

The Influence of Interest Rate Fluctuation on Final Consumer Consumption in Central Asia: Empirical Study

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Abstract: This research study aims to expose an inference of Interest Rate Fluctuation with Final Consumer Consumption in Central Asia and discover how other explanatory factors either stimulate or reduce the Final Consumer Consumption as a whole. This research work absorbed a quantitative analysis through Panel Data Analysis by using a Multiple Regression Model for the period of 22 years (1995-2017). In this study, Final Consumer Consumption is the dependent variable but Interest Rate, Inflation, Gross National Income, and Interest Payment are independent variables. Based on the data type and quality, the appropriate Estimations tests, such as ARDL, Fixed Effect, and Random Effect, were applied for the purpose of exposing the long run relationship between Interest Rate and Final Consumer Consumption. Random Effect test provided suitable inferences that meet the objective of the research work. The results provided that Interest Rate fluctuation as the focused independent variable is significant both economically and statistically that acquired a negative affiliation with Final Consumer Consumption, meaning that if one increases, the other decreases, which we call it a vice versa relationship. The other explanatory variables such as Inflation and GNI are also significant with positive relationships. The inferences suggested that the government of Central Asia is supposed to adopt such policies that would balance the Interest Rate Fluctuation and control Inflation in this region such that it would better of both parties, the state and the people.

Index Terms- Final Private Consumption, Real Interest Rate Fluctuation, Interest Payment, Inflation, and Gross National Income.

1. Introduction

Research Area Profile:

Central Asia is known as a single region that consists five countries such as Kazakhstan, Tajikistan, Turkmenistan, Uzbekistan, and the Kyrgyz Republic. This landlocked region comprises 65 million diverse population both ethnically and linguistically that 5% of overall population in Tajikistan, Kazakhstan, and the Kyrgyz Republic live under poverty line which is 1.90 \$ per day. However, poverty rates in Turkmenistan and Uzbekistan are very high which equal almost 40 percent. The general economy is based on agriculture that largely relies on cereals, cotton, fruits, and vegetables. (USAID 2018). Central Asia is accounted as a stable region but corruption, human rights violations, and ethnic disputes ruined the big images of these countries. This region is the tactical interest of foremost supremacies such as China, and US largely based on the importance of a bridge between Europe and Asia (Natalia 2018). Central Asia experienced different political and economic adaptation footpaths in the last 25 years after receiving independence from the Soviet Union. Namely, Kazakhstan and Kyrgyzstan have made superior steps in market reforms, while Turkmenistan and Uzbekistan have not yet completed their moves to a market economy but Tajikistan characterizes a transitional case. The unique and geographical locations and 20th historical century did not help them toward economic development and integration (Uuriintuya 2017). The Central Asia is faced with current challenges such as insecurity, political and social, and economic reform barriers (Anna 2016).

Problem Statement:

The outcome of interest rates on consumer consumption is the principal concern in macroeconomics that drew the attention of many researchers recently due to its dramatic fluctuations. It is because that the quest of sustainable and fair growths that improve the living standard of people has been one of the developing policies intentions of many nations worldwide, including Central Asia. It is a fact that numerous macroeconomic policies are adopted to the improvement in the prosperity of nations, however still some nations are ousted from such policies due to their weak economic development efforts that Central Asia is a remarkable example.

Consumption is well-defined as the over-all demand for all consumer goods and services in a specific economy stated in monetary terms. Besides, it is known as the spending by families on goods and services and acquisitions of assets among others that financing them requires income or money. The law of John Maynard Keynes states that men are disposed and added that consumption increases when income increases but not as much as income (Hammed 2017). The size of consumption is explained as the result of a decision making process of families over the time construction of the distribution of their income. The total consumption of Kazakhstan in 2016 was 102 billion US dollars, Kyrgyzstan had 8.8 billion, and Tajikistan had 7.2 billion in 2016 (WB 2021).

Regarding the popular opinion, if interest rates increase, consumption decreases that means a significant demand element drops. However, Keynes disbelieved that the interest rate is actually a factor of consumption under normal circumstance, instead he concentrated on current income as the most important factor. Besides, the budget restraint of households is a fair initial point for answering the question of whether interest rates have an influence on consumption such that the budget is financed from current income, assets or credits (Hermann 1996). Economic theory suggested that the influence of real interest rates on consumption rest on the relative extents of the substitution weight and the income weight which the former is the sum that a consumer wins profit from a cut in real interest rate by consuming today rather than saving that results in increase in consumption. The latter is the effect that a cut in real interest rate causes a diminution in consumption because the sum of life time income declines by the drop of returns on saving (Shinobu 2000).

