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Impact of Remittances and Financial Development on Economic Growth: A Panel Data Analysis of Developing Economies

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This master's thesis is my independent work. All the data, authors and literature have been referenced in this thesis.

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Abstract

Remittances, funds that emigrants send back to their home countries, have become an increasingly important source of financial flows for many developing countries. The effect of the remittances on the economic growth of the receiving country depends on local factors including financial development of receiving country; the quality and the size of financial markets can facilitate the amplification of extra resources within an economy. This thesis estimates panel data fixed effects models on 36 developing countries for the period from 1991 to 2020. Results suggest that remittances contribute to the economic growth in the country positively. Moreover, the strength of financial development in the receiving country amplifies the effect of remittances on economic growth. The results also highlight the importance of local factors and in specific the situation of the financial markets in the transmission of the funds to the receiving country.

Keywords: Remittances, Financial Development, Developing Countries

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1. Introduction

Remittances are funds that migrants transfer to their relatives in their countries of origin. They form an important part of household income and consumption hence have a direct effect on economic growth. A few decades ago remittances were not an important source of financial flows. This has changed with increasing labour migration and digitalization in the financial services.

In addition to being a major source of financial inflow for receiving countries, remittances also play a role in promoting economic activity through the creation of small businesses, education, and entrepreneurship (Ratha (2003); Vaaler (2011); Martinez; Cummings; and Vaaler (2015); Giuliano and Ruiz-Arranz (2009)). The growing importance of remittance inflows have made it one of the most reliable sources of external funds, especially for lower- and middle-income countries. Furthermore, remittances can act as a buffer against economic shocks and can reduce poverty and inequality.

Financial development, on the other hand, refers to the expansion and improvement of financial institutions and markets, and is often considered a necessary condition for economic growth. Financial development enables households and firms to access credit, which can be used to finance investment and consumption, leading to economic growth. In addition, financial development can facilitate the efficient allocation of capital, allowing for the productive use of resources and contributing to economic growth.

Given the importance of both remittances and financial development in the context of economic growth in developing economies, it is crucial to understand the relationship between these factors. What is the impact of of remittances on economic growth? In particular, in case of developing world, does the size of the financial sector boost the growth impact of remittances? These are the main questions that this thesis studies.

To better understand the complex relationship between remittances, financial development, and economic growth in developing economies, this thesis studies a wide range of countries over a long sample. In particular it uses panel data methods to examine the impact of these factors on economic growth in a sample of developing economies. The use of panel data allows to the control of country-specific factors and enables the analysis of the dynamic relationship between the variables of interest.

Remittances have recently become one of the most important categories of financial flows between countries. According to World Bank data, the overall flow of remittances reached more than $548 billion in recent years, with over 70% of these inflows going to developing countries (World Migration Report 2022). Lower middle-income and upper middle-income countries are the top recipients of global remittances, and the volume of remittance flows has consistently shown an upward trend (World Development Index, 2020). The volume of remittance flows has always shown an increasing trend throughout the world. Despite the devastating economic impacts of the COVID-19, remittance inflows remained resilient for last few years (World Migration Report, 2022). According to World Bank, the projections for the growth in remittances for the year 2021 remained 7.3 percent with a gross of $589billion.

Developing economies, in particular, have been found to be significantly impacted by both remittances and financial development. These countries often rely heavily on migrant worker remittances as a source of foreign exchange and a mean of reducing poverty. In fact, remittances to many developing countries have been on the rise in recent years, surpassing foreign direct investment and official development assistance as a source of external finance (see Figure 1). While for some developing economies, remittances by international migrants constitute the second largest source of finance after foreign direct investment (FDI) (Giuliano and Ruiz-Arranz 2009). Remittances have been found to have a positive impact on economic growth in some developing economies, but the magnitude of this impact can vary depending on the specific context and the way in which the funds are used.
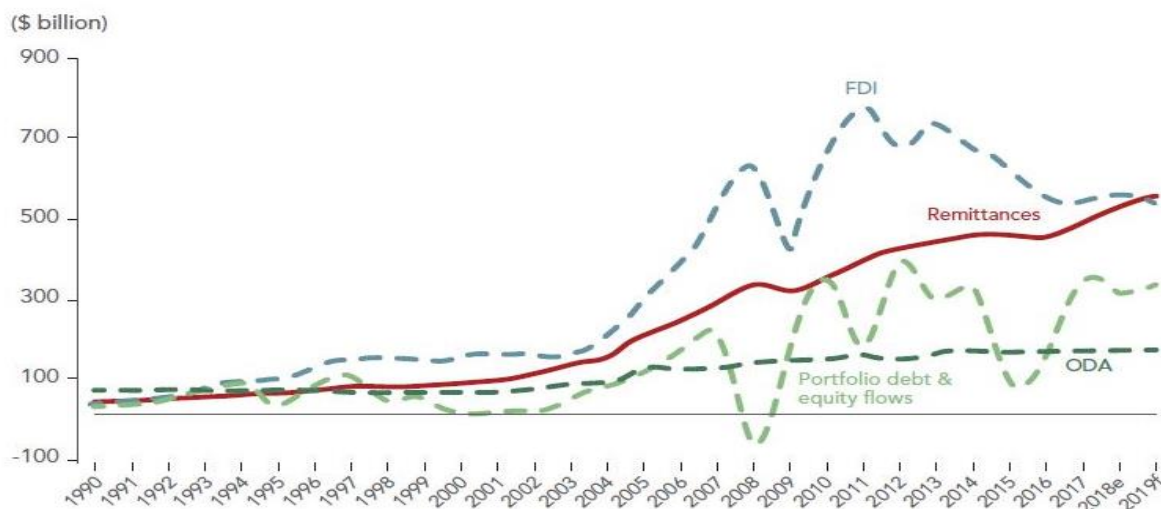
Figure 1: Historic Comparison of FDI, ODA and Portfolio debt & equity flows
Source: Global Knowledge Partnership on Migration and Development (KNOMAD)
Notes: FDI=Foreign Direct Investment; ODA= Official Development Assistance

