigeria, Qatar, Saudi Arabia, United Arab Emirates and Venezuela[5]. The dataset covers the period 1980 to 2012. Following previous studies on the determinants of inflation, we use the basic variables[6] such as: inflation rate, economic output in constant term (2005 US $), trade as a share of GDP, current account deficit as a share of GDP, total debt as a percentage of GDP, oil price, the U.S Treasury bill rate (3 months) and real remittances outflow. Data on remittances is obtained from the World Bank development indicator database (WDI 2014) except for United Arab Emirates which was extracted from the Arab Monetary Fund's online database. The other data was collected from different sources: the World Development Indicators (WDI), the International Financial Statistics (IFS) and Arab Monetary Fund online database.

Unlike Narayan et al. (2011)[7] who used Arellano and Bond (AB, 1991) and Blundell and Bond (BB, 1998) estimators and Termos *et al.* (2013) who used Anderson and Hsiao (AH, 1981) to explore the effect of remittances outflows on inflation, we used an alternative technique based on the bias-correction of the least square dummy variables estimator. Recently introduced by Kiviet, (1995), Judson and Owen (1999), Bun and Kiviet (2003), it was extended by Bruno (2005) to unbalanced panels as considered in our work. This estimation method is chosen because, given the small time span over which this study expands, it produces unbiased and consistent estimates compared to other techniques applied in the estimation of dynamic panel datasets such as and Anderson and Hsiao (AH) (1992) and Arellano and Bond (AB) (1991) (Kiviet, 1995, Judson and Owen, 1998). Using Monte Carlo estimation, Bun and Kiviet (2003) demonstrated that, in small samples, the LSDVC estimator outperforms consistent IV-GMM estimators such as the Anderson-Hsiao and Arellano-Bond estimators.

[5] Gabon withdrew from OPEC in 1995 and Indonesia in 2008.
[6] Narayan *et al.* (2011) explained thoroughly the effectiveness of these variables as a main determinant of inflation.
[7] Arellano and Bond estimator reveals one weakness. Its properties hold only for N large and as a result, properties could be biased and inaccurate in panel data with a small number of cross-sectional units, which is our case in this study. The same situation occurs with other well-known estimators used to study dynamic panel model namely Anderson and Hsiao (1981) and Blundell- Bond (1998) estimators.

Following Narayan et al. (2011) and Termos *et al.* (2013), the econometric model is specified as follows:

$$inflation_{i,t} = \alpha_0 inflation_{i,t-1} + \beta X_{i,t}^{`} + \delta remit_out_{i,t}^{`} + v_i + \varepsilon_{i,t}; \qquad i = 1,.., N;\ t = 1,..,T \qquad (1)$$

Where $inflation_{i,t}$ is the inflation rate of country i at time t; $remit_out_{i,t}$ is remittances outflows in real term X is a vector of the explanatory variables; v is country-specific effects; and $\varepsilon_{i,t}$ is the error term. As the inflation rate is negative in some periods, the model was therefore estimated using log [1+(*inf* /100)] as a dependent variable as. All the variables except T-bill and oil price are expressed in logarithm form. $Inf_{i,t-1}$ is obtained by lagging $inf_{i,t}$ by one period.

4. Results

In the first stage of our econometrics analysis we use both pooled OLS and fixed effect techniques to estimate the equation (1). This approach is for comparative purposes only. Table 3 shows the results of both estimations. The empirical results reveal that the first lag of inflation rate positively affect the current inflation rate and it is statistically significant in both estimations. This is not the case for remittance outflows, which are not statistically significant in both models. The remaining variables are not statistically significant under the OLS estimator. However, they are all significant under the fixed effect estimator except for oil price. Moreover, the signs are different. Gross Domestic Product and U.S Treasury bill have a negative impact on inflation while trade openness and current account deficit have a positive effect. It is well acknowledged in the literature that the inclusion of the lag of the independent variable makes the estimates of variables biased under OLS and FE estimators.

Table 3. OLS and Fixed Effect Estimations Results

	OLS		FE	
Inflation.L1	0.7699	(0.000)***	0.6229	(0.000)***
GDP	-0.0154	(0.448)	-0.4191	(0.000)***
Remittances Outflows	-0.0022	(0.578)	-0.0225	(0.114)
Trade (% GDP)	0.0287	(0.465)	0.1905	(0.003)***
Current Account deficit (% GDP)	-0.0358	(0.565)	0.1496	(0.041)**
Oil price	-0.0004	(0.577)	0.0014	(0.167)
Tbill	-0.0022	(0.643)	-0.0145	(0.014)**
Constant	0.3569	(0.548)	9.9227	(0.000)***
R^2	0.6027		0.6407	

Notes: p-values are in parentheses.
* significance at 10%.
** significance at 5%.
*** significance at 1%.

In the second stage, we estimated our models using bias-corrected least-squares dummy variable (CLSDV) estimator. The different results are presented in Tables 3. We estimated multiple alternatives of the basic inflation model to check the robustness of the effect of remittance outflows on the inflation rate in 14 OPEC member countries.

In model 1, we investigate the impact of the economic output, the first lag of inflation and the real remittances outflows on the inflation rate. In model 2, we added to the model 1 variables' the trade openness as a share of gross domestic product. In model 3 to 5, in addition to the above variables, we include sequentially current account deficit as a share, oil price and U.S Treasury bill.