The rapid changes in interest rates of Central Asian countries provides a ground to discover its effects on consumption. The Central Asian countries experienced ups and downs in interest rate and hence it for sure affected the consumption in one or in another way. For example, Kyrgyzstan had 17.8%, 12.6%, and 17.7% interest rates changes in 2016, 2017, and 2018 respectively. Besides, Tajikistan had 17.9%, 23.5%, and 24.6% in 2016, 2017, and 2018 respectively. These changes are positive and negative which these huge changes definitely affect the consumption and other economic components in various ways (WB 2021). Bela Balassa discovered a negative relationship that if interest rises, consumption will decrease which is true for the case of Central Asian countries (Bela 1989). This negative relationship reduces the savings of households which is the first negative effect of rise interest rates.

It has been a past that interest rates fluctuation distorted the economies of the world badly in difference times. The history of interest rate fluctuations in Central Asian countries experienced a number of both positive and negative effects on the economic growth determinants. For instance, it is believed that higher interest rate will encourage consumption and investment. Joshua Aizenman discovered that higher interest rate policy will inspire consumption, saving and investment in 135 countries including Kyrgyzstan, Tajikistan, and Kazakhstan (Aizenman 2017). World Bank Group indicated that higher interest rates in Tajikistan experienced a return on riskier project during 2016 which is another positive effect of interest rate. (World Bank Group 2017). Besides, Olga Croitorov found out that any interest policy affects, inflation, consumption, and investments in one or in another way (Olga 2009). It is also argued that interest affects the prices of goods and services either positive or negative related its moves. For example, Saltanat Kanapiyaevna exposed that the increase of interest rate motivates of real prices of goods and services in Kazakhstan. This means that if interest rate is increased, real prices will decrease which is a negative impact of high interest rate in Kazakhstan (Saltanat 2013).

In addition, IMF released a report which stated that during inflationary period, Kazakhstan Central Bank cut interest rate for the purpose of reducing inflation, liquidity and shocks (IMF 2018). This indicates that the measure of inflation is linked to high or low interest rates. There exists another argument on the effect of interest rate on capital which states that the decrease in interest rate reduces capital adequacy. In this regards, National Bank of Kyrgyzstan published a report which stated that decreasing interest rate tends to reduce the level of capital adequacy ratio in Kyrgyzstan (N. Jenish 2016). Not only those, it is worth mentioned low interest rate may increase the amount of loan and decrease the prices that lead to investment. For example, Hans Holzhacker argued in his research output that reducing interest rate will tend to increase loan that will lead to distort the market prices, and misallocation of financial sources in non-profitable projects in Kyrgyzstan. Besides, this low interest rate will also increase overinvestment which is not that much required in Kyrgyzstan (Hans 2019).

Since, the interest rate either high or low has both positive and negative impacts on many economic factors such as prices, inflation, investment, saving, capital, and financial projects but still the research are silent on its effect on consumption, that is why, it is a motivation to research and work on it. Besides, it important to find out what is the real level interest rate in Central Asia since it is called a big challenge to the whole economic performance. Furthermore, there are remarkable experiences of interest effects on Central Asia economy recently that affect both adversely and positively. As interest rate is a great challenge, it has to be explored to better policy implications.

Objective of the Study:

The main objective of this research work is to find the exact relationship between consumer consumption and interest rate. Besides, there are additions of a few control variables such as inflation, interest payments, tax payment, and gross national incomes. This study uses only panel data analysis for the period of 22 years (1995-2017) because the assigned title cannot be studied by other data analysis in Central Asian countries.

2. Literature Review

In 2015, Syed Mumtaz Ali Kazmi conducted an empirical study on the real private consumption modeling which used a time series analysis for the period of 1971-2012 via ARDL econometric model in Pakistan. The study focused quite enough factors that stimulate private consumption such as unemployment rate, wealth but interest rate as the main determinant. The inference shows that the relationship between private consumption and interest rate is significant and got a negative relationship. But there is always two sides of the coin, one can argue that interest rate may affect the private consumption positively which means if interest rate increases, consumption may increase too. It is true only for investor who invest investing institutions (Syed Mumtaz 2013). Besides, IMF provided a working paper on the determinants of private consumption in China in 2010. This is a qualitative report which provided a theoretical base collections as a result. Among other factors, interest rate fluctuations have greater impacts on private consumption and has an adverse relationship between each other. The interpretation of the result states that if interest rate increases, private consumption decreases which is true in many emerging economies worldwide (Kai Guo 2010).

In addition, Mudit Kapoor and Shamika Ravi researched on the effect of interest rate on consumption in India in 1998. The author used a cross section data namely Indian National Survey and applied a simple ordinary least squared regression estimate. The result is quite impressive in digits which states that an increase of 50 basis points in interest rate leads to an immediate decline of 10 basis points in consumption. The result is clear and accurate because the former theories regarding the relationship of interest rate and consumption claims that interest rate has negative relationship with consumption (Kapoor 2015). On the other hand, Hamed discovered a very unique understanding on the relationship of interest rate and private consumption through a time series analysis for the period of 1981-2013 by using ARDL regression estimate model in Nigeria. Among other control determinants of private consumption, interest rate had no relationship with private consumption which very unique compared to other previous studies (Hamed 2017). One to argue, might claim that there is always a relationship between two economic components in any economic situation. This inference is not true regarding the former conceptual theories of private consumption.