A well-functioning and facilitating financial strcture of any econmy play an important role in almost every aspect of economic development. Such is the also true in case of remittances injections in the economic activities. For insance, a low cost and less restricted transactional system helps in directing more of the remittances flows and yeild high returns which results in economic growth rate expansion. On the other hand, savings and investment could also be the key performing channel in this context. A welcoming investment and savings environment provided by the local financial sector can also inject the recieved remittances into such activities rather restricted to consumption puposes only.

The econometric model for conducting this study comprises of the the panel data fixed effect estimations. One part of model is linear estimations where the impact of remittances is estimated without implying the interaction of remittances with financial development indicator to the model. While for the interactive part of the estimation, joint impact of remittances and financial development on economic growth is estimated by introducing the interaction term of both the variables into the model.

This study contributes to the existing literature on the relationship between remittances, financial development, and economic growth in several ways. By using panel data, this study aims to provide a more nuanced understanding of the relationship between these factors in the context of developing economies. In adds to the use of cross-sectional data, which may not accurately capture the dynamic nature of the relationship between these variables. Implication of financial development into the remittances growth impact is also not so

popular as many studies. Dujava and Kalovec (2020); Eggoh, Bangake, and Semedo (2019); Topxhiu and Krasniqi (2017) ignore this particular aspect of the relationship.

Several previous studies (Rana, Anik, and Mohanto (2020); Cooray (2012); Opperman and Adjasi (2019); Sutradhar (2020)) on remittances have focused on small regions ignoring the region specific factors such as financial or banking sector development. This can lead to heterogeneity in the results, as each region has its own unique characteristics that can affect the economic impact of remittances. This study also aims to address this gap by examining a large group of major recipient countries in the developing sector. The results of this study have implications for policymakers and development practitioners seeking to understand the role of remittances and financial development in economic growth in developing economies and to design effective policies and programs to promote these factors.

This study also uses a recent long time period of data for a large relatively homogeneous group of countries incorporting 30 years from 1991 to 2020 and 36 countries. Older studies have two common features, either they investigated a bigger pool of countries irrespective of the level of homogeniety in the data, or there are regional studeis focused solely on a few countries. This paper used a different technique by selecting the pool keeping in mind the homogeniety of the data. Also the selected time period also when the remittances business is at boom and digitalization in the financial sector is facilitating both the remittances flow and their injection into the mainstream economy.

The remainder of this thesis is organized as follows: In the next section, a review of the literature on the relationship between remittances, financial development, and economic growth in developing economies is presented. This is followed by a description of methodology in Section 3 and data in Section 4. The results of the panel data analysis are then presented and discussed in Section 5 and robustness analysis in Section 6. Section 7 finishes the paper with conclusion and recommendations for future research.

CERCS codes for this thesis are S180, S181, and S188.

2. Literature Review

This section provides an overview of the literature of financial flows and their effects concentrating on the remittances and summarises variety of questions, methods, data and results which can partly be determined by the factors of the study such as the scale, period, and length of the data.

There are studies which focused on the investigation of the growth impacts of remittances but not focus on the channels providing the boost to relationship. Here in this study, more focus is being given to the financial channel through which remittances stimulate the economic growth. This is relatively new approach and there are only selected previously studies on the issue. Moreover, there are wide variety of proxies to measure the financial development of the countries. So, the overall results of the research questions depend on the data being used for the investigation.

