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The Impact of Workers' remittances On Economic Growth: Evidence from Kenya

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Abstract

For many years workers' remittances have grown to become a significant source of foreign exchange in many developing countries, however, workers' remittances has not been given a big recognition as a source of economic growth in developing countries especially when considering that remittances in Kenya continued to show an upward trend in the past. An explanatory design was used. Data was collected for the periods 1970 to 2010. This study relied purely on secondary annual time series data. The analysis of the data will be carried out by OLS (Ordinary Least Squares) method. Time series Regression was used to analyze the data. we found that there is positive and highly significant relationship between workers' remittances and real GDP per capita, indicating that higher economic growth is related with higher remittances. Further, we paper found a positive impact of gross capital formation and change of exchange rate regime from fixed to floating on economic growth. The government can improve their economic growth performance by reaping the contributions of workers' remittances by reducing the cost of transactions of sending and receiving money from abroad.
Keywords; Economic Growth, Workers' Remittances

Introduction

For many years workers' remittances have grown to become a significant source of foreign exchange in many developing countries. Indeed, it is almost becoming a substitute for foreign direct investment (FDI), official development assistance (ODA), debt relief or other public sources of finance development. Workers' remittances receipts in Sub-Saharan Africa stood at $US0.22 billion in 1970 compared to $US20 billion in 2009. Further Evidence shows that in 2010, $US325 billion was the amount of workers' remittances transmitted to the developing countries. These remittances were indeed more that 5 percent of the gross domestic product (GDP) in the developing countries and almost at par with foreign direct investment (FDI) (World Bank, 2011).

This upward growth of remittances has made them to be considered crucial to the economy unlike in the past. It is important to note that remittances resulting from migration are more influential in enhancing socioeconomic condition of the people living in the country migrated and boost economic development (Khan 2005). Nyamongo *et al (*2012),in their study on the role of remittances on economic growth in a panel of 36 countries in Africa using a panel econometric framework found out that remittances appear to be an important source of economic growth while its volatility appears to have a negative effect on growth. They also found out that remittances appear to be working as a complement to financial development but the importance of financial development in boosting economic growth appears weak among the countries understudy.

Although for a long time literature has detailed several sources of economic growth, there has been an endless debate on the same. Most of the literature already documented seems to associate economic growth more so in the developing countries with the most obvious factors like increasing physical capital, adopting appropriate technology, development assistance, investment in human capital, expanding volume of exports, political stability among others.

It's worth noting that, workers' remittances has not been given a big recognition as a source of economic growth. Adams and Page (2005) explains that remittances contribute to poverty alleviation because the poor who are also economically disadvantaged receive it directly. However despite the positive contribution of remittances to economic growth, literature also documents that remittances may have a negative effects on the economies. Majority of the emigrants may be educated or the highly skilled in the country and this causes "brain drain" and this may slow down economic development for developing countries because home country invested time, effort and money on their education. Leon-Ledesma and Piracha (2004) shows that international migrations bring about dependence on remittances. This dependence distorts development and income inequalities in the country. Other researchers like (Amuedo-Dorantes $ Pozo, 2004; Chami *et al.* (2003) shows that because the remitter may not have a direct influence on the use of the remitted fund some of the funds may not be used for investment projects. In addition some recipients may increase their leisure activities if they treat the remittances as a substitute for the labor income a situation which affects labor productivity.

Remittances in Kenya continued to show an upward trend in the past. Official estimates from the Ministry of Foreign Affairs in Kenya indicate that there are about 3 million Kenyans in the Diaspora, approximately 8% of the country's population; therefore the growth of remittance flow seems endless. In the recent times, migration has also been a result of business opportunities, especially in countries neighboring Kenya (Ngugi, 2011).Most researchers have conducted empirical studies on the impact of remittances on economic growth and their results are diversified with some getting a positive relationship and others negative relationship. Majority of these studies are done from a global or regional perspective with a few being done on an individual country. It's also worth noting that the few country specific studies have analyzed the impact of remittances on several socio economic phenomena like consumption or poverty with no clear focus on the impact on economic growth. Most of these studies make use of panel data and a few using time series.It is therefore common that the impact of remittances on economic growth for a specific country is usually obtained through generalization. This is because most of the panel data studies use one coefficient for all the countries. Using one coefficient to measure the impact of several countries may not bring out well the impact to a specific country. This study will therefore undertake a case study of Kenya which will be a more micro-level analysis to estimate impact of remittances on economic growth. It will utilize time series data of workers' remittances to Kenya from 1970 to 2010. Furthermore, there are well known difficulties with cross section country data and so there is need for more longtime series on the subject, (Jawaid *et al* 2012).This will contribute towards having specific and relevant policy on remittances for Kenya.

