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Article

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Oil Price Shocks, Exchange Rate Volatility and Private Consumption in MINT Countries

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Abstract: This study examined the impact of oil price shocks and exchange rate volatility on private consumption for the MINT countries using data between 1986 and 2016. The study was built on an adjusted theoretical framework which merged the Permanent income hypothesis and life cycle hypothesis. Transitory incomes were considered as positive and negative oil price shocks while permanent income were taken as three-year moving average of GDP per capita. It was observed that exchange rates clustered and were volatile. The Panel ARDL model was estimated using the Pooled Mean Group (PMG) Estimator. This study revealed that private consumption behaviour of the MINT economies converged in the long run despite noticeable short run differences. Exchange rate volatility was found to be insignificant in determining the long run private consumption in the asymmetric model. However, findings suggested that sudden temporary surge and decline in oil price inversely affected private consumption while permanent income had elastic relationship (elasticity value of 1.13) with private consumption. The study recommended a better management of transitory oil price shocks to improve private consumption.

Keywords: shocks; Oil price; consumption

JEL Classification: D51

1. Introduction

The plunge in oil prices since June 2014 could again engender a revisit to the literature on oil price shocks and its consequent multifaceted effects on the economy of both the oil exporting and importing countries. According to the Centre for Applied Macroeconomic Analysis (2015), the fall in oil prices was huge and its effect was similar to the oil price collapse of 1985 to 1986. Therefore, it is expected that common consequences such as income shifts, inflation and financial market pressures may occur among others.

Meanwhile, oil price developments have been found to add to volatility in financial and currency markets. Salisu and Mobolaji (2013) argued that since oil prices are quoted in United State Dollars (USD), fluctuations in oil prices may engender exchange rate volatility for the trading countries through the USD. Volkov and Yuhn (2016) noted that nearly 50% drop in oil prices that occurred between June

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and December 2014 was followed by a reduction in the value of some countries' currencies such as Mexico, Russia, Venezuela, Brazil, Nigeria e.t.c. Oil price fluctuations affect domestic economic activities like inflation, interest, GDP among others for both oil importing and exporting countries. Given the close interaction between crude oil prices and dollar exchange rates, it is realistic to assume that the exchange rate depends on conditional volatility represented by the conditional heteroscedastic variance.

There is no doubt that oil price shocks would be accompanied by changing agricultural and other commodity prices thereby affecting consumption. Furthermore, a slight change in exchange rate would affect the price of domestic goods and services and this may determine individual consumption levels and the production of those goods are directly influenced by the cost of exchange rate. In a country where the economy depends solely on importation of raw materials, exchange rate volatility induces risk premium for long-term arrangements, raises costs of production, reduces trade, causes unanticipated redistribution of interest rate and leads to fluctuation in the real economy with adverse effects on unemployment rate, poverty rate, and reduction in the growth of consumption (Gupta, 2016).

Empirical literatures are numerous on the relationships among oil price shocks, exchange rate volatility and many macroeconomic variables. Some studies focused on exchange rate movements (Volkov and Yuhn 2013; Salisu and Mobolaji 2013), external balance (Rafiq *et al.,* 2014), stock returns (Gupta 2016), inflation (Shaari *et al*., 2013; Salisu *et al.,* 2017), economic growth (Aliyu 2009, Alley *et al*., 2014 and Nusair 2016).

Consumption is the act of using goods and services for the purpose of satisfying man's innumerable needs. According to Mankiw (2014), consumption constitutes not less than 70% of aggregate expenditure in virtually all economies. Again, consumption is considered to be the final purpose of economic activity and is also viewed as a central measure of an economy's productive success according to neoclassical economists. Therefore, the importance of studying consumption cannot be over emphasized in view of the dramatic oil price shocks and exchange rate volatility which might be traced to it.

The "MINT" countries - Mexico, Indonesia, Nigeria and Turkey – were identified as emerging economic giants in 2013, and has since become the assembling point of an economic grouping that is now an important player in global economic relations for a number of reasons (Durotoye, 2014). Although they have diverse history, culture and geopolitics, they share some commonality in terms of economic conditions. They all have resounding opportunities in terms of populations with lots of young workers that will grow the economy faster when ageing, geographic position, oil and commodity production, etc.

