

## **IMPACT OF REMITTANCES ON PRIVATE SECTOR CREDIT IN THE PACIFIC ISLAND COUNTRIES**

Hong Chen\*, Shamal S. Chand\*\* and Baljeet Singh\*\*\*

\* School of Internet Economics and Business, Fujian University of Technology, China.  
Email: hchen0309@sina.com

\*\*The University of the South Pacific, Fiji. Email: shamalshivchand@gmail.com

\*\*\*The University of the South Pacific, Fiji. Email: singh\_bl@usp.ac.fj

### **ABSTRACT**

We examine the effect of remittances on private sector credit in the Pacific Island countries (PICs) using the data from 58 developing countries from 2004 to 2016. The analysis provides strong evidence that the effect of remittance inflows on private sector credit for PICs is positive and higher than that for other developing countries. In addition, the per capita gross domestic product, official development assistance, the number of bank branches, and institutional quality are also positively associated with private sector credit in PICs, while the Consumer Price Index is negatively associated with private sector credit. These results have important implications for the development of financial sector in PICs.

*Keywords: Remittances; Private sector credit; System GMM estimator.*

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## I. INTRODUCTION

Over the last three decades, remittances have emerged as an alternative source of external finance. More importantly, their use has significantly increased in recent decades and they have become one of the most important sources of external funding for several developing countries. The World Bank (2018) estimates that international migrants from low- and middle-income countries sent US\$528 billion in remittances in 2018, a 10.8% rise compared to 2017. In 2019, remittance inflows to low- and middle-income countries were expected to increase by 4% and reach an estimated US\$549 billion (World Bank, 2018). In 2018, remittance inflows to all regions increased significantly. Europe and Central Asia experienced a 20% increase in remittance inflows, while South Asia recorded a 13.5% increase, followed by Sub-Saharan Africa, which experienced a 9.8% boost in remittance inflows. Remittance inflows increased by 9.3% in Latin America, followed by 9.1% growth in the Middle East and North Africa, followed by 6.6% growth in East Asia and the Pacific.

The increasing trend in remittances has motivated researchers to examine the impact of remittances on various developmental dimensions, including that on financial development. However, the impact of remittances on financial sector development, particularly private sector credit, is puzzling.

Theoretically, there are two contradicting views on the influence of remittances on credit (Aggarwal, Demirgüç-Kunt, and Pería, 2011). One point of view advocates that remittances complement private sector credit in developing countries. Accordingly, remittances complement private sector credit through various channels. On the demand side, they directly contribute to the development of financial literacy in remittance-receiving households (Orozco and Fedewa, 2005; Cirasino, Guadamillas, and Salinas, 2008). They also improve recipient households' trust in the banking sector, further encouraging them to seek loans and other financial services from the financial sector (Desai, Kapur, and McHale, 2004). On the supply side, the fixed cost associated with the transfer of remittances compels the remitters to accumulate and transfer large sums at a time, giving the more cash than what is needed in the immediate time period. Households are thus likely to open bank accounts and deposit the surplus cash for safekeeping for a certain period, which likely increases private sector credit (Aggarwal et al., 2011; Brown, Carmignani, and Fayad, 2013).

In contrast, the other view claims that remittances are likely to substitute for private sector credit. Accordingly, the availability of remittances lowers households' financial constraints and could therefore reduce their demand for credit. According to Brown and Foster (1994), Woodruff and Zenteno (2007), and, recently, Bangake and Eggoh (2019), for example, remittances provide an alternative means of finance for investment in physical as well as human capital. The substitutability hypothesis is also supported by Inoue (2018), where different types of financial development remittance inflows can work interchangeably to help mitigate poverty conditions in developing countries. Similarly, remittance-receiving households could also use most or all of the remittances for consumption purposes, and the remittances might thus not necessarily boost the volume of deposits in the banking sector. In addition, Bhattacharya, Inekwe, and Paramati (2018) note inconclusive findings regarding a complementary or bidirectional

relation between remittance flows and private sector credit. More recently, Akçay (2019) has observed a U-shaped relation between remittances and private sector credit in the both long and short run. The theoretical argument provided above clearly shows that the nature of the impact of remittances on credit is ambiguous and is generally an empirical issue.

In light of the debate concerning the theoretical link between remittances and credit, this paper examines the impact of remittances on private sector credit, specifically for small Pacific Island countries (PICs), using panel analysis over the period from 2004 to 2016. This study is essential for the following reasons. First, in light of the unique characteristics of PICs, the influence of remittances on credit cannot be assumed to be the same as that of other countries, as noted from either time series studies, cross-sectional, or panel studies. Therefore, one cannot rely on evidence from earlier studies to make conclusions about the influence of remittances on the private sector credit, especially for PICs. The reasons for assuming that the incremental influence of remittances will differ for PICs are attributed to the special characteristics of their financial systems. Financial systems in PICs are dominated by the banking sector, which is characterized by very few banks, limited numbers of bank branches, foreign ownership, an urban focus, excess liquidity, a lack of competition, high-profit margins, and excessive interest rate spreads (Asian Development Bank, 2001).

Similarly, the state-owned banks in most PICs nearly failed in the 1990s, and the banking sector thus lacks visibility in rural areas, and significant proportions of poor and rural households still do not have a bank account (Asian Development Bank, 2001). In some PICs, less than one-10th of the population owns a bank account, and, overall, over 80% of the population in PICs has no access to any financial services. Excess liquidity in the financial system is attributed to projects of limited profitability and the inability of households to take out loans due to the lack of collateral (largely because of poorly defined land rights) and the absence of cash flow records. An influx of remittances in PICs is likely to promote private sector credit development. Remittance transfers, particularly through the banking system, are likely to provide valuable information about the financial status of remittance-receiving households, improve financial literacy (which is immensely lacking in PICs), provide a stable source of revenue for poor households, build trust between banks and clients, and consequently create greater demand for and supply of private sector credit. Overall, remittances are likely to reduce the fear of default, which is otherwise very high in PICs.