Bryan M. Vengelen also exposed similar inference which agrees the former consumption theories. He researched on the general relationship of long term interest rate and private consumption in 2015 by using consumer expenditure survey with a qualitative analysis. The finding of this research showed that private consumption and long term interest rate have negative relationship which means that if interest decreases, consumption increases (Bryan 2015). Besides, in 2007, the ministry of environment in New Zealand provided a qualitative report on the pressure on consumption in New Zealand which stated that the principal indicators of private consumptions are income, population, and size of family, technology, economic growth, and emerging technology. But this research work is silent about the interest rate which is the main factor of private consumption (ENZ 2007).

Furthermore, Anthony Kofi Osei-Fosu conducted a research on the relationship of interest on house hold deposits with households' consumptions in Ghana in 2014 by using time series analysis for the period of 1970-2009 through ARDL estimation method. The results provided that interest rate is significant in short period rather than long period. This relationship is negative as similar to previous studies conducted on the same issue (Anthony 2014). Bimal Singh also researched on the effects of interest rate on consumption by using a time series analysis for the period of 1979 – 2001 through error correction model (ECM) in Fiji in 2004. Interest rate among other determinants such income and wealth had negative impacts on consumption through adverse relationship. The author argued that if

interest rate is increased, consumption will decrease which this is a *vis versa* relation between interest rate and consumption (Bimal 2004).

On the other hand, Panagiota Tzamouran discovered a very unique inference in a research conducted on the interest impact on household consumption Europe in 2019. The author used a cross sectional analysis which the data is taken from household finance and consumption survey and applied a multiple regression model estimation method. The finding suggests that increasing interest rate has positive impact and positive relationship in some European countries namely in Belgium, Germany, Italia, and Austria. This means that if interest rate increases, consumption will also increase which is straight positive relationship. The author also claimed that in some countries, the relationship is negative such as Spain, Portugal, Cyprus, and Ireland. This inference is much debatable and quite different compared to other studies. The first part of the result is also different compared to former theoretical work on the relevant issue but it is true for those who are investors in investing banks (Panagiota 2019). In contrast, Christiana Osei Bonsu (2017) is silent on interest rate factor of consumption, instead he argued that real exchange rate and economic growth are the main factor of stimulating consumption. The findings suggests that economic growth has positive impacts on consumption which an increase in it will increase the level of consumption (Christiana 2017).

In addition, Charles O. Manasseh conducted a research work on the effects of interest rate and inflation on private consumption in Nigeria in 2018 using time series analysis for the period of 1981-2011 through modified consumer spending model. The finding displayed that inflation and interest rate have significant implications on consumer spending. Both showed that if interest rate and inflation are increased, consumer spending will be decreased as these are *vis versa* relationships with consumer consumption (Charles 2018). On the other hand, Nahanga Verter discovered that a different inference in a research conducted on the determinants of consumer spending in Czech Republic in 2014. The implication showed that only inflation, saving rate, and income have significant impacts on consumer spending by using a time series analysis through Ganger Causality Analysis model (Nahanga 2014). The author most importantly missed the interest rate effects on spending as it is called a vital factor of consumer spending in former theories and conceptual framework.

Besides those, Hermann-Josef Hansen (1996) exposed in an empirical analysis used a time series analysis with quite enough regression estimate methods that central bank interest rates are not the appropriate instruments for stimulating or restraining the private consumption in Germany. However, it is showed that interest rate fluctuations in short term does not have significant impacts on private consumption but there will be effects in long term (Hermann 1996). This inference is quite different and unique when it is claimed that interest rate is not a strong indicator of private consumption because the theories regarding interest rate and consumption indicate that increase in interest rate influences private consumption negatively in all economies. In contrast, Abiodun A. ADEGBOYE discovered completely different understanding in his research conducted on the determinants of private consumption in Nigeria in 2013 by using time series analysis for the period of 1981-2010 through ECM regression model. The finding showed that all factors such as income, FDI, and GDP growth are significant except interest rate (Adedayo 2013). This finding is different compared to other studies because interest rate is found insignificant which might be true in different economies.

Further, Ekaterina also researched on the determinants of Final Consumer Consumption in Asian countries using panel data analysis via multiple regression model in 2018. Among other determinants, interest rate was found significant in relationship with Final Consumer Consumption. The relationship is negative as it is true and similar with existing theories regarding consumption. The inference showed that if interest rate is increased, consumption will be reduced by unknown parameters (Ekaterina 2018). On the other hand, Neelesh Gounder also researched the determinants of consumption and poverty in Fiji in 2012 by using household consumption survey via ordinary least squared estimation model. The inference showed that the allocation of labor and agriculture policies directly influence the consumption and poverty but the author is silent about interest rate effects on consumption and poverty (Neelesh 2012).