Empirical review

There are many studies which have contributed to the large amount of theory and empirical literature on remittances and its effect on different aspects of the economy. Most of these studies cover the role of remittances on several socio-economic phenomena such economic growth, consumption, poverty, investment, financial development among others.

Nyamongo *et al* (2012) in their study on the role of remittances and financial development on economic growth in a panel of 36 countries in Saharan Africa over the period of 1980-2009 found out that remittances appear to be an important source of growth for these countries in Africa during the period under study. They further established that volatility of remittances appears to have a negative effect on the growth of countries in Africa and that remittances appear to be working as a compliment to financial development.

Jawaid *et al* (2012) in their study to investigate the relationship between workers' remittances and economic growth by using 7 years average annual data of 113 countries from the period 2003 to 2009 indicate the positive and significant relationship between workers' remittances and economic growth. The study shows that the workers' remittances are more contributing in high income countries as compared to low and middle income countries.

Imai *et al* (2011) examined the effect of remittances and its volatility on economic growth by using the panel data of 24 Asian and Pacific countries from the period of 1980 to 2009. They a positive relationship between workers' remittances and economic growth but the volatility of workers' remittances was found harmful for economic growth. However they got a significant negative relationship of workers' remittances with poverty.

Bichaka Fayissa & Christian Nsiah, (2010) while exploring the aggregate impact of remittances on the economic growth of 18 Latin American Countries within the conventional neoclassical growth framework using an unbalanced panel data spanning from 1980 to 2005 found that remittances have a positive and significant effect on the growth of Latin American Countries where the financial systems are less developed by providing an alternative way to finance investment and helping overcome liquidity constraints. This concurs with the findings of their further study in 2011.The study estimated the macroeconomic impact of remittances and some control variables such as openness of the economy, capital/labor ratio, and economic freedom on the economic growth of African, Asian, and Latin American-Caribbean countries using newly developed panel unit-root tests, cointegration tests, and Panel Fully Modified OLS (PFMOLS). The results show that remittances, openness of the economy, and capital labor ratio have positive and significant effect on economic growth for all regions as a group and in each of the three in study.

Ivakhnyuk, I., (2006) found out that workers' remittances which are closely related to migration have a positive impact on economic development. In addition, in their study to examine the effect of workers' remittances on economic growth in a sample of 39 developing countries using panel data from 1980–2004 resulting in 195 observations Pradhan *et al* (2008) found out that remittances have a positive impact on growth.

Ramirez and Sharma (2008) examine the impact of remittances on economic growth in 23 Latin American and Caribbean countries using panel data from 1990 to 2005. Results from the estimation show that there is a positive association between workers' remittances and economic growth. The paper presents evidence of negative growth in the absence of remittance receipts in those countries.

Within a theoretical framework, Mundaca (2009) analyzes the effects that both workers' remittances and financial intermediation have on economic growth. He found, among other things, that remittances can have significant positive long-run effects on growth. He confronts the implications of the theoretical model proposed with panel data for countries in Latin America and the Caribbean. After considering the effect of long-run investment and demographic variables, and controlling for fixed time and country effects, the empirical analysis indicates that financial intermediation tends to increase the responsiveness of growth to remittances. The overall conclusion is that making financial services more generally available should lead to even better use of remittances, thus boosting growth in these countries.

Burgess, R. and Haksar, H. (2005) in their study "migration and foreign remittances in the Philippine" found that at the national level, remittances do influence economic growth positively and significantly. However, when they broke down their analysis at the regional level to confirm the national results they found mixed results giving rise to their observations that remittances do not positively affect economic growth. These results generally confirm the observations of Taylor (2006) and Ballard (2003) that while remittance may contribute to economic growth there is need for correct policies and nurturing environment for it to be an effective engine of development.