Second, there is generally a lack of conclusive empirical evidence on the influence of remittances on private sector credit. For instance, Giuliano and Marta (2009), in the case of 100 countries, and Brown et al. (2013), in a study of Azerbaijan and Kyrgyzstan, note that increases in remittance inflows are negatively associated with the demand for private sector credit. In contrast, Demirgüç-Kunt et al. (2011) observe that remittances strongly contribute to denser branch networks in Mexico. Similarly, Aggarwal et al. (2011) observe that remittances enhance financial sector development by extending credit to remittance recipients in the case of 109 developing countries. In another similar study, Aggarwal, Demirguc-Kunt, and Martinez Peria (2006) use data from 99 developing countries and find remittances to have a positive and significant effect on the ratios of bank deposits to the gross

domestic product (GDP) and of credit to the GDP, the latter relation being less robust. Fromentin (2017) finds that remittances have a positive influence on credit and notes that, in the long run, the influence is greater in the case of low-income countries relative to upper-middle-income countries. The positive effect also holds in the short run, except for low-income countries. In a more recent study with 30 developing countries and 27 developed countries, Fromentin and Leon (2019) have observed a positive and significant impact of remittances on firm credit and total credit. However, they also find a negative but nonsignificant impact in the case of household credit. Cooray (2012) observes that remittances have a positive influence on credit in countries with limited ownership of banks.

The evidence from the literature clearly demonstrates the impact of remittances on credit is not the same for all countries and could depend on the countries' general characteristics, such as their level of development, financial system, and the purpose of the credit. In the context of Nigeria, Ajefu and Ogebe (2019) find that remittance inflows can significantly improve the use of financial services and promote financial sector development when transaction costs are reduced and there are minimal to no barriers. The authors find that remittances not only promote financial development in Nigeria through increased household demand for deposit bank accounts, but also encourage the adoption of mobile/internet banking.

In sum, numerous studies have examined the impact of remittances on credit; however, the evidence is mixed and inconclusive. Nevertheless, there is some consensus that the evidence is region or country specific. Moreover, little is known about the impact of remittances on credit in PICs. Using a unique data set from PICs, the current study addresses the gap in the literature by examining the impact of remittances on private sector credit in PICs.

In light of these considerations, we hypothesize that 1) remittances have a positive and significant impact on credit and 2) the impact of remittances on credit is greater in the PICs relative to other developing countries. To examine our hypothesis, we use system generalized method of moments (GMM) estimators. We find that remittances have a positive and statistically significant impact on private sector credit in less developed countries; however, the impact is higher for PICs relative to other countries in the sample. The positive impact of remittances on credit is consistent with findings of, for example, Fromentin (2017) and Aggarwal et al. (2006). Further robustness test confirms that the results are consistent with our initial findings. The findings indicate that PICs should encourage remittance inflows from emigrants due to their significant implications on financial sector development in the PICs.

The remainder of this paper is structured as follows: Section II provides an overview of remittances in the PICs, followed by the empirical model in Section III. Section IV outlines the results and discussion, and Section V concludes the paper by summarizing the major findings.

## **II. REMITTANCES IN PICs**

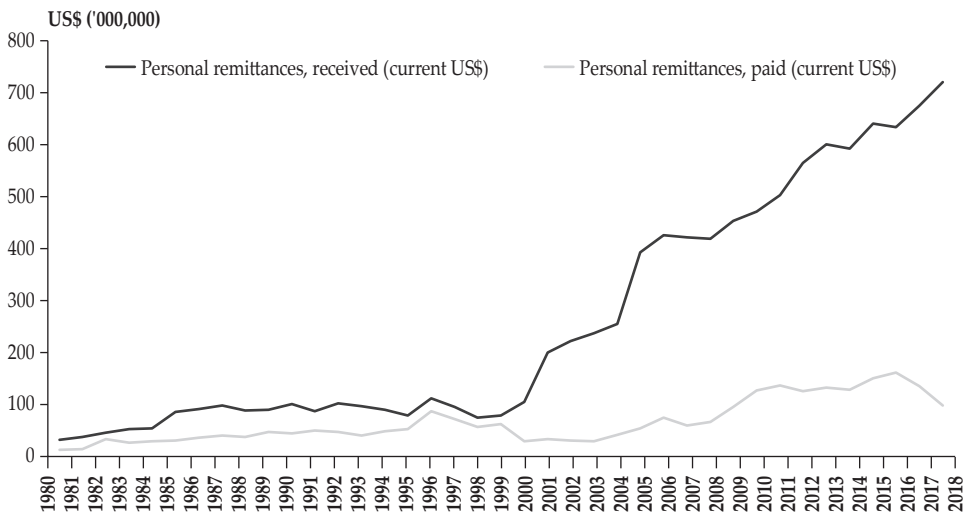
Over the years, the PICs have experienced a continuous large-scale outmigration of its high-skilled labor force due to problems pertaining to economic pressures,

as well as the recent emergence of climate change and sea-level rise. Despite losing valuable human resources, many small PICs have also gained in terms of the generation of foreign exchange earnings through remittance inflows sent by emigrants (Mohanty, 2006). Remittances have become an integral feature of most Pacific Island economies, where most households depend primarily on cash income sent by their family members from abroad for consumption purposes (Connell and Brown, 2005).