Ricardo Barradas conducted research on drivers of financialisation on private consumption in 28 European countries via Panel data analysis for the period of 1995-2015. The author created private consumption equation by including interest rate and other control variables. Besides, a multiple regression and estimation method is used in this research work. The result indicated that labor income comes as the first impression that affect the private consumption with a direct and positive relationship with consumption. Besides, interest rate is also significant and have an adverse relationship with private consumption (Ricardo 2017). The result is similar and in line with previous studies but only labor income is taken as the strong determinant of private consumption which is true based on old theories regarding consumption. Besides, J.Varlamova provided in his research conducted on the macroeconomic and demographic determinants of private consumption in OECD countries through a qualitative analysis in 2015. The results similar with Ricardo which states that among other factors, interest rate has significant impact on private consumption (J.Varlamova 2015).

Dr Adama Combey conducted a research on the impact of interest rate on private consumption in West African Monetary Union using panel data analysis for period of 2006-2014 via mean group, pooled mean group, and dynamic fixed effects in 2016. The result is very debatable because it showed that interest rate is significant and there is no statistical evidence to claim that interest rate either increase or decrease the private consumption in Western African countries. This inference is unique and is not in line with previous studies conducted on the same issue. Besides, this finding is in line with existing theories which say that interest rates do affect the private consumption either positively or negatively (Adama 2016). Thus, one cannot draw a better conclusion from this result.

Research Gap:

The very first gap of this research is that this type of study work is less done and at the very best effort of author, he was not able to find such studies in Central Asian countries and hence it is a need to research and find a solution to this problem. Besides, many researchers conducted only time series analysis for very short periods of time which did not meet the requirement of time series analysis that is why this paper will use panel data analysis. Thus the inferences of panel data analysis will be different and accurate compared to time series analysis. Furthermore, many researchers found different relationships and result that some of them claimed that interest rates have positive relationship with consumption but only few mentioned that they have negative relationship. So this paper will find the correct relationship with a new roadmap. Finally, it is a complicated problem that it must be researched, find a solution, and assign the appropriate policies implications.

3. Methodology

Generally, this research work uses a quantitative method by a assigning a panel data analysis and multiple regression model in Central Asian countries namely, Kazakhstan, Tajikistan, and Kyrgyzstan. This study observes secondary data which the data for dependent variable such as consumption, and independent variables such as interest rate, national income, interest payment, inflation, and tax pay is taken from World Bank for the period of 22 years (1995-2017).

Econometric Model:

This study work follows a multiple regression model for studying the relationship of a single dependent variables with multiple independent variables. First, this model expresses the relationship of interest rate with Final Consumer Consumption through multiple regression model. Second, additional control variables are added such as inflation, national income, interest payment, and tax payment for the discovering the best inferences.

Multiple Regression Model (Panel Data Analysis):

Plain Form: $Y_j = \beta_0 + \beta_1 X_{1j} + \beta_2 X_{2j} + \dots + \beta_n X_{nj} + e \dots\dots\dots 2$

Featured Form: $\beta_0 + \beta_1(Cons)_{it} + \beta_2(Int\ Rte)_{it} + \beta_3(GNI)_{it} + \beta_4(Inf)_{it} + \beta_5(Int\ Pay)_{it} + \beta_6(TaxPay)_{it} + \mu_i + U_{it} \dots\dots 3$

i: 1, 2,....., N (8)

t: 1, 2,....., T (22)

Where

β_0 : The intercept or constant amount

$\beta_1 - \beta_4$: The coefficients of the assigned regressors

Con: it is the sum of household Final Consumer Consumption(Private) and general government consumption.

Int Rte: interest rate is the spread charged by banks on loans minus the interest paid

Inf: inflation is measured via the consumer price index which is the annual percentage change in the cost to the average consumer.

GNI: is the general national income and is the sum of value added by resident producers, plus product tax, and plus net receipts of primary income.

Int Pay: the payments of interest on government loans to both foreign and domestic residents.

Tax Pay: The total payments of taxes by businesses

Assigned Hypothesis:

H0: There exists no significant relationship between

Consumption and interest rate

H1: There exists a significant relationship between Consumption and Interest rate

Or:

H0: $\beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = \beta_6 = 0$

H1: at least one $\beta_i \neq 0$

Variable Justification and Expected Sign:

Final Consumer Consumption: it is the sum of overall growth of both private and government consumption on a constant local currency (World Bank 2021). It is the dependent variable in this study which other independent variables are tested to show the relationships and effects on it.

Interest rate: It is the spread of the charged interest by banks on loans to private sector consumer minus the interest paid by commercial banks which is different in each country. This is the principal indicator that affect consumption negatively in this study. The expected sign is negative as also discovered in some previous studies. It is believed that interest rate will cause Final Consumer Consumption either to increase or decrease by its changes. The author believes that when interest rate increases, consumption will decrease. The rationale behind this is that consumer will pay more on loans and will hence decrease their income such that they will not be able to buy as much as before.

