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Remittances and economic development in Lesotho: does financial sector development matter?

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Abstract

This paper conducts an empirical investigation of the effect of remittances on economic development in Lesotho, with particular attention paid to the role financial development plays in affecting this relationship. We made use of the fully-modified OLS (FMOLS) estimation technique to examine the long run relationship between remittances and development, and this helped to control for potential endogeneity bias. The results of econometric estimations revealed that remittances have had a significant positive effect on development. Also, the results showed that financial development, when measured by broad money exerts a positive effect on development in Lesotho. When remittances were interacted with financial development, the results showed a significant coefficient. This result indicates that remittances act a buffer for alleviating credit constraints of households and also acts to ameliorate inefficiencies of the financial system on poor households.

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1. Introduction

The 21st century has ushered in an era where increased attention has been focused on remittances and the effects they have on a host of economic variables. In recent times, some studies have examined how remittances affect current account dynamics (Lartey, 2016). Some other studies have examined the effects of remittances on growth under different levels of financial development (Chowdhury, 2016). Some studies have also examined how remittances affect poverty (Azam et al., 2016), and youth labour supply (Karymshakov et al., 2016). Studies such as Bayar (2015) examined how remittances affect economic growth.

This surge in interest can be attributed to the dominant role remittances have assumed as a source of external finance for developing countries. In 1995, remittance flows to developing countries were US$55 billion, which was below US$57 billion for official development assistance (ODA), US$83 billion for private debt and portfolio equity, and US$95 billion for foreign direct investment (FDI) (World Bank, 2011a). Thus, remittance flows were below all other sources of external finance to developing countries. These figures had changed by 2000 as remittances, with a value of US$81 billion, were the second largest source of external finance after FDI (US$149 billion) while ODA and private equity flows were third and fourth respectively (with their corresponding figures being US$49 billion and US$27 billion). The 21st century has witnessed a tremendous surge in remittance flows with remittances rising by almost 300 per cent between 2000 and 2009 to US$307 billion (World Bank, 2011a). This figure is more than twice the amount of ODA and almost three times the amount of private equity flows. Only FDI surpassed remittances with a value of US$359 billion (World Bank, 2011a).

These high figures for remittances have led to increasing attention placed on them, with focus on one hand, on their possible effects on economic aggregates, and on the other hand, their determinants. Remittances can affect development outcomes in a number of ways. Firstly, remittances can help to alleviate poverty by making recipients have more cash for consumption of goods and services (Ratha and Mohapatra, 2012). Secondly, remittances can also improve human capital by making more funds available for expenditure on health care and education (Ratha and Mohapatra, 2012; IMF, 2005). In addition to this, remittances can lead to an increase in investment and entrepreneurial activities by households which could come in the form of small businesses or investment in real estate (IMF, 2005; Ratha and Mohapatra, 2012). Also, remittances can have a positive effect on development by reducing poverty and inequality, as a result of poorer households being empowered in their consumption needs and the multiplicative effect of such spending on the macroeconomy (Ratha and Mohapatra, 2012). On the macroeconomic front, remittances could have a positive effect on economic growth as a result of the increased investment by households benefiting from remittances. This is particularly so if the financial system is well developed as this ensures efficient identification and allocation of credit to the most productive investments (IMF, 2005). Furthermore, because remittances do not suffer from wild fluctuations as other forms of external finance, they do not cause shocks or volatility to output or investment during periods of booms or busts in the global economy, but rather, act as a form of insurance against such shocks and natural disasters (Ratha and Mohapatra, 2012).

On the negative side, remittances can have Dutch-disease effects where they lead to appreciation of the exchange rate and a fall in exports of tradables. Remittances can also reduce the motivation of recipients to work which could adversely affect productivity and output.

Finally, some remittance channels could be misused for money laundering and to finance terrorism (Ratha and Mohapatra, 2012).

Following from the increasing role remittances have occupied as a source of external finance especially in developing countries, there has been an increase in empirical studies into examining the effects of remittances on various economic variables. Some studies such as Edwards and Ureta (2003) and Yang (2008) have examined the effects of remittances on physical and human capital. Some other studies have examined how remittances affect poverty (Acosta et al., 2008; Gupta et al., 2009; IMF, 2005) while some other studies have examined the effects of remittances on the exchange rate (Lartey et al., 2008; Acosta et al., 2009).

Further still, a number of studies have examined the effects of remittances on economic growth (IMF, 2005; Giuliano and Ruiz-Arranz, 2009; Calderon et al., 2008; Bettin and Zazzaro, 2009; Mundaca, 2009; Nyamongo et al., 2012). There is no conclusive evidence on if and how, remittances effect economic growth, with Bettin and Zazzaro (2009) noting that the effects of remittances on growth are ambiguous and depend crucially on 2 factors: (i) whether they fund consumption or investment expenditures; and (ii) whether they stimulate work or leisure activities.