In a clear departure from previous literatures, this study examined the impact of oil price shocks and exchange rate volatility on private consumption. The study aggregated households' final consumption expenditure and determine its response to transitory oil price shocks as well as exchange rate volatility in an augmented standard consumption model. The major objective of this study was to unravel the impact of oil price shocks and exchange rate volatility on the private consumption of the MINT economies.

2. Review of Empirical Literature

Oil price shocks are unanticipated components of a substantial change in the price of oil, defined as the difference between the expected and realized oil price (Kilian, 2014). In the aftermath of the 1970s oil crisis, there has been a growing interest in understanding the dynamic effects of crude oil production shortfalls on changes in the real oil price. In terms of causes, researchers have identified three major causes namely; exogenous supply shocks, flow demand shocks and a speculative demand shocks.

Hamilton (2003) opined that all major fluctuations in the price of oil can be attributed to disruptions in the flow of oil production triggered by political events that are exogenous with respect to an economy. Examples of such political events include the 1973 Yom Kippur War, the Arab oil embargo in 1973/74, the Iranian Revolution of 1978/79, the Iran-Iraq War of 1980-1988, the Persian Gulf War of 1990/91, the Venezuelan crisis of 2002, the Iraqi War in 2003 and the Libyan uprising of 2011. Contrastingly, Barsky and Kilian (2002) as confirmed by Kilian (2014) relied on indirect evidence including the striking co-movement in oil and other commodity prices to show that the major oil price fluctuations in the 1970s and early 1980s appeared associated in large part with fluctuations in the global business cycle.

The rationale for asymmetric responses of output to oil price shocks hinges on the existence of indirect effects of unexpected changes in the real price of oil. To this end, three effects have been documented namely *the reallocation effect, the uncertainty effect and the systematic policy effect.* In any case, oil price shocks have been known to have differential effect on economic activity.

Oil price shock is an important phenomenon to the economic activities of most of the oil exporting countries such as the MINT as oil revenue constitutes the larger proportion of the reserve which is regularly used to defend the local currency in terms of the exchange rate. In the exchange rate literature, one expects that a fixed exchange rate is not supposed to change, by definition, they have no volatility, though, they can be devalued or revalued. A floating exchange rate may or may not be volatile depending on how much it changes over time. However, since floating exchange rates are free to change, they are generally expected to be more volatile. Volatile exchange rates make international trade and investment decisions more difficult because volatility increases exchange rate risk (i.e potential to lose money because of a change in the exchange rate). Exchange rate is important when it comes to issues relating to consumption because the value of purchases individuals, firms and governments make, especially as it relates to imported products, is dependent on prevailing exchange rates.

According to Jeffrey (2010), the literature on household's choice of how much of their income to consume and save is relatively larger, deeper and more prominent than many other interesting topics in macroeconomics and thus has been the subject of several theoretical and empirical studies. Early attempts by the Absolute Income Hypothesis was fraught with the Kuznet puzzle. Thereafter, several proposition were formulated. James Duesenberry (1949) contributed in the earliest attempts to reconcile conflicting pieces of evidence about the consumption-income relationship as presented by the Kuznet paradox. The relative-income model was formulated in two variants: a cross-section version and a time-series version. In both variants, consumption depends on current income relative to some income standard that the private sets based on its own past income or on the income of other privates around it.

The life cycle model developed by Franco Modigliani, Albert Ando, and Richard Brumberg in the mid-1950s emphasized how saving could be used to transfer purchasing power from one phase of life to another. Consumers who wish to smooth consumption would prefer to borrow during the early low-income years, repay those loans and build up interest rate during the high-income years, then spend off the accrued savings during retirement. However, Milton Friedman (1957) discussed the general problem faced by consumers when their income fluctuates over time, whether due to life-cycle effects, business cycles, or other factors.

3. Theoretical Framework

The modern consumption theory which is a merger of two theories, the life-cycle model and the permanent-income hypothesis, was pioneered by Nobel laureates Franco Modigliani (1955) and Milton Friedman (1957). Although, they differed mainly in that the life-cycle theory emphasized natural variations in earnings over a finite lifetime whereas the permanent-income model stressed general variations in income over an indefinite horizon, both models emphasize consumption smoothing and forward-looking consumers (Jeffery, 2010). Thus, consumption consists of a planned part that depends on permanent income and an unplanned part that is totally independent of income. The unplanned part has to do with the transitory changes in income. More so, wealth which also determines consumption consists of human and non-human parts. Human wealth refers to the present value of lifetime labour income at a specified discount rate while the non-human wealth consists of financial and housing wealth.