Inflation: It is a rise in price in general terms but define it, it is measured by consumer price index which is the annual change in cost to average consumer of buying goods and services. The sign is expected to be negative because the increase in inflation will tend to decrease the consumption. It is because that consumer will pay more on high prices of goods and services which will also effect on income and saving. Inflation will also decrease consumer buying power of consumer too.

Interest payments: It is the actual payment on government bonds including both short term and long term loan provided to foreign and domestic residents (World Bank 2021). Consumer who pay more in interest payment will decrease their buying power and affect their income such that they will be unable to buy the same as before the increased interest payment. The expected sign in negative in this research work.

GNI: It is the gross national income which is the sum of overall value added, plus product taxes, and plus primary income (World Bank 2021). The expected sign positive in this research work. It is argued that GNI will tend affect the Final Consumer Consumption positively which means that an increase in GNI will increase the Final Consumer Consumption. It is because GNI will directly affect the income of consumer and will increase Final Consumer Consumption and saving.

Tax payments: It is the payment by businesses on taxes which is the total number of taxes paid by businesses. It is worth mentioned that tax is paid once in a year (World Bank 2021). It should claimed that the more tax paid, the less the consumer be able to buy goods and products because it directly affect the income negatively. If tax pay increases, consumption will decrease and hence the expected sign is negative.

Diagnostics and Estimation

Multicollinearity (VIF):

The very best approach for assessing Multicollinearity problem in a research study is to use the Variance Inflation Factor which the purpose is to show that how much the variance of the coefficient of explanatory variables are bigger in the data. The significant limitation of VIF is that when VIF equals 1, there is not a Multicollinearity problem but if the VIF is bigger than 1, there is a slight Multicollinearity problem. In such situations, a variable should not be removed from the model because the Multicollinearity is that much big that deteriorate the inferences. However, if the VIF of a variable is greater than 5, then the same variable should be removed because the model contains high Multicollinearity problem which misleads the result. (Akinwande 2015).

Stationarity:

As for the condition of Classical Linear Regression Model, it is vital find and check the Stationarity and non-Stationarity of the variables. It is important to note that if a variable's statistical properties such as mean and variance do not alter over time is called Stationarity, if they are changed, is called non-Stationarity. It worth mentioned that a variable should be stationary because non-stationary variable provides spurious regression inferences and besides, R-Squared and T-statistics will be overestimated and misleading (Ly'ocsa 2009).

Autocorrelation:

Autocorrelation is a condition when the observation of one variable is interconnected with another variable in the disturbances such that the inference of OLS is still linear, unbiased, and reliable but inefficient. For this purpose, it is important that a model should have no autocorrelation or in other words, serial correlation. In this regard, this paper practices the Wooldridge test which the decision rule is that the Null hypothesis: H_0 : there is not serial correlation, and H_1 : there is serial correlation. (Damodar 2004).

Heteroskedasticity:

It is best defined that the variances of error terms are not constant that is actually the violation homoscedasticity which is a key assumption of CLRM. The existence of heteroscedasticity will not result in biased parameters, however, OLS estimates will no longer be best linear unbiased estimator (BLUE). Besides that, the standard errors are biased in the existence of heteroskedasticity because they lead to biased T-statistics, Confidence intervals, and the entire hypothesis will not be reliable and valid. So it is important to detect heteroskedasticity. (Williams 2015).

Cointegration:

It is an econometric concept that determines the short run and long run relationship among variables over time series by making rock-solid algebraic and economic base for error correction model. Discovering the Cointegration for the long run relationship is the best part of this test. There are several tests for Cointegration but ARDL or in other words, Autoregressive Distributed Lag is the best and more common among them. (Nkoro2016).

OLS (Ordinary Least Squared):

It is a generalized regression technique which is used to make a single independent variable in one interval measure applied both for single and multi-explanatory variables. It is basically used to indicate the relationship of Y (Dependent) with X (Independent) variables via using a line of best fit in a way to predict Y via X in some degrees. (Hutcheson 2011). Besides that, OLS is the first regression

method to test the unknown parameters of classical linear models (CLRM) through minimizing sum of squared of errors. It is important to mention that result of OLS is consistent when the independent variables are exogenous and there is no Multicollinearity problem but it is optimal when there is not serial correlation and errors are homoscedastic. (Anchoar2002).

Fixed effect estimation model:

This research study practices a panel data analysis that will probably have individual fixed effect error problem. Individual effect problem takes place when the individual error is correlated with one of the explanatory variables such that creates endogeneity problem in the regression model. In such case, the inferences of regression model are biased and the coefficients are inconsistent which such problems must be detected, controlled, and removed from the regression model. Allison stated that using panel data analysis means similar topics measured at two or more points in time which some “characteristics that do not change across time whether they are measured or not such as sex, race and ethnicity” and we get a problem that we can control by panel data. By using Fixed Effect model, we should be no longer worried about the effects of omitted time unchanging variables which go to error and affect one of the independent variables. (Williams 2015).