There is a budding new stream of literature which assesses the role financial sector development plays in influencing the nature of the relationship between remittances and economic growth. According to this literature, financial development can either serve as a complement or substitute to remittances in affecting economic growth. On one hand, there can be complementarity between remittances and financial development if transactions costs are kept low as a result of a developed financial system. This will attract more remittance flows from migrants to financial institutions and such additional funds will serve in easing liquidity constraints faced by entrepreneurs. In such a case, remittance funds will be channeled to the high return-yielding projects, thereby leading to faster rates of economic growth. Also, a more developed financial sector facilitates the transfer of remittances to be faster and cheaper, and encourage savings amongst recipients, thus making more credit available for productive investment. A higher level of financial development also attracts larger transfer of remittances and this enhances competition between financial institutions, thereby further bringing down costs and ensuring a more efficient channeling of remittance funds to productive activities (Nyamongo et al., 2012). Studies such as Nyamongo et al. (2012), Mundaca (2009) and Bettin and Zazzaro (2009) have found evidence to support the complementarity of remittances and financial development in affecting economic growth.

On the other hand, remittances and financial development can be substitutes if financial markets are inefficient or credit markets are not in existence. In this case, remittances provide a direct finance to entrepreneurs and such entrepreneurs do not have to face high interest rates or provide collateral, as would be required by financial institutions (Giuliano and Ruiz-Arranz, 2009). Substitutability also implies that with less developed financial markets, poor households will not be able to obtain credit but the availability of remittances relaxes the lack of financial development condition and poorer households can undertake high-yielding projects (Nyamongo et al., 2012). Studies that have found empirical evidence to support this proposition of the substitutability hypothesis include Giuliano and Ruiz-Arranz (2009) and Calderon et al. (2008).

The preceding discussion has highlighted the surge in remittances in recent times and the increasingly important role that remittances have and will play on development outcomes. An attendant issue arising from this concerns the role of remittances in affecting economic development in low-income African countries. Consequently, this paper conducts an empirical investigation of the effect of remittances on economic development in Lesotho, with particular attention paid to the role financial development plays in affecting this relationship.

Lesotho presents a particularly interesting case study for a number of reasons. Firstly, Lesotho is very dependent on remittances, and remittances were as high as 96.9% of GDP in 1987 (ADI, 2013). Although this figure has dropped over the years, remittances are still high, representing 24.8% of GDP in 2009 (World Bank, 2011a). Thus, remittances are a crucial source of foreign exchange earnings and income for households. It would therefore be insightful to empirically examine how remittances have affected economic development in Lesotho. Secondly, remittance inflows to Lesotho have fallen in recent years. Remittances have fallen from a peak of 96.9% of GDP to a trough of 22.96% in 2010. It would be interesting to examine the long-run effects of remittances on Lesotho's economic development. Such a long-run analysis would enable us see how dwindling remittances in recent years have affected development. Thirdly, Lesotho is a land-locked small country with a limited scope of growth drivers. Understanding the inter-relationship between remittances, financial development and economic development could help in policy formulation for sustainable development.

This study is important for a number of reasons. First, incomes and development in many African countries since the 1980s have been very low, and many authors have described development in Africa as 'dismal' or 'stagnant' or 'tragic'. In light of this, it has become imperative to identify factors that could help in stimulating economic development and remittances are one of such factors. It is therefore important to empirically examine the relationship between remittances and economic development. Second, there is a dearth of empirical research into examining how remittances have affected development outcomes in African countries. A substantial proportion of existing empirical research has made use of data drawn across various regions in cross-country regressions to examine how remittances affect economic growth. The results from such broad studies could be influenced by some large countries and such studies do not afford the researcher the opportunity to dwell on country specific dynamics in the relationship between remittances and economic development. In this study we make use of time series data for a specific African country which is heavily reliant on remittances, and this gives us the opportunity to critically examine the country-specific inter-relationships between remittances, financial development and economic development.

The paper is divided into 6 sections. Section 2 presents an overview of remittance trends in Lesotho while the third section presents the model specification and methodology. The empirical results are presented in section 4 and robustness tests are in section 5. Section 6 concludes the paper.