Ahortor and Adenutsi (2009) argue that workers' remittances also create over dependency on external economy or income that's creating voluntary unemployment. Waheed and Aleem (2008) found out that that workers' remittances are only beneficial in short run. In long run the policy makers should focus on export earning instead of workers' remittances as a source of foreign exchange earnings for continues and stable growth. Leon-Ledesma and Piracha (2004) suggests that international migration/remittances paralyze countries making them dependent on remittances. Reliance on remittances distorts development and creates inequalities and disparities among the people within the country. Sofranko and Idris (1999) conclude that workers' remittances fail to create sufficient savings required for rapid economic growth because remittances are mainly used for consumption not for investment.

Other studies however have been inconclusive. In a study conducted by IMF (2005) on the effect of remittances on economic growth for 101 developing countries over the period between 1970 to 2003 it found no statistical linkage between remittances and per capita output growth, or between remittances and other variables like

education and investment. The study attributed this inconclusive result to measurement difficulties arising from the fact that remittances may behave countercyclical with respect to growth. In addition, Spatafora (2005) finds that there is no direct link between per capita output growth and remittances. Based on the above empirical reviews this study hypothesis that:

$H_{O1:}$ *Remittances has no significant effect on economic growth*

Remittances, Consumption, Investment and Poverty

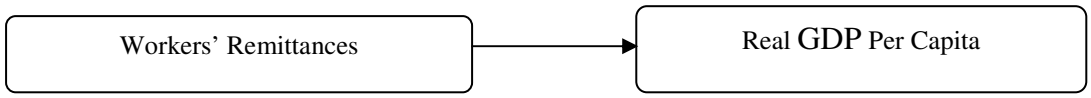
Kiiru (2010) while investigating the relationship remittances and poverty in Kenya shows that remittances have had a positive impact on household consumption. The study further shows that remittances have also been used to deal with household economic shocks. To estimate the effect of remittances on growth, Mihalis H. and E. M. Ekanayake (2008) using cross-country growth accounting methods found that remittances have positive impact on economic growth, though the realization of this impact depends upon the level of human capital stock in the economy. This implies that a investment in human capital stock is needed for remittances to exert a positive effect on growth. In addition, the level of human capital stock has a positive and significant effect on growth.

Adams (2004) finds that both internal and international remittances reduce the level, depth, and severity of poverty. When the poorest of the poor households receive remittances, their income status changes dramatically and this in turn has a large effect on any poverty measure-like the squared poverty gap-that considers the number, distance, and distribution of poor households beneath the poverty line. Remittances are typically transfers from a well-meaning individual or family member to another individual or household. They are targeted to meet specific needs of the recipients and thus tend to reduce poverty. Cross-country analyses generally find that remittances have reduced the share of poor people in the population (Adams and Page 2003, 2005; Gupta, Pattillo, and Wagh 2009)

Conceptual Framework

It is expected that worker's remittances will influence economic growth. Growth of remittances is expected to determine the direction that economic growth will assume whether positively or negatively. This study is based on the conceptual frameworks as illustrated in figure 2.1 below.

Dependent variable **Independent variables**



Control variables

Exports
Gross Capital Formation
Final Government Consumption
Private Capital Flows

Figure 1 Conceptual Framework
Source: Researcher, 2012

RESEARCH METHODOLOGY

The research design of this study will be greatly influenced by the works of Karagöz (2009). The research will endeavor to give an explanation on the relationship between worker's remittances and economic growth. An

explanatory design will help us provide an explanation on the relationship between workers' remittances and economic growth The study will cover only one country, in this case Kenya. Data will be collected for the periods 1970 to 2010.These periods are specifically important since they comprise both pre and post reform periods for the Kenyan economy. Selection of the period is based on availability of data.

This study will rely purely on secondary annual time series data. The data will be obtained from the World Bank database: African Development Indicators. Data on remittances as a ratio of GDP is the sum of three items defined in the fifth edition of the IMF's Balance of Payments Manual: workers' remittances, compensation of employees, and migrants' transfers. Remittances are classified as current private transfers from migrant workers resident in the host country for more than a year, irrespective of their immigration status, to recipients in their country of origin. Migrants' transfers are defined as the net worth of migrants who are expected to remain in the host country for more than one year that is transferred from one country to another at the time of migration. In line with the objectives and hypothecation of this study a data collection sheet will be used the capture the values of all variables to be used in this study.