Pacific Island economies are also experiencing fund leakage in terms of remittances paid. Expatriate workers from abroad are employed to supplement the skill gap in the workforce among PICs. On the positive side, outward remittances from Pacific Island nations have remained relatively constant for the past 39 years, from 1980 to 2019, as shown in Figure 1. Prior to 1999, inward and outward remittance flows were similar; however, remittance inflows significantly increased afterward, reaching over US\$700 million in 2018. This upward trend signifies high-scale emigration from the PICs, and the cultural linkages among Pacific Islanders induce emigrants to send cash income to support their families and, indirectly, the overall economy.

**Figure 1.**  
**Remittance Received and Paid by the Small Pacific Island States**

Figure presents remittances received and paid by the Small Pacific Island States. Data is taken from World Bank Development Indicators Database.



Remittance inflows are particularly important in Samoa and Tonga, comprising 28.26% of the GDP between 2010 and 2018, compared to an average of 18.77% for the other PICs. Table 1 shows the general trend of inward remittances in PICs. It is worth noting that remittances significantly boost the income-generating capacity of many PICs by driving consumption, domestic savings, and investments. From 1980 to 1989, remittances consisted of 4.25% of the GDP of small PICs, rising significantly to an average of 7.15% from 2010 to 2018. On average, the remittance

inflows for Fiji, Samoa, Vanuatu, and Tonga are significantly higher than the world average, as well as the averages of other low- and middle-income countries. However, remittance inflows are significantly lagging in Papua New Guinea, compared to other PICs.

**Table 1.**  
**Remittance Inflows for Selected PICs**

This table shows annual average remittance inflows as percentage of GDP over the periods 1980-1989, 1990-1999, 2000-2009 and 2010-2018. The data are taken from the World Bank Development Indicators Database.

PICS	Annual average remittance inflows as a % of GDP			
	1980-1989	1990-1999	2000-2009	2010-2018
Fiji	1.45	1.54	5.32	5.03
Samoa	25.09	21.80	15.29	18.77
Vanuatu	6.63	6.16	2.31	2.64
Tonga	21.06	16.50	28.67	28.26
Papua New Guinea	0.24	0.34	0.14	0.04
Pacific Island Small States (average)	4.25	4.14	7.03	7.15
World (average)	0.40	0.35	0.53	0.70
Low & Middle Income (average)	1.16	1.13	1.64	1.51

### III. EMPIRICAL METHODOLOGY AND DATA

#### A. Empirical Methodology

The empirical literature analyzing the impact of remittances on private sector credit has outlined models to include indicators of income, inflation, official development assistance (ODA), and institutional quality (Brown et al., 2013; Fromentin and Leon, 2019; Opperman and Adjasi, 2019). This study uses this approach to examine the influence of remittances on private sector credit in 58 developing countries over the period 2004–2016. To evaluate whether the impact of remittances on private sector credit differs for PICs, we use an interactive term between remittances and PIC, where the PIC variable is a dummy variable that takes the value of one if the country is a PIC, and zero otherwise. We state our model as follows:

$$psc_{it} = \alpha_0 + \beta_1 rem_{it} + \beta_2 rem_{it} \times pic_i + \gamma X_{it} + \mu_{it}, \quad i = 1, \dots, n \quad (1)$$

where, for country  $i$  and time  $t$ ,  $psc_{it}$  is private sector credit as a percentage of the GDP,  $rem_{it}$  is remittances as a percentage of the GDP,  $pic_i$  is the PIC dummy variable,  $rem_{it} \times pic_i$  is the interaction term,<sup>1</sup> and  $X_{it}$  is a vector of control factors that includes additional control factors such as the real GDP at constant 2010 prices (as a natural logarithm, denoted by  $ly_{it}$ ), the Consumer Price Index (CPI, denoted

<sup>1</sup> This interaction term between remittance and PIC is similar to the variable of Feeny, Iamsiraroj, and McGillivray (2014), who use an interaction term between foreign direct investment and PIC to examine the impact of foreign direct investment.

by  $cpi_{it}$ ), the number of bank branches (as a natural logarithm, denoted by  $lcb_{it}$ ), ODA ( $oda_{it}$ , measured by ODA inflows to the GDP ratio, as a percentage), the small island developing states, henceforth SIDS (a dummy variable, denoted by  $sids$ ),<sup>2</sup> and a measure of institutional quality.

In terms of the control factors, first, this study uses the real GDP per capita as a measure of the level of economic development. A number of studies have argued that the level of a country's development contributes positively to its private sector credit (Shan, Morris, and Sun, 2001; Brown et al., 2013; Fromentin, 2017; Sharma and Syarifuddin, 2019). Economies with a higher GDP per capita are believed to have better economies of scale in organizing and supporting financial institutions. The real GDP per capita is widely used as a measure of a country's level of economic development in studies on the link between remittances and financial development (e.g., Opperman and Adjasi, 2019). Economic development is hypothesized to require better financial development, which simultaneously contributes to financial development.

Second, a number of studies have used inflation as a control variable to factor in macroeconomic stability (Boyd, Levine, and Smith, 2001; Sharma, Tobing, and Azwar, 2018). Intuitively, a rising inflation rate reduces purchasing power, which leads to a reduction in savings and returns on savings. Hence, with a reduction in savings, credit becomes scarce, due to limited liquidity in the banking sector. Huybens and Smith (1999), Bittencourt (2011), and Opperman and Adjasi (2019), for example, note that inflation has a negative impact on private sector credit. Inflation rates (denoted by  $inf_{it}$ ) and the CPI ( $cpi_{it}$ ) are used interchangeably as measures of inflation in studies examining the impact of remittances on financial sector development. Since more private sector credit can lead to higher inflation, the inflation indicator could be endogenous in the current model.