2. Remittance Trends in Lesotho

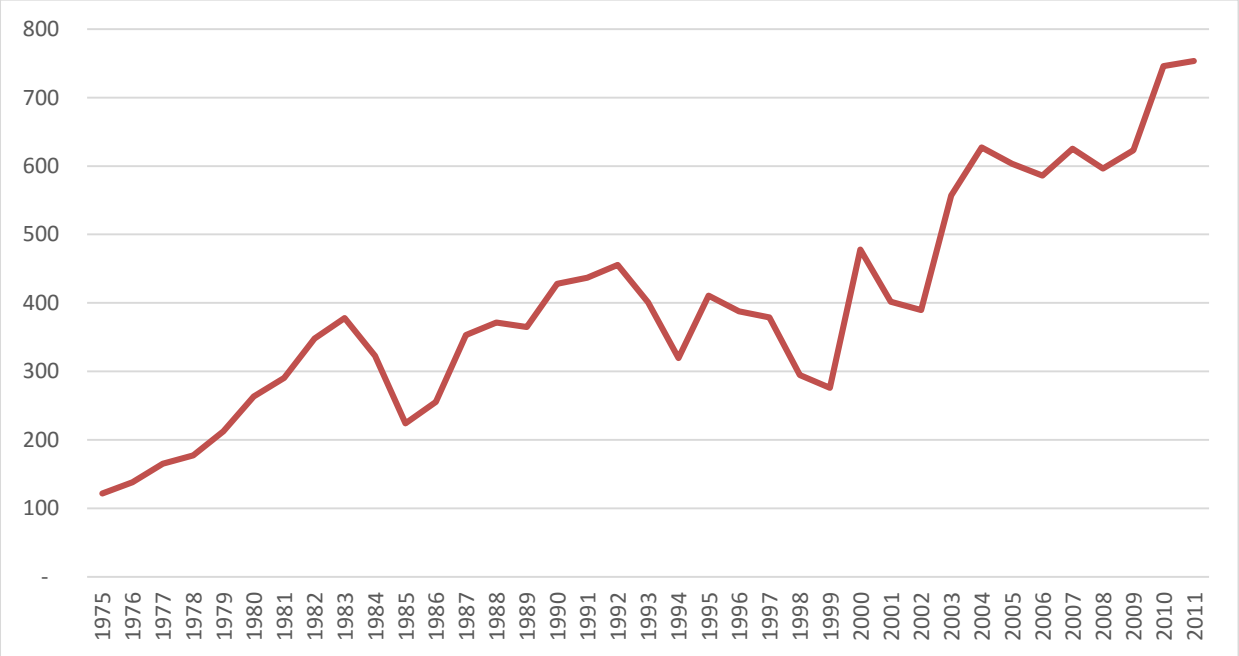
Lesotho is a small country whose land area is approximately 30,000 square km and it has a distinctive feature of being completely encircled by South Africa. The country is mostly covered by a rugged mountainous terrain and only about 11% of the total land area is arable. Lesotho has another distinctive feature which is that its Gross National Product (GNP) is substantially larger than its Gross Domestic Product (GDP) and this is attributable to large

factor income from abroad due to migrant remittances. Lesotho has a population of about 2 million people, with over 80% living in rural areas.

Estimates of the population of Lesotho living abroad range from 240,000 people (Crush et al., 2010) to over 400,000 people (Ratha et al., 2011), and thus Lesotho ranks as one of the most migration-dependent countries in the world (Crush et al., 2010). With half the population living below the poverty line and high unemployment, most households are dependent on remittances for their livelihoods (Crush et al., 2010). Lesotho ranks as one of the highest recipients of remittances as a share of GDP and in 2009 was ranked as the third largest recipient of remittances as a share of GDP as remittances were 24.8% of GDP (World Bank, 2011a). The country was surpassed by Tajikistan (35.1%) and Tonga (27.7%) (World Bank, 2011a). By 2010, with 29% of GDP, Lesotho was ranked 2nd largest recipient of remittances as a share of GDP, after Tajikistan (31%) (World Bank, 2011b).

Although there has been a fall in emigration to South Africa, remittance inflows have continued to increase over the years (Nalane et al., 2012). Figure 1 shows that despite falling in some years in the mid-1980s and late 1990s to early 2000s, remittances received in the country have experienced an upward trend. Remittance inflows increased from US122 million in 1975 to US753million in 2011, representing an annual average growth rate of 6.86%. This rapid growth of remittance inflows to Lesotho is attributable to rising average wages of mine workers which has more than offset the effects of retrenchments (Nalane et al., 2012). Average annual earnings of Lesotho mineworkers in South Africa increased from M12,321 in 1992 to M82,076 per annum in 2008 (Nalane et al., 2012).