The analysis of the data will be carried out by OLS (Ordinary Least Squares) method. The data will be exposed to various diagnostic tests to confirm the assumptions of OLS. The following are the diagnostic test conducted in this study.

Diagnostic Tests

A brief discussion of underlying assumptions and diagnostic tests those were conducted to ascertain whether the underlying assumptions of OLS were met or not follow such as Multicollinearity of the Explanatory Variables, Autocorrelation of the Disturbance terms, Heteroskedasticity of the Disturbance terms, Auto-Regressive Conditional Heteroskedasticity (ARCH), Correct Specification of the Model, Unit Root Test for Stationarity and Cointegration Analysis

Model Specification

The study will adopt a modified model consistent with the one used by Karagöz (2009) while analyzing the impact of workers' remittances on economic growth in Turkey. From the model it is shown that remittances flow to Turkey have statistically meaningful but negative impact on growth. On the other hand, exports and domestic investments positively affect the economic growth, while foreign direct investment has no meaningful effect.

He estimated the following model:

$$GDPPC_t = \beta_0 + \beta_1 GDPPC_{t-1} + \beta_2 RREM_t + \beta_3 EXPO_t + \beta_4 RINV_t + \beta_5 RFDI_t + \varepsilon_t \text{.....(1)}$$

Where *GDPPCt* is per capita GDP, $GDPPC_{t-1}$ is one period lagged per capita GDP, *RREMt* is ratio of workers' remittances to GDP, *REXPOt* is ratio of exports to GDP, *RINVt* is ratio of gross domestic investments (include both private and public sectors fixed capital investments) to GDP, and *RFDIt* is ratio of foreign direct investment inflow to GDP. ε_t is error term which includes the effects of omitted factors.
This study has made slight modifications to the model by including some different variables especially the ones deemed to be unique to Kenyan economy.

Using time series data on real GDP (per capita), workers' remittances, exports, private capital flows, gross capital formation, final government consumption and some dummy variables the study estimated the following model:

$$GDPPC_t = \beta_0 + \beta_1 WR_t + \beta_2 X_t + \beta_3 PCF_t + \beta_4 GC_t + \beta_5 GCF_t + \beta_6 D_2 + \beta_7 D_3 + \varepsilon_t \text{.....(2)}$$

Where;

$GDPPC_t$ is the Real per capita GDP and t denotes time.

WR_t is the percentage of workers' remittances to GDP.

X_t is the percentage of exports to GDP.

PCF_t is the percentage of Private Capital Flows to GDP.

GC_t is the percentage of Government Consumption to GDP.

GCF_t is the percentage of real Gross capital formation to GDP.

D_2 denotes the dummy variable for exchange rate regime. It takes a value of 1 for the period after 1992 and the value of zero otherwise.

D_3 denotes the dummy variable for Electoral cycles. It takes a value of 1 for every year of election and the value of zero otherwise.

ε_t is the error term which is assumed to be a white noise

Measurement of the variables

Table 1: Summary of Variables and their Measurements

Variable	Measurement	Expected Sign
Dependent Variable		
Economic growth	Real GDP per capita will be used as a proxy for economic growth	
Independent Variables		
Workers' Remittances	Workers' remittances as a percentage of GDP	+
Exports	Exports as a percentage of GDP	+
Private Capital Flows	Private capital flows as a percentage of GDP	+
Gross Capital Formation	Gross capital formation as a percentage of GDP	+
Final Government consumption	Final government expenditure as a percentage of GDP	+ or -
Exchange Rate Regime	Dummy two is used as a proxy of exchange rate regime	+
Electoral cycles	Dummy three is used as a proxy of electoral cycles	-

Empirical Results and Discussion

Descriptive Statistics and Diagnostic Test Results

Table 2 Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
GDPPC	41	415.7542	31.14335	291.1721	468.6997
WR	41	.0212892	.0176621	.0028493	.0583036
PCF	36	.0042796	.0060934	-.0025348	.0245361
GCF	41	.2057467	.0364635	.1500382	.2976002
GC	41	.1718579	.0134694	.1447996	.1980338
X	41	.2715608	.0420356	.2016926	.3890363
Dummy 2	41	.4390244	.5024331	0	1
Dummy 3	41	.195122	.4012177	0	1

Where GDPPC is real Gross Domestic Per Capita, WR is Workers' Remittances, PCF Is Private Capital Flows, GCF is Gross Capital Formation, GC is Final Government Consumption, X is exports and Obs is the number of observations.