In addition, we use the number of bank branches to measure the financial system's infrastructure. A better infrastructure facilitates household access to financial services and hence contributes directly to private sector credit development. We therefore hypothesize that the number of bank branches is positively associated with private sector credit. The development of private sector credit would, in turn, lead to greater access to financial services; the number of bank branches could therefore be endogenous.

Furthermore, due to the significant volume of ODA in the PICs and its critical role in financing many official development projects in these small states (Fromentin and Leon, 2019), ODA is widely used to measure external financial sources. The inclusion of this measure in the current model would provide an assessment of whether ODA complements or substitutes private sector credit. Since ODA allows developing countries to overcome financial difficulties due to an economic downturn or natural disaster, ODA is likely to have a positive spillover onto private sector credit (Becerra, Cavallo, and Noy, 2014). Hence, we hypothesize ODA to have a complementary effect, namely, we assume that ODA contributes positively to private sector credit. We further include a multiplicative

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<sup>2</sup> PICs are part of SIDS. The data sample in this study covers 16 SIDS, including six from the Pacific and 10 from other regions.

interactive term between ODA and the SIDS dummy variable to evaluate if the impact of ODA on credit in SIDS differs from that in developing countries overall.

Lastly, institutional quality is believed to contribute positively to a country's development in all ways, including financial development (Opperman and Adjasi, 2019). The institutional element has several dimensions, such as political stability ( $ps_{it}$ ), regulatory quality ( $rq_{it}$ ), rule of law ( $rl_{it}$ ), governance effectiveness ( $ge_{it}$ ), and voice accountability ( $va_{it}$ ). The estimated scores for these five institutional indicators range from -2.5 to 2.5. However, consensus is lacking on the consistently significant impacts of these institutional indicators in the literature. This is mainly due to measurement errors in institution indicators (El Hamma, 2017; Fagbemi and Ajibike, 2018; Opperman and Adjasi, 2019). To capture the effect of institutions and reduce the effects of measurement errors, we use the interactions of the two institution measures. Our analysis suggests that such terms as  $ps_{it} \times va_{it}$ , and  $ps_{it} \times ge_{it}$  outperform single institution indicators, since the positive effects of the former are more consistent and significant. This result suggests that the interaction terms, which confirm institutional improvements only when two institutional dimensions develop in the same direction simultaneously, capture the development of institutions in an economy more accurately than a single institutional measure does. This study's method of identifying institutional effects on development could comprise another contribution to the literature.

### *B. Data*

The data are an annual time series. Our sample includes 58 developing countries over the period 2004–2016. The reason for covering 58 developing countries that include non-SIDS in the case study of PICs is mainly the lack of sufficient periods for SIDS and PICs. There are only 16 SIDS, which include only six PICs. Analysis with data on 16 SIDS or six PICs would yield unstable and biased estimation results. Nevertheless, regressions using the SIDS subsample are also conducted to serve as robustness analysis.

The data are collectively sourced from the World Bank's and the International Monetary Fund's databases. In particular, data for the real GDP per capita, ODA, and inflation rates are sourced from the World Bank's World Development Indicators database, while data for domestic credit to the private sector as a ratio of the GDP and remittance inflows to the GDP are sourced from the World Bank's Global Financial Development Database. Data for institutional quality measurements, such as political stability, regulatory quality, rule of law, governance effectiveness, and voice accountability, are sourced from the Worldwide Governance Indicators database. Additionally, data for the number of bank branches are sourced from the International Monetary Fund's Financial Access Survey. Summary statistics of the key variables are presented in Table A1 in the Appendix. Table A1 also lists the number of developing countries covered in this study.

## **IV. FINDINGS**

Estimation of Equation (1) follows a specific-to-general approach, considering avoidance of the multicollinearity problem and spurious estimation results



by using all I(1) variables, addressing heteroskedasticity, and controlling for endogeneity by using system GMM estimators. The system GMM estimation results for all the countries and SIDS are summarized respectively in Tables 2 and 3. The overall goodness of fit in the panel regressions varies from 0.3450 to 0.4003 in the sample of 58 developing countries, and the overall goodness of fit in the regressions using 16 SIDS ranges only between 0.0545 and 0.1948. However, the empirical findings are generally consistent across the regressions in Tables 2 and 3. Further, the robustness analysis is conducted by including the growth of real per capita GDP ( $gy_{it}$ ) and inflation ( $inf_{it}$ ) as alternatives to  $ly_{it}$  and  $cpi_{it}$ , respectively. The regressions are assessed with the Arellano–Bond dynamic panel data estimator, and the results are summarized in Table 4.

Specifically, remittances ( $rem_{it}$ ) have a positive impact on private sector credit ( $psc_{it}$ ). The coefficient of 0.48 for remittances in the general regression in column (6) in Table 2 suggests that a one percentage point increase in the ratio of remittances to the GDP is associated with a 0.48 percentage point increase in private sector credit, *ceteris paribus*. The magnitude of such an impact is higher in the PICs ( $rem_{it} \times pic_{it}$ ) in the regressions using 58 countries. However, the impact of remittances in PICs becomes nonsignificant, indicating that, in terms of private sector credit, it is not significantly different compared to that of the other SIDS in the sample (see Table 3). The overall magnitude of the impact of remittances in SIDS (see Table 3) is higher compared to that in the full sample (see Table 2). This finding is within our expectations and consistent with our hypothesis that the influence of remittances is higher in SIDS, such as the PICs. Access to private sector credit is likely more difficult in PICs, compared to other developing countries, due to higher credit risk in the region; however, the inflow of remittances improves households' chances of accessing credit. Remittances provide a stable source of income for poor households, improve financial literacy, and build trust between banks and households; they therefore potentially have a huge impact on the demand for and supply of private sector credit in the region. The positive impact of remittances on private sector credit is consistent with that in, for example, Fromentin (2017), Aggarwal et al. (2006), and Opperman and Adjasi (2019).