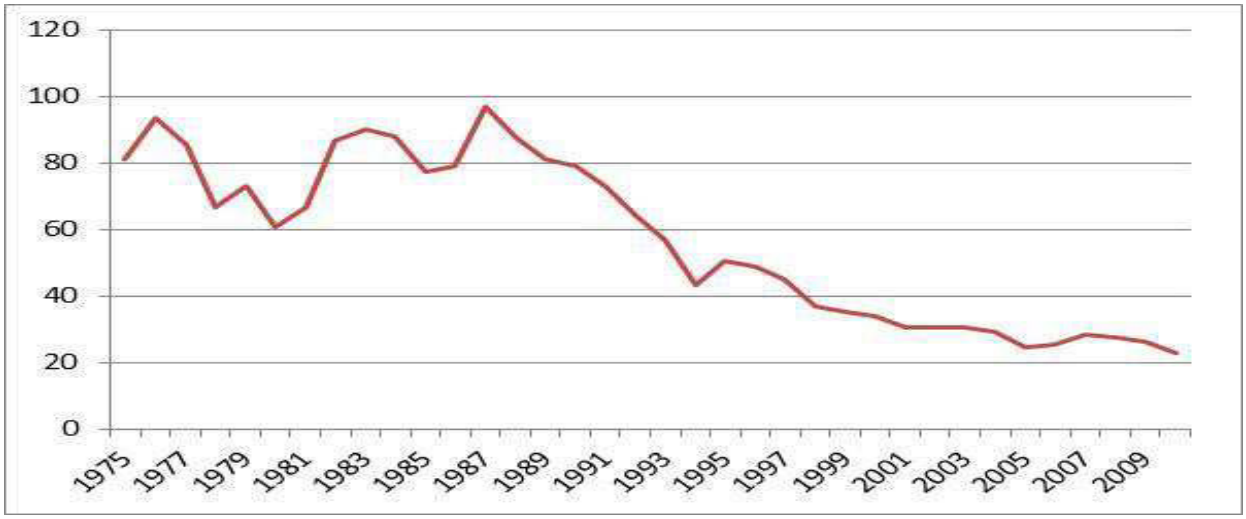
Figure 1: Migrant Remittance Inflows to Lesotho (US$ million)



Source: Africa Development Indicators (2013)

Remittance inflows have over the years represented a substantial share of GDP in Lesotho. Figure 2 shows that although remittances as a share of GDP have experienced a declining trend particularly since the peak of 96% in the late 1980s, they still constitute over 20% of GDP. Thus, remittances are a crucial component of income in Lesotho and this is a major reason why it is necessary to conduct this empirical study.

Figure 2: Migrant Remittance Inflows to Lesotho as a Share of GDP (%)



Source: Africa Development Indicators (2013)

Remittance inflows dominate other sources of external financial inflows such as ODA, FDI, SACU revenues (Nalane et al., 2012). We get an indication of this from Table 1 which shows that remittance inflows were over 7 times larger than commercial services exports and over 6 times larger than FDI.

Table 1: Remittance Inflows as a Share of Financial Flows and GDP

Variables	% Share of Remittance Inflows (2009)
Commercial Services Exports	731
Foreign Direct Investment	658
Official Development Assistance (Net)	337
Merchandise Exports	55
Gross Domestic Product	26

Source: Nalane et al. (2012)

3. Model Specification and Methodology

3.1 Model Specification

This study is concerned with conducting an empirical investigation of the effects of remittances on economic development in Lesotho, and to further examine if financial development plays an intervening role in affecting how remittances affect economic development. Drawing from

the literature on determinants of economic growth and development, we specify our empirical model where economic development is a function of our primary variables of interest – remittances, and financial development - and other important macroeconomic variables. Following the studies of Giuliano and Ruiz-Arranz (2009) and Nyamongo et al. (2012), we first specify a baseline equation where we investigate whether remittances, excluding financial development has an effect on development. This is expressed as equation (1) below:

$$Y_t = \propto_0 + \propto_1 REM_t + \propto_2 X_t + \varepsilon_t \quad (1)$$

where Y = per capita GDP

REM = remittance inflows as a share of GDP

X = a matrix of control variables, which includes investment, government expenditure, economic openness.

The central tenet of this study is to examine if financial development affects the way remittances affect the economy. Thus, after estimating equation (1) and obtaining the coefficient on remittances, we proceed to interact financial development with remittances, thereby giving rise to equation (2) below:

$$Y_t = \beta_0 + \beta_1 REM_t + \beta_2 FINDEV_t + \beta_3 REM * FINDEV_t + \beta_4 X_t + \varepsilon_t \quad (2)$$

Where FINDEV = measures of financial development. We employ 2 popular measures of financial development, which are liquid liabilities (M2) as share of GDP (M2) and credit provided by banks to the private sector as a share of GDP (PRIVCRE). M2 is the broadest measure of financial intermediation, while PRIVCRE measures the extent to which banks finance consumption, working capital and investment of the private sector (Giuliano and Ruiz-Arranz, 2009, p.146).

REM*FINDEV = interaction term between remittances and financial development

Thus, equation (2) will have the following variants and it is these equations (3) and (4) that will be estimated:

$$Y_t = \beta_0 + \beta_1 REM_t + \beta_2 M2_t + \beta_3 REM * M2_t + \beta_4 X_t + \varepsilon_t \quad (3)$$

$$Y_t = \beta_0 + \beta_1 REM_t + \beta_2 PRIVCRE_t + \beta_3 REM * PRIVCRE_t + \beta_4 X_t + \varepsilon_t \quad (4)$$

3.2 Methodology

We adopt a 3-step estimation procedure. We first test for the stationarity of the data using the Ng and Perron (2001) unit root test. This test uses the GLS detrending procedure of Elliott, Rothenberg and Stock (1996) to create an efficient version of the modified PP tests of Perron and Ng (1996). This modified test is adopted for two reasons: firstly, it does not exhibit the severe size distortions for errors with large negative MA or AR roots common with the Phillips and Perron (PP) (1998) tests; and secondly, when the autoregressive term is close to unity, it possesses substantially higher power than the PP tests (Ng and Perron, 2001).