According to the Life-Cycle model,

$$\Omega_o = A_o + \sum_{t=0}^{T} \frac{y_t}{(1+r)^t} \text{.....(1)}$$

Where Ω_o is wealth, A_o is the value of current non-human wealth (financial or physical) assets, Y_t is the expected stream of real labour income over the lifetime and r is the real interest rate.

For the Permanent-Income Hypothesis however,

$$\sum_{t=0}^{\infty} \frac{Y^P}{(1+r)^t} = A_o + \sum_{t=0}^{\infty} \frac{y_t}{(1+r)^t} \text{.....(2)}$$

This shows that there is a close relationship between the Life-Cycle model and the Permanent-Income Hypothesis.

$$C_t = F(Y_t^p) \text{.....(3)}$$

However, augmenting the inference drawn from the standard consumption theory and in line with the objective of the present study, consumption was related to the shocks in oil price taken as transitory or temporary upsurge and down-surge (Op^+_t and Op^-_t) and exchange rate volatility (vol) still within the Life Cycle-Permanent Income Hypothesis (LC-PIH) model. This has some implications. Instead of the direct assumption of consumption smoothening, the study considered a separate consumption-transitory income causality and consumption-permanent income causality. Measured consumption is the sum of

permanent and transitory consumption (Costas, 2004). This implies that consumers respond quite differently to a change in their incomes due to transitory and permanent elements and some other factors.

4. Data and Methodology

Data

The study utilized annual time series data on oil price, exchange rate and private consumption for MINT countries from 1986 to 2016. Household final consumption expenditure per capita was measured in constant USD, Brent Oil Prices in USD, and GARCH extraction of volatility from annual Official Exchange Rate, a 3-year moving average of Gross Domestic Product per capita in constant USD and Consumer Price Index. All data were sourced from world development indicator (WDI) database.

Model Specification

The study considered oil price shocks in a transitory fashion and following Shin *et al*., (2014), assume a simple case in which p_t is decomposed into Op_t^+ and Op_t^- around a single threshold value of zero which allows for distinguishing between positive and negative changes in the growth rate of p_t. Thus, two transitory changes in income were generated as follows;

$$Op_t^+ = \sum_{j=1}^{t} \Delta Op_j^+ = \sum_{j=1}^{t} max\,(\Delta Op_j, 0) \quad (4)$$

$$Op_t^- = \sum_{j=1}^{t} \Delta Op_j^- = \sum_{j=1}^{t} min\,(\Delta Op_j, 0) \quad (5)$$

For the permanent income, the value of Life-Cycle wealth was captured as some sort of a moving average of measured income of countries. Friedman in his calculations of the consumption function for the United States estimated the consumer units horizon as approximating three years.

Therefore, the model in mathematical form is thereby given as;

$$C_{it} = \gamma_0 + \gamma_1 op^+ + \gamma_2 op^- + \gamma_3 y_{it}^{\ p} + {}_{it}\gamma_4 vol_{it} + \gamma_5 cpi_{it} \quad (6)$$

The expectation is that;

$\gamma_o > 0$, $\gamma_1 >$ or < 0, $\gamma_2 >$ or < 0, $\gamma_3 > 0$, $\gamma_4 >$ or < 0, and $\gamma_5 >$ or < 0.

Estimation Procedure

This study maintained two alternating assumptions in the estimation of slope parameters which could then be decided by the familiar Hausman' sigmamore test. The validity or otherwise of pooling in a heterogeneous panel was assumed. Recall that the "MINT" countries - Mexico, Indonesia, Nigeria and Turkey have been identified as emerging economic giants and they share some common economic conditions.

Consequently, the estimation procedures adopted were the Pooled Mean Group (PMG) and The Mean Group (MG). Pesaran, *et.al* (2001) among others, have however demonstrated that the assumption of homogeneity of slope parameters is often inappropriate when dealing with large *T* panels. Omitting the

slope parameter heterogeneity when in fact it exists may produce inconsistent and potentially misleading results. The PMG and MG estimators have been developed to capture any inherent slope heterogeneity in the panel data model and any potential bias that may result. Essentially, the PMG estimator requires a combination of pooling and averaging of coefficients while the MG estimator estimates *N* time series regressions and averaging the coefficients.