Random effect Estimation

This paper also uses Random effect model for the purpose of having unbiased, consistent and efficient estimation results. It is clear that under the random effects assumptions explanatory variables are exogenous so that pooled OLS provides consistent estimates but if simple ordinary least square estimation is used, standard errors have to be adjusted for the fact that errors are correlated over time for given *i*. Since there might be serial correlation, OLS is not efficient. On the other hand, using random effect estimation will benefit the results by estimating time in-variant variables which do not work in fixed effect estimation model. Generalized least square estimation is used in random effect model. According to the econometric guide, random effect model undertakes that the individual-specific effect is a random variable which is not correlated with the independent variables of all previous, present and future time periods of the similar individual. Random effect model also accepts continuous variance of the individual specific effect and adopts that the explanatory variables with a continuous variable are not completely collinear (Schmidheiny 2016).

4. Regression Findings

VIF Test:

The VIF test is used to detect the problem of Multicollinearity in the model that shows how much the variance of the coefficient of explanatory variables are bigger in the data. In the existence of Multicollinearity, a variable should be removed from the model because the Multicollinearity deteriorates and misleads the inferences.

Variables	VIF	1/VIF
Int Rate	4.30	0.2325581
GNI	3.20	0.3125
Tax Pay	2.80	0.357142
Int Pay	2.50	0.4
Inf	1.06	0.943396

Following table #1, it is shown that there is not the problem of Multicollinearity in the model because the applied provided that all VIF values are lesser than the limits which is 5. This means that this model does not suffer from the problem of Multicollinearity

because the highest collinearity is shown by interest rate which is 4.30. Hence, there is not such variable that it should be removed from the model because all the assigned variables showed less correlation among each other.

Autocorrelation Test:

Usually, models in research study face the problem of autocorrelation which is the relationship among residuals that is caused by missing variables or incorrect functional form. The existence of autocorrelation provides inefficient inferences of the regression model although there still unbiased and linear. For this purpose, this research study practices the Wooldridge test in order to detect the problem of autocorrelation.

Table #2: Wooldridge test for autocorrelation in panel data	
H0: no first-order autocorrelation	
Prob> F=	0.1652

Following table #2, the result provided that the p-value is 0.1652 that greater than significance level (0.05). This means that H₀ is not rejected and validates that there is not enough evidence to prove that the model has a serial correlation and hence this model is free of autocorrelation.

Heteroskedasticity:

The basic understanding of heteroskedasticity is that the variances of error are not constant such that it is the violation of classical linear regression model (CLRM). The existence of heteroskedasticity provides unbiased inferences but they will not be best linear unbiased estimator (BLUE). In order to detect the problem heteroskedasticity, this paper used Breusch Pagan test.

Table #3: Breusch-Pagan / Cook-Weisberg test for Heteroskedasticity	
Ho:	Constant variance
Variables:	fitted values of Consumption
chi2(1)	= 45.410
Prob>chi2	0.361

Regarding table #3, the result of the Breusch Pagan test provides that there is not the problem heteroskedasticity in this model and one cannot reject the H₀ hypothesis. It is because that p-value is greater than the significance level (0.05) and hence there is not enough evidence to prove that this model has the problem of heteroskedasticity which is the violation of homoskedasticity.

Stationarity:

It is a condition of Classical Linear Regression Model to find and check the Stationarity and non-Stationarity of the variables. It worth mentioned that a variable should be stationary because non-stationary variable provides spurious regression inferences and besides, R-Squared and T-statistics will be overestimated and misleading

Table #4: Stationarity

Variables	T-Statistic	P-value
Final Con	-12.3818	0.000
Int r Rate	-2.9587	0.020
GNI	-2.012	0.004
Tax Pay	-1.8405	0.035
Int Pay	0.7100	0.044
Inf	0.5501	0.055

Regarding table #4, there are not any variables that they are non-stationary because all the p-values of the assigned variables are less than the significant level (0.05) which showed this model is an exception of non-Stationarity because all the variables are stationary in this model. It is important to mention that if there is a non-stationary variable, it should be changed to stationary by the first difference. But this model does not have any non-stationary variable that it should be changed to stationary.