Following the unit root tests, the long-run relationship between the variables is examined using the Johansen cointegration test. After the cointegration tests, this study employs the Fully-Modified Ordinary Least Square (FMOLS) as proposed by Phillips and Hansen (1990) to determine the long-run effect/coefficients of remittances and other variables on economic development. The FMOLS is used because it has some interesting characteristics which make it better than ordinary least squares (OLS). Firstly, the FMOLS modifies the ordinary least squares to account for serial correlation and endogeneity in regressors as a result of

cointegrating relationships by presenting an asymptotically unbiased and fully efficient estimates. In addition, the FMOLS provides optimal coefficients for cointegrating regressions when the variables in the models are full ranked i.e. integrated of order one [I(1)] (Phillips, 1995).

Time series data spanning the period 1970 to 2014 were used for analysis. Data were obtained from the African Development Indicators (ADI) 2014.

4. Empirical Results

4.1. Descriptive Statistics

Descriptive statistics for the variables of interest are presented in Table 2. Mean per capita GDP in Lesotho is $365. Thus, Lesotho ranks as a low-income economy in the World Bank's classification. Even when the highest recorded GDP per capita of $520 is considered, Lesotho is still a low-income economy. GDP per capita has been quite volatile in the country as revealed by the high standard deviation. The ratio of remittances to GDP had an average value of 54% over the sample period. Thus, despite their fall in recent years, remittances in Lesotho on the average, are still fairly high. Financial development, represented by M2 and private credit, is quite low in Lesotho. Mean M2/GDP ratio is 34% while mean private credit/GDP ratio is 13%. This suggests a largely underdeveloped financial system and shows that more still needs to be done to boost financial development in the country.

Table 2: Descriptive Statistics

	Y	REMIT	INV	M2	PRIVCRE	TRADE
Mean	365.416	54.033	41.271	34.613	13.923	151.661
Median	350.874	49.556	36.602	35.773	13.177	154.816
Maximum	520.745	96.945	76.695	50.837	26.197	187.681
Minimum	206.365	22.962	18.083	15.112	6.539	107.852
Std. Dev.	86.303	25.384	15.854	8.560	4.953	16.218
Observations	40	40	40	40	40	40

4.2. Unit Root Test

In the Ng and Perron (2001) test adopted, three M-tests (MZa, MZt and MSB) and modified Elliot et al. (1996) Point Optimal Test (MPT) were considered in ascertaining the stationarity of the time series data used in this study. The null hypothesis is that there is the presence of unit root.

Table 3 presents the results of the Ng and Perron unit root tests. From the table, it can be seen that all the series in our sample are integrated of order one, or are I (1) series.

Table 3: Results for Ng and Perron Unit Roots Test

Variables		**MZa**	**MZt**	**MSB**	**MPT**
Y	Level	-1.1329	-1.0235	0.01461	1.23145
	First Difference	-18.8667*	-3.05698*	0.23300*	1.78000*
REM	Level	-0.68088	-0.36877	0.14161	1.13471
	First Difference	-16.6153*	-2.87264*	0.27500*	4.45000*

M2	Level	-1.01100	-0.63605	0.12913	0.75745
	First Difference	-17.3000*	-3.42000*	0.59484*	17.7572*
INV	Level	-4.69640	-1.53235	0.12628	1.21684
	First Difference	-13.26244*	-2.23447**	0.37839*	7.46437*
TRADE	Level	-5.70000	-1.62000	0.15400	1.18000
	First Difference	-9.05439**	-2.04151**	0.22547*	3.03291*
GOVCON	Level	-0.28305	-0.16025	0.06617	1.29325
	First Difference	-47.6789*	-4.87669*	0.18228*	1.52903*
PRIVCRE	Level	-4.39237	-1.47515	0.13584	0.11928
	First Difference	-18.3892*	-3.02986*	0.16476*	1.44097*
REM*M2	Level	-2.03887	-0.97174	0.14766	1.13370
	First Difference	-17.5364*	-2.95747**	0.16865*	1.41045*
REM*PRIVCRE	Level	-3.03165	-1.16720	0.11501	0.95420
	First Difference	17.7292*	2.97177*	0.16762*	5.17346*

Notes: (1) The asymptotic critical values for the MZa test are -13.87 and -8.10 for 1% and 5% significance levels respectively.

(2) The asymptotic critical values for the MZt test are -2.58 and -1.98 for 1% and 5% significance levels respectively.

(3) The asymptotic critical values for the MSB test are 0.16 and 0.17 for 1% and 5% significance levels respectively.

(4) The asymptotic critical values for the MPT test are 1.35 and 2.17 for 1% and 5% significance levels respectively.

(5) *, ** depicts the rejection of the null hypothesis at 1% and 5% significant level.