From the Table 2, the GDP per capita for Kenya has a mean of 415.7 with a standard deviation of 31.1 over a period of 41 years. From 1970 to 2010, GDP per capita had a maximum value of 468.69 and a lowest value of

291.17. Workers' remittances over the same period had a mean of 0.021 with a standard deviation of 0.18. This variable had a maximum of 0.058 and a minimum of 0.003 with 41 observations. Private capital flows had a mean of 0.004 with a standard deviation of 0.006. With 36 observations the variable had a maximum of 0.003 and a minimum of -0.003.Gross capital formation had a mean of 0.205 with a standard deviation of 0.036. It had a maximum value of 0.29 and a minimum value of 0.15 with 41 observations. Government consumption had a mean of 0.172 with a standard deviation of 0.013. It had 41 observations whereby the minimum value was 0.145 and the highest value was 0.198. Finally, exports had a mean of 0.272 with a standard deviation of 0.420. Out of the 41 observations, the minimum value of the exports was 0.201 and a maximum value of 0.389.

Diagnostic Test Results

Appendix 1 depicts the results of Multicollinearity using the Correlation Matrix. The correlation matrix shows the implied relationships between the individual explanatory variables.GDP per capita, Workers' Remittances, Private Capital Flows, Gross Capital Formation, Government Consumption and Exports all had a correlation coefficient of less than 0.8 amongst themselves implying that there is no severe multicollinearity.

The result from the Breusch-Pagan / Cook-Weisberg test for Heteroskedasticity as shown in Appendix 2 had a Chi square of 1.59 with a P value of 0.2072 implying the acceptance of the null hypothesis. This means that the variance of the error term is constant.

The study further tested for Auto-Regressive Conditional Heteroskedasticity (ARCH) using the LM test for Autoregressive Conditional Heteroskedasticity (ARCH). The test result presented in Appendix 3 gives a Chi Square of 1.082 with a P value of 0.2982 implying the acceptance of the null hypothesis of no Auto-Regressive Conditional Heteroskedasticity.

The Breusch-Godfrey LM test for autocorrelation was used to test for the presence of Autocorrelation in the data. Appendix 4 presents the results, the test reports a Chi Square of 9.482 with a P value of 0.0021 implying the acceptance of the null hypothesis of the presence of first order serial autocorrelation. There is autocorrelation since the chi-square is 9.482 is statistically significant with a p value of 0.0021. (For significance the p value must be less or equal to 0.1000).To illustrate further, Figure 3 in the appendix shows that GDP per capita is Auto correlated implying that there is presence of unit root. Since the first order serial autocorrelation is present in the data, we used the robust standard errors to account for the presence of Autocorrelation.

The Ramsey RESET test for model misspecification is presented in Appendix 5. The result gives an F statistic of 2.29 with a P value of 0.1189 implying the acceptance of the null hypothesis of no omitted variables hence the model is correctly specified.

The study further conducted the unit root test for all the variables using the Augmented Dickey Fuller (ADF) test and the results are presented in Appendix 6. From the results, all the variables have unit root but became stationary after the first difference except PCF which is stationary in level. To choose the lag length of each of the variable we considered the Akaike Information Criteria (AIC).

Finally after testing for unit root for each time series variable, we also found the order of integration of the same variables in order to perform cointegration test. From the results, all the variables are integrated of order one I (1) except PCF which integrated of order zero I (0). This implies that we cannot run the Johansen test for cointegration since the variables are not integrated of the same order.

Time series Regression Results

Having conducted the necessary diagnostic tests, we regressed real GDP percapita as the dependent variable on the first difference of workers' remittances, private capital flows, gross capital flows, government consumption, exports, dummy 2 for exchange rate regime and dummy 3 for electoral cycles in Kenya. The regression results are presented in Table 3 below.