The panel autoregressive distributed lag (ARDL) model which allows for the combination of *I* (0) and *I* (1) series was adopted. The asymmetric version of the Panel ARDL is given as:

$$\Delta C_{it} = \alpha_0 + \alpha_1 C_{it-1} + \alpha_2 y^p{}_{it} + \alpha_3 vol_{it} + \alpha_4 OP^+{}_{it} + \alpha_5 OP^-{}_{it} + \alpha_6 cpi_{it} + \sum_{j=1}^{N1} \lambda_{ij} \Delta C_{it-j} + \sum_{j=0}^{N2} \psi_{ij} \Delta y^p{}_{it-j}$$
$$+ \sum_{j=0}^{N3} \eta_{ij} \Delta vol_{it-j} + \sum_{j=1}^{N5} \beta_{ij} \Delta cpi_{it-j} + \sum_{j=0}^{N6} (\chi^+{}_{ij} \Delta OP^+{}_{it-j} + \chi^-{}_{ij} \Delta OP^-{}_{it-j}) + \mu_i + \varepsilon_{it} \ldots\ldots (7)$$
$$i = 1, 2, \ldots, N;$$
$$t = 1, 2, \ldots, T.$$

Where μ_i is the group-specific effect; **i** is the number of groups; **t** is the number of periods; ***c*** is the logarithm of household consumption. $\boldsymbol{Y^p}$ is the permanent income; ***vol*** *is* the GARCH extraction of volatility (conditional variance) from exchange rate; $\boldsymbol{op^+}$ and $\mathbf{op^-}$ are the transitory changes of global oil price and CPI is the consumer price index.

Equation (7) can be re-specified to include an error correction term thus:

$$\Delta C_{it} = \tau_i \xi_{it-i} + \sum_{j=1}^{N1} \lambda_{ij} \Delta C_{it-j} + \sum_{j=0}^{N2} \psi_{ij} \Delta y^p{}_{it-j} + \sum_{j=0}^{N3} \eta_{ij} \Delta vol_{it-j} + \sum_{j=1}^{N4} \beta_{ij} \Delta cpi_{it-j}$$
$$+ \sum_{j=0}^{N5} (\chi^+{}_{ij} \Delta OP^+{}_{it-j} + \chi^-{}_{ij} \Delta OP^-{}_{it-j}) + \mu_i + \varepsilon_{it} \ldots\ldots (8)$$
$$i = 1, 2, \ldots, N;$$
$$t = 1, 2, \ldots, T.$$

In equation (8), the error-correction term captures the long run equilibrium in the asymmetric Panel ARDL. Its associated parameter τ_i is the speed of adjustment term that measures how long it takes the system to adjust to its long run when there is a shock.

In this study, the exchange rate series was used to compute exchange rate volatility. First, the study specified the mean equation and then the variance equation. The residuals of the conditional variance are the exchange rate volatility.

$$exr_{it} = \alpha + \beta^1 exr_{it-1} + \mu_{it} \ldots\ldots\ldots\ldots (9)$$
$$\mu_{it} / \Omega_{it} \square\ iidN(0, h_{it})$$

$$h_{it} = \gamma_o + \sum_{i=1}^{p} \delta_i h_{it-1} + \sum_{j=1}^{q} \gamma_1 \mu^2_{it-j} \ldots\ldots\ldots\ldots (10)$$

From (10), it means that the value of the variance scaling parameter h_t depends both on past values of the shocks, which are captured by the lagged squared residual terms, and on past values of itself.

5. Results and Discussions

5.1. Preliminary Analyses

Table 1 presents the descriptive statistics of the study variables. Some important statistics reported included the mean, median, kurtosis, skewness and normality etc. for all the study variables. All of the variables skewed positively. The values of the kurtosis for exchange rate volatility and negative oil price shock indicated that these variables were leptokurtic in nature. While private consumption, permanent income and consumer price index were platykurtic, positive oil price shock was mesokurtic. The values of the Jarque-Bera statistic showed that the series were not normally distributed since the p-values of all the series were statistically significant at 5% level. This implies that the null hypothesis of normal distribution should be rejected.