4.3. Cointegration Test

The Johansen and Juselius (1990) cointegration method is adopted in testing if a long run equilibrium relationship exists between the variables. In adopting this approach, we first determine the optimal lag length of the Vector Autoregressive (VAR) model using various criteria, and the test results of the lag length selection criteria are presented in Table 4. It is seen from Table 4 that all the five different information criteria considered, i.e., Akaike Information Criterion (AIC), Schwarz Information Criterion (SIC), Hannan-Quinn Information Criterion (HQ), Final Prediction Error (FPE) and Sequential modified LR test statistic (LR), suggest the optimal lag length as 1.

Table 4: VAR Lag Order Selection Criteria

Criteria/Lag Length	0	1	2
Sequential Modified Test Statistic (LR)	Not Available	212.94*	35.48
Final Prediction Error (FPE)	9.49+14	5.01e+12*	2.05e+13
Akaike Information Criterion (AIC)	54.35	49.04*	50.06
Schwarz Information Criterion (SC)	54.67	51.56*	54.77
Hannan-Quinn Information Criterion (HQ)	54.46	49.90*	51.67

Note: * indicates lag order selected by the criterion.

The Johansen cointegration test is then applied to the variables using a lag length of 1 and the results are presented in Table 5. The results of the cointegration tests show a long-run equilibrium relationship between development, remittances and the control variables in Lesotho. The table reveals that for all equations, the trace and Maximum eigenvalue tests indicate between 3 and 5 cointegrating relationships, suggesting that there is long relationship between per capita income, remittance, investment, government consumption and trade openness.

Table 5: Test Results for Cointegration between Pairs of Variables

Equation	Trace Test, k=1				Maximum Eigenvalues , k=1				No of Cointegrating Equation
	H_o	H_A	Trace Statistics	5% Critical Values	H_o	H_A	Max-Eigen Statistic	5% Critical Values	
Equation (1)	R=0*	R=0	71.93	69.82	R=0*	R=0	33.88	26.91	3
	R≤1*	R=1	47.85	45.02	R≤1*	R=1	27.58	24.13	
	R≤2*	R=2	29.79	20.89	R≤2*	R=2	21.13	12.89	
	R≤3	R=3	8.07	15.49	R≤3	R=3	6.73	14.26	
	R≤4	R=4	1.28	3.84	R≤4	R=4	1.31	3.95	
Equation (3)	R=0*	R=0	172.53	125.62	R=0*	R=0	54.82	46.23	5
	R≤1*	R=1	117.71	95.75	R≤1*	R=1	45.96	40.08	
	R≤2*	R=2	71.74	69.82	R≤2*	R=2	33.87	28.88	
	R≤3*	R=3	47.86	42.86	R≤3*	R=3	27.58	22.17	
	R≤4*	R=4	29.79	20.69	R≤4	R=4	10.15	21.13	
	R≤5	R=5	10.54	15.49	R≤5	R=5	10.05	14.26	
Equation (4)	R=0*	R=0	175.51	125.62	R=0*	R=0	61.50	46.23	4
	R≤1*	R=1	114.01	95.75	R≤1*	R=1	47.12	40.08	
	R≤2*	R=2	69.82	66.87	R≤2*	R=2	33.88	28.63	
	R≤3*	R=3	47.86	38.25	R≤3*	R=3	27.58	17.69	
	R≤4	R=4	20.56	29.79	R≤4*	R=4	21.13	11.88	
	R≤5	R=5	15.49	8.67	R≤5	R=5	14.26	7.33	

4.4. Results of the FMOLS Estimation

4.4.1 Baseline Scenario/Specification

The results of estimating equation 1 with FMOLS are presented in Table 6. Equation 1 consists of the regression of per capita GDP on remittances and a number of other explanatory variables. Looking first at the primary variable of interest, it can be seen that the coefficient on remittances is positive, thereby indicating a positive relationship between remittances and economic development. This coefficient is statistically significant, and this can interpreted as meaning that as remittance inflows into Lesotho rise, then economic development as proxied by per capita income rises. This is similar to the result obtained by studies such as Calderon et al. (2008), Nyamongo et al. (2012), Giuliano and Ruiz-Arranz (2009), Mundaca (2009) and Bettin and Zazzaro (2009) who all found a significant positive effect of remittances on growth and development.

Examining the other variables in the model, the results from Table 6 show that all the other variables have positive coefficients. Therefore, investment, trade openness and government expenditure exert a significant positive effect on development.

Table 6: Regression Results for Baseline Specification

Variable	Dependent Variable: Y (per capita GDP)	
	Coefficient	t-statistic
Constant	31.670***	7.134
REMIT	0.892***	7.001
INV	0.953***	4.127
TRADE	0.617**	2.129
GOVCON	0.764***	4.276
R^2	0.922	
Adj R^2	0.913	
Durbin Watson	1. 993	

Note: ** and *** depict significance at the 5% and 1% levels respectively

4.4.2 Specification with Interaction Terms

Having found that remittances exert a positive effect on development in Lesotho, we now move to the central focus of this study, which is to examine if the effects of remittances on development in Lesotho are affected by the level of financial development. In line with the model specified, Table 7 presents the results of estimating equations 3 and 4 where remittances has been interacted with alternative measures of financial sector development.