ARDL Cointegration			
Final Consumer Consumption	Coef.	Std. Err.	P> z
Int Rate	-.6881799	.2171501	0.002
Inf	-.3398683	.190984	0.075
GNI	.5295508	.2496844	0.034
Int Pay	-.559071	.5660504	0.323

In table #5, one can see the result of ARDL test applied for the purpose of discovering both the short term and long term relationships between dependent and independent variables as it comes the first sign of understanding that how each independent variable relates with the dependent variable. Fortunately, we came up with satisfied result and put here only the long term relationship because we estimate the decisions and policy implications based on the long term relationships. In this table, it is revealed that Interest rate is significant at 0.2% significance level which means that there is a relationship between Final Consumer Consumption and interest rate. Following Inflation and Gross National Income are also significant at 1% and 3% significance levels respectively. But Interest Pay is not significant because the alpha value is greater than 10% significance level. This might be only true in Central Asia but if we use data for other countries, this may get its significance level. It is worth mentioned that those variable that we call them significant, or in other words, when the values of Alpha are less than 10% of the assigned variables, this means they have long term relationships among each other. So if one of the independent variable increases or decreases, this affect the dependent variable in value.

Table #6: Fixed and Random Effect Estimation Results						
Variables	Fixed Effect			Random effect		
Final Con	Coef.	Std. Err	P>/Z/	Coef.	Std. Err	P>/Z/
Int Rate	-.1566262	-.0687587	0.027	-.1421625	.0666905	0.033
Inf	.0989741	.0602134	0.106	-.1008271	.0596999	0.091
GNI	.9834903	.24407	0.000	.9093184	.2282324	0.000
Int Pay	-.4750002	.616218	0.444	-.7274016	.5342381	0.173
_cons	3.277721	3.908688	0.405	4.788131	3.426484	0.089

We have already addressed the importance and the obligation of using either Fixed Effect or Random Effect estimation in this analysis. We insist that Panel Data analysis usually has individual error problem, saying that individual error is correlated with one of the explanatory variable which creates endogeneity and resulting biased and inconsistent inferences. So using Fixed Effect estimation will help us to remove individual error problem. On the other hand, Random Effect Estimation will give us unbiased, consistent and efficient results by removing serial correlation: A condition when standard errors are correlated over time.

Both Fixed and Random Effects tests are applied via STATA but provided different and close inferences which is hard for a researcher to decide without applying the Hausman Test. A Hausman test can tell the difference and at the same time, states that which test result is correct for the objective of the paper. So we also applied the Hausman test to decide on the true inferences.

Table #7: Hausman Test	
Prob> Chi2	0.9078

Note; if alpha greater than 10%, do not reject the null and argue that RE is correct.

The inference provided by applying the Hausman Test tells that we do not reject the null hypothesis in favor alternative. If the value of alpha is less than 10%, reject the null hypothesis which means that the Fixed Effect provide accurate results, otherwise, Random Effect. So the result in table # 7 says that the value of alpha is greater than 10%, it means that the Random Effect is correct and provides correct inferences. So based on the Hausman Test Results, we follow the results of Random Effect Test for analysis of this paper.

In table # 6, the Interest Rate Fluctuation disclosed an impartial relationship with Final Consumer Consumption via running RE. The Interest Rate Fluctuation as the core independent variable is significant at 2.7% Alpha significance level. It tells that 1% increase in Interest Rate would reduce the Final Consumer Consumption by 0.15% which means that the relationship between these two variable is negative; if one increases, the other should decrease. Siphosethu Lucia Fikizolo discovered similar results in his research study conducted in South Africa; “The Asymmetric Effects of Interest Rate Changes on Household Consumption: South Africa”. He claimed that there exists a negative relationship between Final Consumer Consumption Expenditure and Interest Rate. This hints that an increase in Interest Rate would decrease the value of Final Expenditure (Siphosethu 2020). Besides that, the inferences that were discovered in Mudit Kapoor research work is matching with the conclusions of this paper. He studied “the Effect of Interest Rate on Household Consumption: Evidence from a Natural Experiment in India”, and found out that Final Consumer Consumption and Interest Rate have a negative relationship between them. He claimed that changes in Interest Rate bring negative changes in Final Consumer Consumption, adding that if Interest Rate changes, Final Consumer Consumption will be decreased by different percentage (Mudit Kapoor 2009). On the other hand, Douglas W. Elmendorf discovered contradictory inferences in a research work: “The Effect of Interest-Rate Changes on Household Saving and Consumption: A Survey”. He came up with three different effects. First, he claimed that if Interest Rate increase, people tend to consume less today and save for the future. This the condition when people put money for interest in a bank. The Second effect is that an increase in Interest Rate leads people to consume more today and save less for the future (Douglas 1996). Furthermore, Warren Tease exposed a very unique assumption and claimed that it is very difficult to find a relationship between Interest Rate and Final Consumer Consumption and also added that if there is, it will be very weak relationship. He addressed these explanation after conducting research on “Real Interest Rate Trends: The Influence of Saving, Investment and Other Factors” (Warren 1991).