Table 2. LSDVC Estimations Results

	Model 1	Model 2	Model 3	Model 4	Model 5
Inflation.L1	0.8109*** (0.0624)	0.7019*** (0.0611)	0.6938*** (0.0622)	0.6938*** (0.0623)	0.6938*** (0.0623)
GDP	-0.4327*** (0.1497)	-0.3612** (0.1806)	-0.4651** (0.2028)	-0.4651** (0.2028)	-0.4651** (0.2028)
Remittances Outflows	-0.0010 (0.0228)	-0.0091 (0.0266)	-0.0089 (0.0268)	-0.0091 (0.0268)	-0.0091 (0.0268)
Trade (% GDP)		0.1188* (0.0801)	0.1425* (0.0805)	0.14258* (0.0804)	0.1425* (0.0804)
Current Account deficit (% GDP)			0.1917** (0.1016)	0.1917** (0.1016)	0.1917** (0.1016)
Oil price				0.0025 (0.0022)	-0.0004 (0.0021)
Tbill					-0.0234** (0.0107)

Notes: bootstrapped standard errors are in parentheses (50 iterations; see Bun and Kiviet (2003) and Bruno (2005b)).
* significance at 10%.
** significance at 5%.
*** significance at 1%.

When analyzing the results of model 1 to 5, we can distinguish two significant outcomes. Firstly, the addition of different potential variables does not modify the sign and the statistical significance of the effect of remittance outflows on inflation. For example, through five models, we note that the effect of remittances outflows is negative and statistically insignificant. Secondly, we observed that the magnitude and statistical significance of the remaining regressors are steady throughout the different models.

In all five different estimations, lag of inflation rate has a positive sign and shows a strong statistical significance. The coefficients range from 0.6938 to 0.8109 demonstrating that present current inflation is positively and strongly related to last year's inflation rate.

As for lag inflation rate, the gross domestic output is strongly statistically significant. However, it has a negative effect on inflation. This result is consistent with the work done by Desai *et al.* (2003) which revealed a negative relationship between output growth and inflation

for a panel of 100 countries. The same result found by Aisen and Viega (2006), who explored the same relationship for a panel of 75 developing countries, Recently, Narayan *et al.* (2011) confirmed a negative effect of gross domestic product on inflation rate.

Surprisingly, remittance outflows variable has a negative impact but is statistically not significant on inflation. This result is found to be inconsistent with Termos *et al.* (2013) who found that remittance outflows exert deflationary pressures in GCC economies. There are two possible explanations. The first one could be related to the estimator used by the authors which is unreliable in the case of small sample. The second explanation is that remittance outflows amount from GCC countries is bigger compared to OPEC countries as it has been shown in the introduction and their effect on inflation represents a special case.

Trade openness shows a positive and significant coefficient in all models where it was included. This result is consistent with cost-push hypothesis, which suggests that trade openness does not certainly decrease inflation; rather it increases it. In other words, there is a positive effect of trade openness on inflation (Alfaro, 2005; Kim and Beladi, 2005; Evans, 2007). However, empirical literature on the relationship between trade openness and inflation is inconclusive. An alternative hypothesis, spillover hypothesis, put forward that trade openness is linked with falling prices and therefore protectionism is inflationary (Musa, 1974; Romer, 1993; Lane, 1997; Gruben and McLeod; 2004).

The current account deficit as a share of gross domestic product exposes a positive effect on inflation rate and the coefficient is statistically significant. The current account deficit variable was included in 3 out of the 5 models. Our result indicates that deficit generates inflationary pressure. In comparison with the outcomes from empirical studies, Narayan *et al.* (2011), for instance, found that current account deficit increases the inflation. Termos *et al.* (2013) found that current account deficit has a positive effect on inflation but statistically not significant.

One of the most important result in this study is that the price of oil does not have any significant effect on inflation, while the U.S. Treasury bill rate has a negative and significant effect on the inflation rate.

5. Conclusion

In this empirical research, we contributed to the literature that to distinguishes the factors affecting inflation by modeling the influence of remittances outflows on the inflation for a panel of 14 OPEC countries over the period 1980 to 2010.

To avoid finite sample bias and inaccuracy when using some estimator including Anderson and Hsiao (1981), Arellano and Bover (1995) and the Blundell and Bond (1998), we used bias-corrected least-squares dummy variable (CLSDV) estimator, recently introduced by Kiviet, (1995), Judson and Owen (1999), Bun and Kiviet (2003) and extended by Bruno (2005), to unbalanced panels. It was necessary to check the robustness of our results suggesting that remittance outflows have negative but statistically insignificant effect on inflation in OPEC countries. We could confirm our results by including different potential factors that usually affect the inflation according to the literature.

We estimated five different models and we found the remittances effect on inflation kept the same characteristics across all models. Moreover, we found that real gross domestic product exerts a deflationary pressure in the case of our sample. At the opposite, the current account deficit, which increases the inflationary pressure. The positive effect of openness on inflation confirms the side effect of a big share of imports in the trade balance. A surprising result confirms that oil price does not have any effect on inflation in OPEC countries.

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