Table 3: Time Series Regression Results

Number of obs = 36, F (7, 28) = 6.75, Prob > F = 0.0001, R-squared = 0.5419,

Root MSE = 15.464

The Dependent Variable is GDPPC

Variable	Coefficient.	Robust Std. Error.	t-Statistic	p>t	[95%confidence interval]	
WR	1301.444	270.5811	4.81	0.000	747.184	1855.705
PCF	430.5975	383.3665	1.12	0.271	-354.6932	1215.888
GCF	218.1426	116.6588	1.87	0.072	-20.82216	457.1073
GC	-11.60902	268.8928	-0.04	0.966	-562.4109	539.1929
X	-46.18083	77.42833	-0.60	0.556	-204.7856	112.4239
D2	-24.59334	12.99997	-1.89	0.069	-51.22258	2.035893
D3	7.617603	5.509003	1.38	0.178	-3.667078	18.90228
_CONS	372.1236	60.50578	6.15	0.000	248.1831	496.0641

The regression is done using robust standard errors to cater for serial correlation

Where GDPPC is real Gross Domestic Per Capita, WR is Workers' Remittances, PCF Is Private Capital Flows, GCF is Gross Capital Formation, GC is Final Government Consumption, X is exports and Obs is the number of observations.

From the Table 3 depicting the OLS regression results, the F statistic is 6.75 with a P value of 0.0001 implying that the independent variables, that is, Workers' remittances, Private capital flows, Gross capital formation, final Government Consumption, Exports, dummy for exchange regime and dummy for electoral cycles jointly explains the dependent variable, GDP per capita.

The R squared which is a measure of goodness of fit is 0.5419 and a root mean standard error of 15.464 implying that 54.19 percent of the variations in the real GDP per capita are explained by the independent variables; Workers' remittances, Private capital flows, Gross capital formation, final Government Consumption, Exports, dummy for exchange regime and dummy for electoral cycles.

Hypothesis Testing

We found a positive and highly significant relationship between workers' remittances and real GDP per capita, indicating that higher economic growth is related with higher remittances. The coefficient of Workers' remittances, 1301.444, is statistically significant with a P value of 0.0001 implying that a one unit change in the percentage of workers' remittances to GDP will lead to 1301.444 unit change in Kenya GDP per capita. These results seem to support the findings of other studies like Nyamongo *et al* (2011), Fayissa and Nsiah (2010) and Igbal and Satter (2005) who also found a positive and significant impact of Workers' remittances on economic growth.

Our results indicate that Private capital flows have a positive impact on economic growth but its impact is statistically insignificant. This could be explained by the fact that the investment climate in Kenya is not conducive and that the ease of doing business is very low due to corruption, political instability among other issues.

We found a positive and significant relationship between Gross capital Formation and Economic growth in Kenya. The coefficient is 218.1426 as shown in table 4.2. This implies that a one unit change in the percentage of Gross capital formation to GDP will lead to 218.1426 unit change in Kenya GDP per capita.

Final Government Consumption has a negative sign and does not have significant impact on economic growth. This is because most of the government consumption goes into consumption and other expenditure which do not support private sector investment.

Table 3 also contains the results for the impact exports to economic growth in Kenya. The results indicate that exports have a negative impact on economic growth although the impact is not significant. This can be explained by the fact that Kenya is a net importer and that the Marshall- Learner conditions do not hold for the Kenyan case. Dummy variable for exchange rate regime has coefficient of -24.59334 and statistically significant. This

implies that the change of exchange rate regime from fixed to floating exchange rate regime had a positive impact on the economic growth. The actual coefficient of this dummy is given as (372.1236-24.59334 =347.53).

The electoral cycles captured by dummy variable had a coefficient of 7.618 and is statistically insignificant implying that elections in Kenya do not affect her economic growth. This may be because voters may evaluate candidates on more micro indicators of performance. The exception is the year 2007-2008 where the economic growth was affected due to the political violence that erupted from the disputed presidential elections.