Giuliano and Ruiz-Arranz (2009), for example, investigated the data of 100 developing countries for a period of 27 years from 1975 to 2002. A study of 109 developing countries for a period of 32 years during 1975-2007 also confirms a positive, significant, and robust relationship between financial development and remittances flow (Aggarwal, Demirgüç-Kunt, and Pería 2011). Martinez, Cummings, and Vaaler (2015) also conducted their research on 48 countries from developing word for a period between 2001 to 2009. The data from Emerging Seven (E7) economies was also used to find out the excessive inflow of the remittances can cause Dutch Disease (Su et al. 2021). But in these studies, there is very limited focus on the financial conditions of the receiving economies.

There are also some studies which took some other social factors into consideration while estimating the results. Investigation of the 28 different Emerging Market Countries (EMCs) proved that attributes such as masculinity and power distance increase the economic effects of remittances while individualism and avoidance relate in negative ways (Piteli, Buckley, and Kafouros 2019). Kim (2021) took data of 46 such countries for a period of 20 years. Studies concerning regional areas are mostly comprises of analysing data on the basis of region or, in some context, developing pool of the world. Dujava and Kalovec (2020) identified that, particularly in the poor countries, the remittances are important source of economic growth. They further stated that remittance effect is strong in such countries mainly because of the low savings rate, underdeveloped financial markets and low human capital level. In case of developing countries, evident from 49 different countries, economic growth is positively affected by the international remittance transfers (Eggoh, Bangake, and Semedo 2019).

Conducting study on bigger pool of countries regardless of the homogeneity in the remittances flow in the subject data is also common in this area. Azizi (2020) explored a relatively bigger pool of 124 developing countries for a period of 25 years to explore the

relation between financial development and international remittances flow. From the developing countries pool, the further division is done on the level of income for each country to examine the short- and long-run impact of remittances on financial development (Fromentin 2017). Ahamada and Coulibaly (2011) used a sample of 87 developing and emerging countries and analyse the data for 28 years. They used an interval of 5 years to compute statistics of the panel data.

It is worth to mention that, at different level of economic development, countries often show a certain level of institutional quality, remittance inflow, and economic freedom. This further plays an important role in deciding the role of remittances and financial condition into economic growth. An underdeveloped institutional structure results in lack of trust of depositors and thus, the recipient chooses not to deposit money in the banks rather to invest int real estate or other assets (Kakhkharov and Rohde 2020).

Some researchers have also stressed on investigating this relationship for a specific region rather than economic condition of the country. The economic impacts of the remittances divide the cultural attributes as some being positively and other being negatively related in helping remittances to play its role in economic growth of countries (Piteli, Buckley, and Kafouros 2019). Ngoma, Ismail, and Siong Hook Law (2021) used the data for 15 Asian countries. Noman and Uddin (2011) also investigated a rather smaller pool of only four South Asian countries for a period of 30years. They took data between 1976 to 2005. There is also evidence of remittances acting as substitute to formal banking sector in sub-Saharan African countries (Opperman and Adjasi 2019).

There are also some studies primarily focused on only one or two economies to analyse the subject matter. Depken, Radić, and Paleka (2021) investigated a case of Croatia. A special case of Ghana was also studied by Peprah, Ofori, and Asomani (2019). Similarly, Ur Rehman and Hysa (2021) looked into the data of six Western Balkan countries (WBC). They took the data for a period of 18years ranges from 2000 to 2017.

Kakhkharov and Rohde (2020) revealed that in the transition economies of Central and Eastern Europe and former Soviet, the positive impact of remittance on financial development is robust that other control variables, especially for credit-related indicators. But the institutional quality and existing financial depth plays an important role in channelling the remittances receipt to further enhance financial development in countries. The data of 19 Sub-Sahara African countries shows no evidence that remittances impact

financial development and there is no evidence that financial development determine the remittance transfers of the countries (Coulibaly 2015).

Cooray (2012) also finds out that the data from 94 non-OECD countries show that an increasing flow of remittances also increase both the size and efficiency of the financial sector in receiving countries. From the Mexican household data, it has been shown a positive impact of remittances on existence of debts, savings, borrowings, and ownership of debts (Ambrosius and Cuecuecha 2016).

Econometric techniques also play important part in determining the results. Following the nature of data, variable used, instruments and theoretical framework, studies used different methodologies. Since it is mostly the pool data, most popular estimation technique remained different version of GMM. Various studies like Giuliano and Ruiz-Arranz (2009); Ur Rehman and Hysa (2021); Aggarwal, Demirgüç-Kunt, and Pería (2011); Opperman and Adjasi (2019); EL Hamma 2019); Cooray (2012); Eggoh, Bangake, and Semedo (2019); Inoue (2018); Tsaurai and Hlupo (2019) and many others used GMM.