The next important variable is Inflation such that a change in its value will bring greater impacts on the Final Consumer Consumption. According the RE test result, this variable is significant at almost 10% significance level. A 1% increase in Inflation will increase the Final Consumer Consumption by 0.011%. The sign of the coefficient of the variable is positive which means the relationship is also positive among them. Obinna Osuji discovered that Inflation and Consumption have positive relationship to each other which the results of this research study is consistent with Obinna Osuji research study (Osuji 2020). The inferences of this research study is also consistent with the Christiana Osei Bonsu research work conducted in Ghana under the title: Macroeconomics Determinants of Household Consumption Expenditure in Ghana: A Multivariate Cointegration Approach. He claimed that lower interest rate reduces savings but higher Inflation stimulate Consumption which definitely displays a positive relationship (Christiana 2017). Besides those, Suman Yadav and Ravi Shankar provided consistent conclusions about how inflation affects household consumption in India. He insisted that Inflation plays a significant role in changing consumption levels and added that higher Inflation leads to higher Consumption which is a positive relationship (Suman 2015). On the other hand, the results discovered in this research work is inconsistent with the research study conducted by Casadio, Paolo and Paradiso, Antonio. They found that Inflation can have several effects on Final Consumer Consumption but notified that Inflation is negatively linked with Consumption such that it affects income distribution and consumer behavior (Casadio 2010).

On the other hand, Gross National Income (GNI) is strongly significant at 0.0% significance level but with a positive relationship among them. This means that a 1% increase in GNI, will rise the Final Consumer Consumption by 0.10%. If a country has an increase in Gross

National Income, it will directly affect the Final Consumer Consumption of the same country people. Ekaterina conducted researched the title of “Determinants of Household Final Consumer Consumption Expenditures in Asian Countries: A Panel Model, 1991-2015” and established consistent consequences. He added that increasing to some extent the Gross National Income, will affect the value of Final Consumer Consumption (Ekaterina 2015).

On the contrary, the final independent variable; Interest Payment, is not significant even at 10% significance level. The result we discovered via STATA by running RE, shows that an increase or decrease in Interest Payment will not effect on the Final Consumer Consumption. But the theory suggests that Interest Payment should have impacts on Final Consumer Consumption because there is a strong negative relationship between them.

5. Conclusion

The main objective of this research work is to study the impacts of Interest Rate Fluctuations on Final Consumer Consumptions via panel data analysis for the period of 23 years (1995-2017) in Central Asia. In this study, a multiple regression model is used for the purpose of discovering the relationship of one dependent variables with a few other independent variables. Besides using a few diagnostic tests for data and model correction, an ARDL, Fixed Effect, and Random Effect estimations are used for investigating the long run relationship of the above mentioned variables because they were the best fit tests based on the data formation and type. In this study, a few explanatory variables were added who were also effecting the same problem in Central Asia that includes, Inflation, Gross National Income, and Interest Payments.

In contrast to literature review, this research work came up with a different and unique result which is consistent with theories provided on the relationship of interest rate and consumption. The conclusion say that interest rate adversely affect the consumption in Central Asia, meaning that if interest rate are increase, consumption will be decreased and it is called a vice versa relationship. This inference is also consistent with other research understanding conducted in other Asian and European countries but in different times. Furthermore, Inflation and gross national income were also significant and showed their impacts on Final Consumer Consumption via STATA tests and estimations. The connections for inflation and GNI are negative and positive respectively. Finally, we discovered that interest payments was not significant however, it should have impacts on Final Consumer Consumption but this research work result did not discover any relationship. Yet, the author could not find any research study that would show the relationship between interest payment and consumption. It is believed these inferences are interesting to apply a few policies that would solve both the economic and social impacts of the problem existed by the higher interest rates and inflation.

Policy Implications

1. **Balancing the Interest Rate:** The inferences of this research work suggest that balancing or lowering interest rates on loan would stimulate the Final Consumer Consumption. Meaning that borrower will not pay more on their debts and will have enough money either to save or consume for the purpose of making a living. There are numerous examples that people who took loan from banks for the purpose of buying land, homes, cars, or funding their businesses, are paying the interest payments or the charges but when the interest rate gets higher, then they pay more and hence, they will not have enough money to consume or save. So it is very vital for Banks in Central Asia to adopt a monetary policy for lowering the interest rates especially for borrower. So if borrowers pay more for their loans and remain less to save, then this will push the whole community low level of living and we may call the condition poverty when this happens for a long time. This will also affect the ability to buy or purchasing power and many products will leave their value in the markets which will also affect the personal income. Besides, this will also effect on the health of the borrowers because they will get depression and anxiety which will need more money to spend. So lowering interest rate on loan given to borrowers will improve both the social and economic problem of the community.
2. **Controlling Inflation:** The results also provided that higher inflation will decrease consumption which is not good both for economic and social life of Central Asian Countries people. To elaborate, when the prices are high, people will pay more than before but they will buy less which means people will not have purchasing power or to pay for making a living. Still people will face both economical and healthy problems in Central Asian Countries. So it is important for the governments of Central Asia to adopt monetary policies, reduce the supply of the money, wage growth, fiscal policies, and exchange rate policies.

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