Conclusion of the Study

Workers' remittances have become one of the largest sources of external financing in Kenya. After reviewing the literature it shows a recent revival in interest in workers' remittances largely due to big size of their flows. In this paper, we analyzed the impact of workers' remittances from the period 1970 to 2010. From the time series regression analysis, the study found that workers remittance have a positive impact on economic growth. This is in line with the previous results in the literature, for example, (Nyamongo *et al* 2011).Further, the paper found a positive impact of gross capital formation and change of exchange rate regime from fixed to floating on economic growth The paper found out that private capital flows, final government consumption, exports and elections appear not to have meaningful impact on economic growth in Kenya. Remittances in Kenya seem to have been translated to value-added activities and investments which are fundamental sources of development and economic growth.

Policy Recommendations

From this study several policy recommendations may be drawn .The government can improve their economic growth performance not only by concentrating on the traditional sources of growth such as promoting technology, human capital, exports, tourism and foreign direct investment, but also by reaping the contributions of workers' remittances by reducing the cost of transactions of sending and receiving money from abroad. This will encourage workers remittance flow into the country through the formal channels and hence more economic growth. The government should also encourage gross capital formation through maintenance of stable macroeconomic climate to encourage savings and investments. Savings rate plays an important role in determining economic growth. Finally, the government should maintain floating exchange rate regime as it positively contributes to economic growth. In this study we analyzed the impact of workers' remittances on economic growth in Kenya. To this end an analysis end use of remittances in Kenya will be very crucial to the Kenyan economy.

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APPENDICES

Appendix 1: Correlation Matrix

	GDPPC	WR	PCF	GCF	GC	X
GDPPC	1.0000					
WR	0.4250	1.0000				
PCF	0.0843	-0.0680	1.0000			
GCF	0.1947	-0.5067	0.1384	1.0000		
GC	0.1246	-0.4509	0.0753	0.5690	1.0000	
X	-0.2048	-0.1952	0.4276	0.1401	-0.1189	1.0000

Where GDPPC is real Gross Domestic Per Capita, WR is Workers' Remittances, PCF Is Private Capital Flows, GCF is Gross Capital Formation, GC is Final Government Consumption and X is exports.

Appendix 2: Test for Heteroskedasticity

Breusch-Pagan / Cook-Weisberg test for Heteroskedasticity
Ho: Constant variance

Variables: fitted values of GDPPC

Chi2 (1)	=	1.59	Prob > chi2	=	0.2072

Appendix 3: Test for Autoregressive Conditional Heteroskedasticity (ARCH)

LM test for autoregressive conditional Heteroskedasticity (ARCH)

lags(p)	chi2	Df	Prob > chi2
1	1.082	1	0.2982

H0: no ARCH effects vs. H1: ARCH (p) disturbance

Appendix 4: Test for Autocorrelation

Breusch-Godfrey LM test for autocorrelation

lags(p)	chi2	Df	Prob > chi2
1	9.482	1	0.0021

H0: no serial correlation

Appendix 5: Test for Model Misspecification

Ramsey RESET test using powers of the independent variables
Ho: model has no omitted variables

F(15,8) =2.29			Prob > F =		0.1189

Appendix 6: Test for Unit Root

		Level		First difference	
Variables	**Lag**	**Intercept**	**Intercept + Trend**	**Intercept**	**Intercept + Trend**
GPPPC	0	-4.930 (0.0000)	-4.750 (0.0006)	-4.471 (0.0002)	-4.124 (0.0058)
	1	-2.145 (0.2270)	-2.903 (-4.251)	-5.575 (0.0000)	-5.299 (0.0001)
WR	0	0.084 (0.9650)	-2.455 (0.3508)	-7.407 (0.0000)	-7.562 (0.0000)
	1	0.400 (0.9815)	-2.097 (0.5477)	-4.665 (0.0001)	-4.930 (0.0003)
X	0	-2.832 (0.0539)	-2.900 (0.1622)	-6.177 (0.0000)	-6.094 (0.0000)
	1	-2.965 (0.0383)	-3.105 (0.1049)	-4.891 (0.0000)	-4.820 (0.0004)
PCF	0	-5.714 (0.0000)	-5.833 (0.0000)	-9.380 (0.0000)	-9.235 (0.0000)
	1	-4.306 (0.0004)	-4.373 (0.0024)	-7.731 (0.0000)	-7.626 (0.0000)
GC	0	-2.221 (0.1987)	-2.651 (0.2570)	-6.374 (0.0000)	-6.234 (0.0000)
	1	-2.163 (0.2199)	-2.356 (0.4033)	-5.353 (0.0000)	-5.272 (0.0001)
GCF	0	-3.404 (0.0108)	-4.696 (0.0007)	-9.268 (0.0000)	-9.156 (0.0000)
	1	-2.412 (0.1385)	-3.464 (0.0434)	-6.908 (0.0000)	-6.818 (0.0000)