Unit root test was carried out to determine the stationarity properties of the variables, and to determine their order of integration. In time series and panel econometric analyses, stationary tests are usually carried out because most time series data tend to be non-stationary. These tests included Levin, Lin and Chu test, Breitung, Im, Pesaran and Shin test, Fisher ADF test and Phillips Peron. The results are presented in Table 2.

The stationarity tests results in Table 2 revealed all the variables were level stationary at 5% level of significance with the exception of permanent income, negative oil price and consumer price index which were stationary after first difference i.e I (1).

Table 1. Panel Descriptive Statistics

	C	OP+	OP-	VOL	Y	CPI
Mean	3436.689	26.7241	16.4348	5319181	5245.384	52.0521
Median	2958.554	17.9000	0.0000	18920.52	4939.775	43.5862
Maximum	7958.211	111.63	108.560	3.14E+08	11639.32	158.9435
Minimum	707.8172	0.0000	0.0000	12.60944	1198.254	0.010631
Std. Dev.	2308.493	34.652	28.1277	31217489	3347.709	43.9874
Skewness	0.3135	1.2677	2.0904	8.6541	0.1962	0.4788
Kurtosis	1.5702	3.3991	6.6078	81.8181	1.4709	2.0178
Jarque-Bera	11.9839	34.0360	157.5637	33373.28	12.4601	9.4095
Probability	0.0024	0.0000	0.0000	0.0000	0.0019	0.0091
Obs	118	124	124	123	120	120

Source: Authors' Computation (2018).

Table 2. Panel Unit Root Tests Results

METHOD	C	VOL	Y	OP+	OP-	CPI
Null Hypothesis: unit root with common process						
LLC	-2.369**a	-4.197**a	-2.705**b	-3.206**a	-7.487**b	-1.8356**b
Breitung	-1.509**a	-0.806	-1.762**b	-2.162**a	-0.938	-2.92203***b
Null Hypothesis: unit root with individual unit root process						
IPS	-2.567**a	-6.088**a	-3.280**b	-2.139**a	-11.972**b	-1.669**b
ADF-Fisher	22.252**a	32.492**a	25.82**b	16.10**a	95.643**b	15.272**b
PP	18.978**a	33.851**a	9.076	15.28**a	246.078**b	17.402**b
I(D)	I(0)	I(0)	I(1)	I(0)	I(1)	I(1)

Note: The unit root process only considers intercept and trend. Also, ** indicate statistical significance level of 5%, 'a' denotes level while 'b' denotes first difference.

Source: Author's Computation (2018).

Volatility of Exchange Rate

In order to examine the volatility of exchange rates over the sample period, the residual obtained from the exchange rate volatility model using GARCH (1,1) must satisfy two conditions. Here, it must have ARCH effect (i.e. the series must be heterosckedastic in nature) and the volatility must cluster, otherwise, the variable is not volatile (Oseni, 2016). Results presented in table 3 revealed that the residual had ARCH effects because the F-statistic was statistically insignificant at 5% level, implying that the null hypothesis that there was ARCH effect was accepted while the alternative was rejected (Table 3).

Table 3. Result of ARCH Effect Test

F-statistic	0.0235	Prob. F(1,120)	0.8785
Obs*R-squared	0.0239	Prob. Chi-Square(1)	0.8772

Source: Author's Computation (2018).

Correlation Analyses of the Model Variables

It has been argued that estimating the correlation among the variables of a model would afford researchers the opportunity of detecting multicollinearity among variables. In line with this explanation, the results of the correlation analysis of the study variables presented in Table 4 revealed that the correlation coefficients among the independent variables were below 0.95 indicating that there was no tendency for multicollinearity among the independent variables.

Table 4. Correlation Analysis

Correlation	C	OP+	OP-	VOL	Y	CPI
C	1.000000					
O+	0.127098	1.000000				
O-	0.110945	-0.462246	1.000000			
VOL	-0.194672	-0.037745	-0.046160	1.000000		
Y	0.944761	0.128419	0.121492	-0.182341	1.000000	
CPI	0.258326	0.432389	0.471104	-0.080227	0.272095	1.000000

Source: Authors' computation, 2018.

5.2. Model Estimation

The PMG and MG, attributed to Pesaran & Smith (1997) and Pesaran & Smith (1999) to investigate the long run relationship were adopted in the study. These estimators are independent of the order of integration.