The real GDP per capita ( $ly_{it}$ ) strongly contributes to private sector credit, with a coefficient of 45.7 in column (6) in Table 2, suggesting that a one percentage point increase in the real GDP per capita is associated with a 0.457 percentage point increase in private sector credit. The coefficient for  $ly_{it}$  is large mainly because  $y$  is in logarithmic form while  $psc_{it}$  is in levels. Such large coefficients of  $ly_{it}$  are also found in the literature. For example, Aggarwal et al. (2011, p. 262) identify a coefficient as large as 40.44 for the logarithm of the GDP. However, the actual impact of our coefficients is not very high, since a 1% increase in the real GDP per capita only causes a 0.457 percentage point increase in private sector credit.

The inflation indicator ( $cpi_{it}$ ) is shown to significantly hold back the development of private sector credit in the 58 developing countries (see Table 2). A one percentage point increase in  $cpi_{it}$  is likely to reduce  $psc_{it}$  by 0.01 percentage point. This finding is consistent with studies such as that of Aggarwal et al., 2011. However, such an effect is not found in the panel regressions of 16 SIDS, implying that the level of inflation is not a significant determinant of private sector credit in these countries.

The number of commercial bank branches ( $lcbb_{it}$ ) significantly promotes private sector credit in the panels for both the 58 countries and the 16 SIDS. Together with the evidence of endogeneity for  $lcbb_{it}$ , this finding supports our hypothesis that private sector credit and the financial system's infrastructure share bidirectional causality.

The variable  $oda_{it}$  positively and significantly contributes to private sector credit in the 58 developing countries. However, such an effect is not evidenced in the SIDS, either in the sample of 58 developing countries or the sample of 16 SIDS, which suggests that  $oda_{it}$  only promotes private sector credit in non-SIDS. It is suggested that a one percentage point increase in ODA is associated with a percentage point increase of 0.39 to 0.51 in private sector credit (see Table 2) for all the countries. On the other hand, the coefficient of the interactive term  $oda_{it} \times sids_i$  is negative and significant. Since the coefficient of  $oda_{it} \times sids_i$  is larger, in absolute terms, than the coefficient of  $oda_{it}$ , ODA has a negative impact on private sector credit in SIDS. This result is further confirmed by the findings in Table 3, where the coefficient of  $oda_{it}$  is negative but nonsignificant. These findings imply that ODA substitutes for private sector credit in SIDS.

Institutional quality as measured by the interaction of two institution indicators is found to strongly and significantly promote private sector credit. Such evidence is consistent across all regressions in either the sample of 58 developing countries or the sample of 16 SIDS.

Further robustness analysis (Table 4) finds that not only the effects of remittances, the number of bank branches, ODA, and institutions on private sector credit remain the same as discussed in the above context, but the growth of real GDP per capita and inflation have the same effects as their respective substitutes, namely, the real GDP per capita and the CPI. This result provides evidence of robust estimates.

**Table 2.**  
**Determinants of Private Sector Credit in Developing Countries**

This table reports system GMM estimation results. The dependent variable: private sector credit ( $psc_{it}$ ) while the independent variables are noted in column 1. The data sample covers 58 developing countries over the period 2004-2016. The  $pic_i$  dummy variable has the value of one if a country is a PIC and zero otherwise; the  $sids_i$  dummy variable has the value of one if a country is a SIDS and zero otherwise. Z statistics are in parentheses; p-values are in square brackets. Asterisks \*, \*\* and \*\*\* represent statistical significance at the 10%, 5% and 1% levels, respectively. These are obtained based on one-tailed hypothesis test given the hypotheses described in the model.  $Z_{\alpha=0.10} = 1.28$ ,  $Z_{\alpha=0.05} = 1.64$ , and  $Z_{\alpha=0.01} = 2.33$ . There is no multicollinearity issue with the regression model. Coefficients of pairwise correlation among independent variables are all within -0.65 and 0.65. Instrumental variables include the first lag of endogenous variable(s) and trade openness. Hansen J test with a p-value great than 0.20 indicates the validity of instrumental variables. Hausman test with p-value less than 0.05 indicates the rejection of the null hypothesis of exogeneity.

Independent Variable	(1)	(2)	(3)	(4)	(5)	(6)
	Coeff. (z stat)	Coeff. (z stat)	Coeff. (z stat)	Coeff. (z stat)	Coeff. (z stat)	Coeff. (z stat)
$ly_{it}$	43.56*** (19.23)	43.29*** (19.16)	50.64*** (18.38)	45.56*** (13.34)	45.73*** (13.05)	45.7*** (13.18)
$rem_{it}$	.42*** (3.48)	.34*** (2.70)	.46*** (3.61)	.42*** (3.28)	.45*** (3.50)	.48*** (3.83)
$rem_{it} \times pic_i$		.76** (1.91)	.67* (1.69)	.69* (1.77)	.67* (1.72)	.72* (1.89)