The first column presents the FMOLS estimation results for equation 3 where the measure of financial development employed is broad money. The results reveal a positive coefficient for broad money, thus indicating that financial development exerts a positive effect on development. This conforms to the central conclusion of the finance-growth nexus literature where a developed financial sector enhances growth and development (Beck et al., 2000). Remittances still has positive effect on development and this is in line with the results obtained from the baseline regression presented in Table 6.

We now move to the interaction term between remittances and financial development. Interacting remittances with financial development in this manner allows the impact of remittances on development to vary across levels of financial development in Lesotho and the sign of this interaction term sheds light on the inter-relationship between remittances and financial development. Table 7 shows a significant negative coefficient on the interaction term of remittances and financial development as measured by broad money. This implies that remittances and financial development are substitutes in promoting development. Thus, as Lesotho's financial development rises, then the marginal impact of remittances on development falls. This implies that remittances will be able to exert a larger effect on Lesotho's development if financial development is shallow. This result is similar to results obtained by Calderon et al. (2008), Giuliano and Ruiz-Arranz (2009), and Bettin and Zazzaro (2009). The finding that remittances and financial development are substitutes in influencing development has a number of implications. Firstly, this result suggests that poor, especially rural households face credit constraints and thus depend on remittances to finance high-return projects (Calderon et al., 2008). Secondly, the result points to the fact that remittances are able to compensate for the inefficiency of the financial sector by soothing liquidity constraints and helping to channel resources towards productive investments (Giuliano and Ruiz-Arranz, 2009). Thirdly, the

results indicate that remittances have relaxed the budget constraints of poor households, and this is more important in countries with shallow financial systems.

When we look at the estimations for equation 4 where private credit is the measure of financial development, it is seen that remittances still exerts a significant positive effect on development. However, private credit, although positive, is statistically insignificant. Interestingly also, the interaction term between remittances and private credit is insignificant. This is similar to the result obtained by Bettin and Zazzaro (2009).

Moving on to the control variables in the regression, we see that the results are largely in line with those from Table 6. Investment and trade openness exert a significant positive effect on development in equation 3, while investment and government expenditure have significant positive coefficients in equation 4.

Table 7: Regression Results for Specification with Interaction Terms

Variable	Dependent Variable: Y (per capita GDP)	
	Equation 3	Equation 4
Constant	20.779*** (2.672)	37.769*** (3.926)
REMIT	0.517* (1.949)	0.307** (2.157)
M2	0.307*** (2.799)	
PRIVCRE		0.693 (1.585)
INV	0.316*** (6.039)	0.933* (1.907)
TRADE	0.674*** (2.713)	0.454 (1.307)
GOVCON	0.265 (1.519)	0.992*** (2.783)
REM*M2	-0.059** (-2.326)	
REM*PRIVCRE		0.028 (0.433)
R^2 Adj R^2 Durbin Watson	0.932 0.919 1.860	0.924 0.909 1. 823

Notes: ** and *** depict significance at the 5% and 1% levels respectively
t-statistics in parenthesis ()

5. Robustness Tests

In summary, our results show that remittances have exerted a significant positive effect on development in Lesotho in the long run. Further results also showed that after interacting financial development with remittances, this interaction term is significantly negatively related to development. This result implies that remittances and financial development are substitutes in promoting development. Although the results are statistically significant, it is important to

test our robust the estimates obtained are to changes in the specifications or methodology. Crucially, it would be important to see if structural breaks play a potential role in affecting the relationship between remittances and development.

In order to test the sensitivity of our results, we conduct robustness tests in this section. The robustness tests are in 2 stages. Firstly, we test the sensitivity of our unit root and cointegration tests to the existence of structural breaks in the data. Secondly, we test the sensitivity of our long-run estimates by employing an alternative estimation technique.

5.1 Structural Breaks Unit Root Test

Perron (1989) showed that conventional unit root tests have low power in the presence of structural breaks. We test the robustness of our unit root tests by employing the Zivot and Andrews (1992) unit root test. The Zivot and Andrews unit root test has a null hypothesis of a unit root, while the alternative hypothesis allows for the existence of one structural break, which is determined endogenously from the data.

The results of Zivot and Andrews structural break unit root tests are presented in Table 8. It is seen that contrary to the conventional unit root tests where all variables were stationary in first difference, two variables (GOVCON and M2) are stationary in levels, I(0). This underscores the importance of accounting for structural breaks and that conventional unit root tests can give misleading results.