It would be recalled that the PMG estimator constrains the long run coefficients to be similar across all panels. The pooling assumption yields efficient and consistent estimates when this restriction is true. If the model is heterogeneous, the PMG estimates are inconsistent while the MG estimates are consistent. Therefore, the test for the difference between MG and PMG was carried out.

Test for the choice of estimator: Table 5 presents the results of the Hausman test to choose between the PMG and MG estimators. The results favoured the use of the PMG estimator. This is because the probability value of the chi-square statistic was more than 5% level of significance. The implication of this is that there existed statistical evidence that pooling the long run slope parameters to explain convergence for the MINT countries was in order. In other words, the private consumption behaviour of these emerging economies are expected to be the same in the long run while differences could exist in the short run.

Table 5. Hausman Tests

	Coefficients			
	MG	**PMG***	**Difference**	**S.E.**
	(b)	**(B)**	**(b-B)**	**Sqrt (Diag (V_B-V_B))**
VOL	-.0016	8.15e-10	-.0016	.0034
O+	-.0025	-.00173	-.0008	.0014
O-	-.0031	-.00221	-.0009	.0017
Y	1.6910	1.1288	.5623	.6722
CPI	-.0003	.0012	-.0016	.0016
X^2 (5) (PROB)	7.69 (0.1743)			

Source: Author's Computation (2018).

Results of the Short-Run Estimations

The PMG estimator does not constrain the short run coefficients to be similar for the countries as it does for the long-run. For Mexico, results revealed that the volatility of the Mexican Peso-USD exchange rate was significant and positively affected private consumption. Transitory and permanent incomes were found to be insignificant in determining private consumption. Meanwhile the price level measured by the consumer price index had a negatively significant relationship with individual consumption. Short run findings for Nigeria revealed that permanent income had positive and significant effect on private consumption in line with *a priori* expectations. Furthermore, there existed a negatively significant relationship between CPI and private consumption in line with expectation. It is usually expected that increases in price level decrease demand/consumption. Nigeria's error correction coefficient was -0.358 and was significant at 5 percent level. This implied that 35.8 percent of the total disequilibrium which might occur to private consumption in Nigeria due to a shock to the system in the previous year is corrected in the current year. Therefore, it will take about three years for the system to fully restore back to its long run equilibrium.

For Indonesia, the CPI was negative and significant. The transitory income (both positive and negative) had significant positive effect on private consumption. The ECT value of -0.3244 (significant at 5 percent) implied that 32.44 percent of the total disequilibrium to private consumption in the previous year is corrected in the present year thereby taking about 3 years to restore back to the long run equilibrium path. The similarity in the speed of adjustment for Nigeria and Indonesia is noteworthy.

Considering the short run results for Turkey, like the other three countries, the coefficient of the CPI was negative and significant. As in Indonesia, the transitory income (both positive and negative) in Turkey had positive and significant effect on private consumption. However, the coefficient of ECT value of -1.1387 (significant at 5 percent) represented over-adjustment in private consumption in Turkey. This implied that about 114 percent of the disequilibrium in the private consumption in the previous years is restored in the current year. Therefore, it takes less than a year for the system to restore back to the long run equilibrium path. In the short run, the similarities and differences in the characteristics of private consumption across the countries are glaring.

Table 7. The PMG Short Run Parameters

Mexico							
D(C)	**ECT**	**VOL**	**O+**	**O-**	**Y**	**CPI**	**Const.**
Coefficient	-0.1228	0.0006*	0.0004	0.0002	1.3923	-0.0077***	-0.1617
Std. Err.	0.0771	0.0003	0.0004	0.0005	0.4534	0.0027	0.1385
z-Statistic	-1.59	1.73	1.03	0.47	3.07	-2.88	-1.17
Indonesia							
Coefficient	-0.3244***	7.41E-11	0.0006**	0.0008**	0.0455	-0.0046***	-0.4661***
Std. Err.	0.0806	1.22E-10	0.0003	0.0003	0.183	0.0013	0.1371
z-Statistic	-4.03	0.61	2.23	2.54	0.25	-3.67	-3.4
Nigeria							
Coefficient	-0.3588**	3.00E-11	-0.0019	-0.0004	0.9927*	-0.0121**	-0.3806
Std. Err.	0.1789	3.61E-10	0.001	0.002	0.592	0.006	0.2618
z-Statistic	-2.01	0.08	-1.27	-0.24	1.68	-1.94	-1.45
Turkey							
Coefficient	-1.1387***	-5.74E-08	0.0022***	0.0028***	-0.6276**	-0.0066***	-1.647**
Std. Err.	0.151	2.16E-07	0.0006	0.0006	0.2696	0.0019	0.7168
z-Statistic	-7.54	-0.27	3.85	4.32	-2.33	-3.46	-2.3