**Table 2.**  
**Determinants of Private Sector Credit in Developing Countries (Continued)**

Independent Variable	(1)	(2)	(3)	(4)	(5)	(6)
	Coeff. (z stat)	Coeff. (z stat)	Coeff. (z stat)	Coeff. (z stat)	Coeff. (z stat)	Coeff. (z stat)
$cpi_{it}$			-0.017*** (-4.55)	-0.015*** (-3.82)	-0.013*** (-3.44)	-0.013** (-3.44)
$lccb_{it}$				2.63*** (2.61)	3.27*** (3.10)	4.18*** (3.88)
$oda_{it}$					.39** (2.09)	.51*** (2.70)
$oda_{it} \times sids_i$					-42** (-1.98)	-53*** (-2.50)
$ps_{it} \times va_{it}$						5.41*** (3.64)
Period	2004-16	2004-16	2004-16	2004-16	2004-16	2004-16
# countries	58	58	58	58	58	58
Centered R-square	0.3450	0.3491	0.3654	0.3805	0.3881	0.4003
Endogenous variable	$ly_{it}$	$ly_{it}$	$ly_{it} cpi_{it}$	$ly_{it} cpi_{it}$ $lccb_{it}$	$ly_{it} cpi_{it}$ $lccb_{it}$	$ly_{it} cpi_{it}$ $lccb_{it}$
Hansen J test $\chi^2$ [p-value]	0.74[0.38]	1.21[0.26]	0.07[0.79]	0.23[0.63]	0.61[0.43]	0.28[0.59]
Hausman test $\chi^2$ [p-value]	33.0[0.00]	31.1[0.00]	41.2[0.00]	38.1[0.00]	40.0[0.00]	42.6[0.00]

**Table 3.**  
**Determinants of Private Sector Credit in SIDS**

This table reports results from the system GMM based model. The data sample covers 16 SIDS over the period 2004-2016. The dependent variable: private sector credit ( $psc_{it}$ ) while the independent variables are noted in column 1. For other details refer to Table 2.

Independent Variable	(1)	(2)	(3)	(4)	(5)	(6)
	Coeff. (z stat)	Coeff. (z stat)	Coeff. (z stat)	Coeff. (z stat)	Coeff. (z stat)	Coeff. (z stat)
$ly_{it}$	38.08*** (4.57)	37.81*** (4.52)	30.2*** (2.74)	21.99*** (2.04)	20.9** (1.93)	25.9*** (2.36)
$rem_{it}$	1.01*** (3.67)	.95*** (2.73)	.94*** (2.73)	.58* (1.70)	.55* (1.62)	.69** (2.01)
$rem_{it} \times pic_i$		.13 (0.25)	.12 (0.23)	.44 (0.85)	.46 (0.89)	.40 (0.77)
$cpi_{it}$			0.025 (1.04)	0.022 (0.99)	0.019 (0.84)	0.021 (0.94)
$lccb_{it}$				7.76*** (3.62)	8.13*** (3.70)	9.42*** (4.26)
$oda_{it}$					-0.08 (-0.76)	-0.11 (-0.91)
$oda_{it} \times sids_i$						

**Table 3.**  
**Determinants of Private Sector Credit in SIDS (Continued)**

Independent Variable	(1)	(2)	(3)	(4)	(5)	(6)
	Coeff. (z stat)	Coeff. (z stat)	Coeff. (z stat)	Coeff. (z stat)	Coeff. (z stat)	Coeff. (z stat)
$psc_{it} \times ge_{it}$						6.80*** (2.72)
Period	2004-16	2004-16	2004-16	2004-16	2004-16	2004-16
# countries	16	16	16	16	16	16
Centered R-square	0.0545	0.0556	0.0834	0.1677	0.1732	0.1948
Endogenous variable	$ly_{it}$	$ly_{it}$	$ly_{it}$	$ly_{it}$	$ly_{it}$	$ly_{it}$
Hansen J test $\chi^2$ [p-value]	0.70[0.40]	0.65[0.41]	0.33[0.56]	0.01[0.93]	0.02[0.88]	0.001[0.97]
Hausman test $\chi^2$ [p-value]	25.7[0.00]	25.8[0.00]	20.8[0.00]	19.4[0.00]	19.2[0.00]	19.5[0.00]

**Table 4.**  
**Results from Robustness Test**

Results in this table are based on the Arellano-Bond dynamic panel-data estimator. The dependent variable: private sector credit ( $psc_{it}$ ) while the independent variables are noted in column 1. Instruments for the differenced equation include two lags of endogenous variables and the first-order difference of exogenous variables, and the instrument for the level equation is the constant term.  $gy_{it}$  is the growth of real per capita GDP;  $inf_{it}$  is inflation rate. The data sample covers 58 developing countries over the period 2004-2016. For other details refer to Table 2.

Independent Variable	(1)	(2)	(3)	(4)	(5)	(6)
	Coeff. (z stat)	Coeff. (z stat)	Coeff. (z stat)	Coeff. (z stat)	Coeff. (z stat)	Coeff. (z stat)
$psc_{i,t-1}$	.84*** (28.67)	.85*** (28.11)	.79*** (30.04)	.74*** (31.92)	.75*** (31.55)	.75*** (31.69)
$gy_{it}$	.16** (2.39)	.16** (2.29)	.16*** (2.59)	.09** (2.21)	.09** (2.03)	.08** (1.95)
$rem_{it}$		.18** (2.28)	.26** (2.06)	.15* (1.83)	.14* (1.77)	.14* (1.79)
$rem_{it} \times pic_i$		.41 (1.47)	.27 (1.10)	.23 (1.20)	.24 (1.28)	.28 (1.49)
$inf_{it}$			-.22*** (-12.12)	-.21*** (-10.58)	-.22*** (-10.62)	-.21*** (-10.25)
$lccb_{it}$				3.03*** (5.03)	3.36*** (5.16)	3.28*** (5.04)
$oda_{it}$					.25** (2.28)	.25** (2.30)
$oda_{it} \times sids_i$					-.33*** (-2.71)	-.33*** (-2.70)
$psc_{it} \times va_{it}$						3.46*** (3.32)
constant	6.56*** (5.23)	4.43** (2.48)	7.79*** (4.97)	-6.92** (-2.10)	-9.68*** (-2.59)	-8.89*** (-2.38)
Period	2004-16	2004-16	2004-16	2004-16	2004-16	2004-16
# countries	58	58	58	58	58	58
Endogenous variable	$gy_{it}$	$gy_{it}$	$gy_{it} \ inf_{it}$	$gy_{it} \ inf_{it}$ $lccb_{it}$	$gy_{it} \ inf_{it}$ $lccb_{it}$	$gy_{it} \ inf_{it}$ $lccb_{it}$