H_0 There is unit root; the values in the brackets are the P values

Appendix 8: Time series data used in Analysis

Time	WR	GDPPC	X	PCF	GCF	GC	D2	D3
1970	0.45277	291.172	29.8257		24.3967	16.2575	0	0
1971	0.40823	343.377	28.6394		23.916	17.9803	0	0
1972	0.65772	387.871	26.5878		22.3226	17.6322	0	0
1973	0.50117	396.101	27.3938		25.8112	16.4522	0	0
1974	0.62223	397.374	33.6759		25.7566	17.0359	0	1
1975	0.40499	386.348	29.8237	0.401103	18.1416	18.3254	0	0
1976	0.28493	380.292	32.4505	1.08696	20.2394	17.4601	0	0
1977	0.41118	401.018	34.9589	1.21512	23.6572	17.2052	0	0
1978	0.49776	412.975	28.9355	0.604957	29.76	19.5148	0	0
1979	0.30701	427.975	25.7532	1.25311	18.1328	19.1958	0	1
1980	0.38154	435.073	29.517	1.08329	24.5071	19.8034	0	0
1981	1.14582	434.596	30.4599	0.120937	22.9134	18.5888	0	0
1982	1.05697	424.623	26.6575	0.052671	21.8602	18.433	0	0
1983	0.97137	414.134	25.9499	0.154538	20.9251	18.4217	0	1
1984	0.91675	405.823	26.7499	0.06275	19.811	17.3818	0	0
1985	1.07579	407.83	25.2989	0.3819	25.3248	17.4603	0	0
1986	0.72025	421.398	25.8484	0.383959	21.768	18.3196	0	0
1987	0.82802	430.644	21.3052	0.108268	24.2894	18.5688	0	0
1988	0.9163	441.49	22.3712	-0.02158	25.449	18.4058	0	1
1989	1.07716	446.466	23.033	0.735383	24.8621	18.0566	0	0
1990	1.62108	449.673	25.6926	0.664462	24.1641	18.6424	0	0
1991	1.52206	441.22	27.0416	0.230995	20.9705	16.7713	0	0
1992	1.39696	423.671	26.2604	0.077404	16.9208	15.6823	0	1

1993	2.05397	411.94	38.9036	2.20372	17.6104	14.48	1	0
1994	1.9205	410.147	37.0403	0.076157	19.2932	15.1549	1	0
1995	3.29769	415.996	32.5917	0.261288	21.8198	14.8429	1	0
1996	2.39435	421.477	25.2006	0.463322	15.0038	15.1806	1	0
1997	2.68212	412.459	22.6864	-0.253483	15.141	15.5362	1	1
1998	2.46799	415.247	20.1693	-0.168194	16.6927	16.25	1	0
1999	3.34707	414.141	20.8327	0.048422	15.5214	15.7533	1	0

Time	WR	GDPPC	X	PCF	GCF	GC	D2	D3
2000	4.23834	406.073	21.5876	0.760458	17.4141	15.0543	1	0
2001	4.23516	410.616	22.9316	0.029907	18.7903	15.9729	1	0
2002	3.29296	402.183	24.898	0.117398	15.1382	17.078	1	1
2003	3.60986	403.232	24.0868	0.281664	16.4821	18.1313	1	0
2004	3.85186	412.861	26.6103	-0.153219	16.9625	17.8601	1	0
2005	4.2961	426.045	28.509	-0.101074	16.9133	17.3802	1	0
2006	5.01242	441.532	27.1118	0.027065	17.9474	17.5682	1	0
2007	5.83036	460.509	26.7785	2.45361	19.0263	17.8847	1	0
2008	5.54406	455.75	27.5584	0.084288	19.2062	16.4873	1	1
2009	5.51409	455.869	24.152	0.16149	19.4007	15.7601	1	0
2010	5.51891	468.7	27.5209	0.517359	19.298	16.6472	1	0

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