, ** and * indicate significance at 10%, 5% and 1% critical level 1respectively. Number of observation =112.*

Long Run Pool Mean Group Estimation

The long run results presented in table 6 upheld the homogeneity assumption. It shows that the coefficient of exchange rate volatility did not significantly affect private consumption, while permanent income and transitory incomes have significant relationships. Interestingly, the coefficients of the two transitory incomes were negative and visibly small while the coefficients of the permanent income was positive and appeared large. In other words, a sudden and temporary surge in oil price, say by 1%, temporarily reduced private consumption by 0.0017%. Similarly, a sudden and temporary plunge in oil price, say by 1%, temporarily reduced private consumption by 0.0022%. A percent change in permanent income caused private consumption to change by 1.13%. In addition, there existed a positive and significant relationship between the consumer price index and private consumption. These estimates are consistent and efficient as validated by the Hausman sigmamore's test.

In line with Volkov and Yuhn (2013) which reports that a model of exchange rate without incorporating oil prices could suffer from an omitted-variable bias, the present study combined oil price shocks with exchange rate volatility in modeling private consumption in the MINT countries. The approach in this study therefore provides a more robust attempt and contrast with Oseni (2016) in Sub-Sahara Africa (SSA) countries. Although, exchange rate was found to be volatile following the results of the GARCH (1, 1) model, results of the panel data analysis showed that exchange rate volatility had no significant relationship with private consumption in the MINT countries.

Table 6. Long Run Pooled Mean Group Parameter estimates

D(C)	VOL	OP+	OP-	Y	CPI
Coefficient	8.15e-10	-0.0017***	-0.0022***	1.1287***	0.0012***
Std. Err.	6.17e-10	0.0005	0.0006	0.0671	0.0005
Z-Statistics	1.32	-3.44	-4.00	16.83	2.46
Log-likelihood		231.5205			

****** indicate significance at 10%, 5% and 1% critical level respectively. Number of observation =112. Number of groups= 4*

Robustness Check

To find the robustness of the long run slope parameters, the Dynamic Fixed Effect (DFE) estimation was carried out in addition to the PMG estimator in Table 6 to facilitate the ease of comparison. . The slope parameters presented in Table 8 below.

Table 8. Checking the Robustness of Slope Parameters

Technique	Variable	Coefficient	Inference
PMG	VOL	8.15e-10	Positive and insignificant
	O+	-0.0017***	Negative and significant
	O-	-0.0022***	Negative and significant
	Y	1.1287***	Positive and significant
	CPI	0.0012***	Positive and significant
DFE	VOL	1.52e-09	Negative and insignificant
	O+	-0.0022*	Negative and significant
	O-	-0.0029**	Negative and significant
	Y	0.7280***	Positive and significant
	CPI	0.0033***	Positive and significant

, ** and * indicate significance at 10%, 5% and 1% critical level 1respectively. Number of observation =112.*

In Table 8, the long run results of the PMG and the newly computed DFE were used for estimating the slope parameters for exchange rate volatility, permanent income, transitory incomes and consumer price index. The estimation techniques yield slope parameters which were not only statistically similar but were also similar in signs.

Conclusion and Policy Recommendations

Without any loss of generality, it can be concluded from this study that for the MINT economies, the volatility of exchange rate did not significantly determine long run private consumption especially when asymmetries in oil price are incorporated. However in the long run, findings from this study revealed a sudden and temporary change in oil price (both positive and negative) had negative effect on private consumption. Permanent income significantly affected consumption in line with *a priori* expectation and established theories. The robustness check (using the DFE) confirmed the validity of the findings in this study. The study recommended a better management of incomes from transitory oil price shocks to improve private consumption and better the life of the citizens.

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