## V. CONCLUSIONS AND POLICY IMPLICATIONS

The aim of this study is to investigate the impact of remittance inflows on private sector credit in PICs. The study uses system GMM estimators and data from 58 developing countries over the period 2004–2016. We use a PIC dummy to identify the impact of remittances on private sector credit in PICs. The results show that remittances have a positive impact on private sector credit in developing countries; however, the impact is substantially higher for PICs. Besides remittances, the real GDP per capita and ODA, the number of bank branches, and institutional quality are also positively associated with private sector credit in all countries, while the CPI is negatively associated with private sector credit. In contrast, we find that ODA has a negative impact on private sector credit in SIDS.

Overall, the findings show that remittance inflows play a crucial role in promoting private sector credit and financial sector development in the PICs. Policymakers in PICs should formulate policies to encourage emigrants to send remittances through formal mechanisms by providing electronic banking services to foster growth in liquidity, improve financial literacy, and build greater trust between banks and households.

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## APPENDIX

**Table A1.**  
**List of Countries and Summary Statistics of Key Variables**

This table shows summary statistics of key variables. Names of variables are in row 1, and their abbreviations are in parentheses. Names of countries are in column 1. The sample period is from 2004 to 2016.

Country and Region	Private sector credit to GDP (%), $psc_{it}$	GDP per capita at constant 2010 US\$ ( $y_{it}$ )	Remittance inflows to GDP (%), $rem_{it}$	Inflation (out of 100), $inf_{it}$	CPI (2004=100), $cpi_{it}$	Number of commercial bank branch ( $cbb_{it}$ )	Net official development assistance and official aid received to GDP (%), $oda_{it}$	Political stability index ( $ps_{it}$ )	Voice accountability index ( $va_{it}$ )	Governance effectiveness index ( $ge_{it}$ )
Fiji	78.84	3855	5.47	4.35	131	62	2.10	0.16	-0.52	-0.51
Papua New Guinea	19.31	1935	0.08	8.39	205	71	3.55	-0.65	-0.04	-0.70
Samoa	59.26	3544	17.79	3.02	123	21	11.70	1.05	0.57	0.21
Solomon Islands	28.83	1330	1.91	6.10	151	15	33.27	0.27	0.06	-0.97
Tonga	40.98	3605	26.02	4.41	141	11	14.43	0.68	0.22	-0.41
Vanuatu	59.13	2834	2.11	2.84	121	26	13.80	1.03	0.45	-0.43
<b>PICs (average)</b>	<b>47.72</b>	<b>2850</b>	<b>8.90</b>	<b>4.85</b>	<b>145</b>	<b>34</b>	<b>13.14</b>	<b>0.42</b>	<b>0.12</b>	<b>-0.47</b>
Belize	57.93	4340	4.96	2.19	116	45	1.68	0.13	0.64	-0.43
Comoros	17.08	1320	17.97	2.28	115	4	5.92	-0.47	-0.38	-1.66
Dominica	51.27	6703	6.17	2.26	111	8	4.84	0.95	0.98	0.44
Dominican Republic	22.85	5549	7.69	8.15	146	718	0.30	0.02	0.12	-0.54
Grenada	69.63	7559	3.87	2.54	119	20	3.32	0.56	0.76	0.14
Guyana	42.79	3091	14.56	10.31	228	31	7.83	-0.44	0.07	-0.20
Jamaica	27.23	4833	15.83	9.12	185	118	0.53	-0.13	0.54	0.18
Micronesia, Fed. Sts.	20.52	2795	4.13	2.48	120	7	36.67	1.12	1.03	-0.55
St. Lucia	88.43	8043	2.10	3.26	127	23	1.40	0.85	1.11	0.53
Suriname	25.17	8012	0.16	11.94	226	33	1.97	0.14	0.40	-0.15
<b>Other SIDS (average)</b>	<b>42.29</b>	<b>5224</b>	<b>7.74</b>	<b>5.45</b>	<b>149</b>	<b>101</b>	<b>6.45</b>	<b>0.27</b>	<b>0.53</b>	<b>-0.22</b>
Albania	32.65	3918	13.02	2.27	119	445	2.91	-0.08	0.10	-0.29



Table A1.  
List of Countries and Summary Statistics of Key Variables (Continued)