Table 8: Zivot-Andrews Structural Breaks Unit Root Test

Variables	Intercept only		Both intercept and Trend	
	t-stat.	Breakpoint	t-stat	Breakpoint
Y	-4.341	1982	-4.177	1988
REMIT	-3.269	1982	-2.605	1983
INV	-3.886	1998	-3.313	1992
GOVCON	-6.907***	1987	-6.540***	1985
M2	-4.543***	1995	-4.342***	2008
TRADE	-5.963	1987	-5.726	1990
PRIVCRE	-3.839***	2003	-2.869	1991

Notes: ** and *** imply significance at 5% and 1% respectively based on percentage points of the asymptotic distribution critical values as provided by Zivot and Andrew (1992)

5.2 Structural Breaks Cointegration Test

Similar to the conventional unit root tests, the Johansen cointegration test does not take account of the presence of structural breaks. Gregory and Hansen (1996) introduced the residual based cointegration test, which accounts for one structural break in the cointegrating relationship.

The results of the Gregory and Hansen structural break cointegration tests are presented in Table 9. Three statistics are presented. The results show that all statistics show the presence of a cointegrating relationship between the variables in the models. Thus, we can still conclude as previously, that a long-run relationship exists between the variables in our model. This implies that irrespective of the presence of structural breaks, there is still a long-run relationship between development and the explanatory variables. This corroborates the cointegration tests obtained previously.

Table 9: Gregory and Hansen Structural Breaks Cointegration Test

	Equation 1	Equation 3	Equation 4
t-stat	-5.519**	-6.419**	-6.402**
Lag	1	1	1
Break point	2006	2006	2006
Za-stat	-28.484**	-36.005**	-34.324**
Za-break	2006	2006	2006
Zt-stat	-5.591**	-6.492**	-6.486**
Zt-break	2006	2006	2006

** implies significance at 5% based on percentage points of the asymptotic distribution critical values as provided by Gregory and Hansen (1996)

5.3 Dynamic OLS (DOLS) Estimation Results

It is possible that the results obtained previously depicting a positive relationship between remittances and development, and which showed that remittances and financial development are substitutes could be driven by the estimation method employed. Thus, it is important to test if an estimator different from the FMOLS would give similar results or not.

In order to test the robustness of the FMOLS results, we have estimated with an alternative estimator, the dynamic OLS (DOLS) estimator of Stock and Watson (1993). The results of the baseline specification are presented in Table 10 while the results of the specification with interaction terms are presented in Table 11. The results are broadly similar to what was obtained using the FMOLS estimation. In both Tables 10 and 11, remittances have had a significant positive relationship with economic development in Lesotho. When we move to the interaction of remittances with financial development, both sets of interactions with broad money and private credit are significantly negative. Thus, we obtain stronger support for the results obtained previously. Thus, our results are robust to changes in the estimation technique. We can conclude, as previously, that increases in remittances and financial development have been associated with higher development in Lesotho. However, as we saw previously, financial development and remittances are substitutes in affecting development in Lesotho.

Table 10: DOLS Regression Results for Baseline Specification

Variable	Dependent Variable: Y (per capita GDP)	
	Coefficient	t-statistic
Constant	34.724***	4.593
REMIT	0.724***	4.498
INV	0.851***	4.097
TRADE	0.398**	2.369
GOVCON	0.477***	3.344
R^2	0.982	
Adj R^2	0.968	
Durbin Watson	1. 138	

Note: ** and *** depict significance at the 5% and 1% levels respectively

Table 11: DOLS Regression Results for Specification with Interaction Terms

Variable	Dependent Variable: Y (per capita GDP)	
	Equation 3	Equation 4
Constant	15.147** (2.735)	28.185 (1.177)
REMIT	0.422*** (4.299)	0.714* (1.919)
M2	0.709*** (6.536)	
PRIVCRE		0.352*** (4.829)
INV	0.881*** (4.733)	0.614** (2.451)
TRADE	0.592*** (6.697)	0.370*** (5.369)
GOVCON	0.158 (1.359)	0.992*** (2.783)
REM*M2	-0.059** (-2.326)	
REM*PRIVCRE		-0.232*** (-4.071)
R^2 Adj R^2 Durbin Watson	0.965 0.952 2.421	0.959 0.947 2. 168

Notes: *, ** and *** depict significance at the 10%, 5% and 1% levels respectively
t-statistics in parenthesis ()

6. Conclusion

This study conducted an empirical investigation of the effects of remittances on economic development in Lesotho paying special attention to the role that financial development plays in this relationship. We made use of the fully-modified OLS (FMOLS) estimation technique to examine the long run relationship between remittances and development, and this helped to control for potential endogeneity.

The results of econometric estimations revealed that remittances have had a significant positive effect on development. Thus, increases in remittances have been associated with higher development in Lesotho. Also, the results showed that financial development, when measured by broad money exerts a positive effect on development in Lesotho. When remittances were interacted with financial development, the results showed a significant coefficient. This result suggests that remittances and financial development are substitutes in affecting development in Lesotho. This result indicates that remittances act a buffer for alleviating credit constraints of households and also acts to ameliorate inefficiencies of the financial system on poor households.

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