Country and Region	Private sector credit to GDP (%), $psc_{it}$	GDP per capita at constant 2010 US\$ ( $y_{it}$ )	Remittance inflows to GDP (%), $rem_{it}$	Inflation (out of 100), $inf_{it}$	CPI (2004=100), $cpi_{it}$	Number of commercial bank branch ( $cbb_{it}$ )	Net official development assistance and official aid received to GDP (%), $oda_{it}$	Political stability index ( $ps_{it}$ )	Voice accountability index ( $va_{it}$ )	Governance effectiveness index ( $ge_{it}$ )
Algeria	15.36	4493	0.34	6.61	165	1309	0.17	-1.18	-0.91	-0.53
Angola	17.04	3464	0.06	15.02	248	865	0.69	-0.49	-1.16	-1.13
Armenia	28.57	3342	17.58	3.96	130	407	3.69	-0.08	-0.67	-0.14
Azerbaijan	19.66	5088	2.91	8.55	186	595	0.61	-0.65	-1.32	-0.61
Bangladesh	37.87	800	8.41	6.52	151	7786	1.60	-1.43	-0.46	-0.77
Belarus	26.41	5788	1.22	24.28	473	230	0.17	0.18	-1.58	-0.93
Bhutan	35.13	2243	0.55	5.68	143	68	8.03	0.93	-0.49	0.38
Bolivia	44.50	2003	4.63	5.80	156	1410	4.04	-0.54	-0.04	-0.56
Bosnia and Herzegovina	50.28	4663	13.43	2.72	118	920	3.44	-0.46	0.00	-0.61
Botswana	27.15	6722	0.45	7.71	162	100	1.29	1.03	0.50	0.51
Bulgaria	57.26	6750	3.65	4.23	139	4765	2.38	0.23	0.50	0.11
Cabo Verde	55.47	3260	10.59	1.35	116	87	13.00	0.81	0.86	0.08
Colombia	41.54	6488	1.74	4.64	135	4727	0.37	-1.56	-0.12	-0.07
Ecuador	24.15	4783	4.09	4.98	148	1190	0.31	-0.54	-0.25	-0.69
Georgia	34.98	3168	9.73	5.69	147	687	4.76	-0.67	-0.02	0.23
Ghana	16.10	1354	3.39	24.11	525	755	5.58	0.02	0.43	-0.08
Guatemala	28.78	2861	10.75	5.04	141	2665	0.92	-0.73	-0.29	-0.67
Honduras	49.03	1920	17.68	5.85	147	1018	4.06	-0.47	-0.39	-0.67
India	48.23	1370	3.32	6.54	158	91873	0.15	-1.15	0.43	-0.05
Indonesia	30.68	3158	1.12	9.07	200	19874	0.16	-0.92	0.01	-0.25
Jordan	77.70	3482	15.84	5.90	154	732	4.60	-0.44	-0.72	0.11
Kenya	28.47	965	2.18	9.35	191	1029	4.39	-1.26	-0.22	-0.51

Table A1.  
List of Countries and Summary Statistics of Key Variables (Continued)

Country and Region	Private sector credit to GDP (%), $psc_{it}$	GDP per capita at constant 2010 US\$ ( $y_{it}$ )	Remittance inflows to GDP (%), $rem_{it}$	Inflation (out of 100, $inf_{it}$ )	CPI (2004=100, $cpi_{it}$ )	Number of commercial bank branch ( $cbb_{it}$ )	Net official development assistance and official aid received to GDP (%), $oda_{it}$	Political stability index ( $ps_{it}$ )	Voice accountability index ( $va_{it}$ )	Governance effectiveness index ( $ge_{it}$ )
Kyrgyz Republic	13.56	893	23.16	9.63	200	242	8.70	-0.94	-0.75	-0.78
Lesotho	12.57	1184	26.09	6.83	145	35	7.11	0.04	0.00	-0.42
Madagascar	11.30	417	2.58	9.17	185	179	9.58	-0.37	-0.47	-0.87
Moldova	33.67	2001	28.00	10.19	203	1078	5.12	-0.23	-0.18	-0.65
Mongolia	42.80	2936	3.98	13.47	270	1156	5.21	0.66	0.19	-0.48
Morocco	60.34	2820	7.15	1.40	110	4340	1.51	-0.43	-0.67	-0.13
Mozambique	21.58	435	0.97	5.93	143	407	16.24	0.07	-0.16	-0.62
Namibia	50.75	5474	0.45	7.08	162	166	2.15	0.84	0.43	0.12
Nicaragua	29.63	1591	9.61	8.17	173	283	8.34	-0.24	-0.39	-0.86
Nigeria	17.97	2223	6.92	10.76	202	4839	1.08	-1.97	-0.68	-1.04
Pakistan	21.82	1004	5.38	10.02	211	9630	1.36	-2.40	-0.85	-0.65
Peru	26.00	5048	1.70	3.46	124	1360	0.30	-0.79	0.11	-0.34
Philippines	33.34	2173	11.04	3.56	129	4930	0.22	-1.38	0.00	0.02
Rwanda	15.59	581	1.81	7.10	162	247	17.18	-0.40	-1.24	-0.17
Sri Lanka	34.09	2875	8.10	9.14	197	2287	1.55	-0.90	-0.41	-0.15
Thailand	120.32	5058	1.16	2.90	123	5795	-0.03	-1.12	-0.52	0.30
Uganda	12.72	610	3.97	8.98	169	369	9.97	-0.98	-0.55	-0.53
Vietnam	92.35	1331	6.32	9.84	214	2226	2.70	0.22	-1.43	-0.21
Zambia	12.36	1423	0.34	11.35	206	276	7.25	0.36	-0.22	-0.70
<b>Non-SIDS (average)</b>	<b>35.47</b>	<b>2909</b>	<b>7.03</b>	<b>7.73</b>	<b>180</b>	<b>4366</b>	<b>4.12</b>	<b>-0.46</b>	<b>-0.32</b>	<b>-0.37</b>