In literature, a well defined combination of OLS and GMM is popular in conducting such studies. The one purpose of applying this methodology is to avoid the problem of endogeniety which often exists in variables like remittances and financial development (Bettin and Zazzaro 2012). OLS regressors does not address the problem of endogeniety so it is the best way to counter this problem (Giuliano and Ruiz-Arranz 2009). Also, to address the problem of reverse causality, lagged values of regressor as instrument are usually taken (Aggarwal, Demirgüç-Kunt, and Pería 2011). Furthermore, Weak instrumentation of the dataset sometimes make it unappropriated to use two-stage-least square (2SLS), so it is wise to use GMM which provide efficient estimates in such conditions (Ur Rehman and Hysa 2021).

There is also an application of Pooled Mean Group (PMG) estimation methodology to conduct this study. Ngoma, Ismail, and Siong Hook Law (2021) used this estimation technique. The ability of this estimator to estimate consistent estimates of dynamically heterogeneous and asymptotically normal parameters even explanatory variables are integrated of order zero or one, makes this estimator a good fit for the pooled data analysis (Ngoma, Ismail, and Siong Hook Law 2021). Fromentin (2017) did the further division, from the developing countries pool, on the basis of income for each country to examine the short- and long-run impact of remittances on financial development through PMG.

Noman and Uddin (2011) used Vector Autoregression (VAR) where multivariate Granger methodology used to identify direction of the causality between variables such as GDP, remittances and financial development. Granger causality gives more reliable results when considering results from panel rather than individual countries which does not contain much information (Baltagi, 2005). Depken, Radić, and Paleka (2021) also used this same estimation methodology to explain the case of Croatia. Coulibaly (2015) applied Granger causality using Seemingly Unrelated Regression (SUR) to study this relationship.

Dujava and Kalovec (2020) investigate this endogenous relationship with IV-estimation technique and discussed some possible instruments to estimate the impact of remittances on economic growth. In order to address the issues related to omitted variables, measurement error and reverse causality, instrumental variable (IV) estimations are more efficient (Kakhkharov and Rohde 2020).

There are some other techniques like Autoregressive Distributed Lag (ARDL) used by Peprah, Ofori, and Asomani (2019) to show that the compine impact of remittances and financial development on growth should be the real concerns of policy makers. A more sophisticated approach Panel Smooth Transition Regression (PSTR) has been applied to investigate this relationship. This model eliminate the individual effect by removing the means of the individual and transform by non-linear least squares (Ahamada and Coulibaly 2011).

Pertaining to the results, the economic impacts of remittances, though remains a popular research area, have not yield any consensus regarding the results. An estimated survey report of 95 different studies reports 40% positive impacts, 40% no impact and remaining 20% reported negative effect for the relationship between remittances and economic growth. Although the overall impacts seem to be positive but the literature in this section severely suffering from problems such as publication biasness. In this study, there is also difficult to set control on other sources of external financing especially when dealing with data from developing world. The typical results of this topic also influenced by the region of the world under investigation.(Cazachevici, Havranek, and Horvath 2020)

In the developing world, countries take remittances as long-term measure for the financial stability and poverty reduction (Azizi 2020). There exists somewhat consensus on the positive impact of remittance transfers on economy but the role of financial development has not yet reached on a point of consensus (Sobiech 2019). Fromentin (2017) confirmed

the earlier studies that long-run impact of remittances are significantly positive for financial development in the developing countries. He also found that, for the short run, the results also implied a significantly weak positive impact except for the low-income countries. It can me implied that, in the low-income countries, the remittance transfer is not being targeted to enhance the savings and investments rather to consumption purposes.

Giuliano and Ruiz-Arranz (2009) using System Generalized Method of Moments (SGMM) found that, in less financially developed countries, remittances promote growth by facilitating alternative financial investment ways. They further found out that remittances can substitute for the inefficient financial system and play major part in economic growth by improving the capital allocation and credit constraints.

A case of Western Balkan Countries (WBC) presenting a different picture from these results. Ur Rehman and Hysa (2021) found a negative effect of financial development and remittances interaction on economic growth. They made that these countries have shallow financial system which hinders the positive impacts of remittances on economic growth. In other words, in the absence of a proper channel, the remittances flow cannot do well to contribute to the national economy. Sobiech (2019) showed that both the remittances and financial developments are substitutes for economic performance. Further implied that, in the presence of sufficiently developed financial sector, the impact of remittances on economic development is relatively stronger than otherwise.

There is also an interesting finding by Issahaku, Abor, and Harvey (2017). They maintained that the study of big pool of developing countries shows that there exists a positive and significant relation between remittances flow and banking sector development. But for low remittances recipient countries, inflows promote banking sector growth, and this relationship is inverse in case of high remittances recipients. It was also found that remittances inflows impact the stock markets positively in remittances dependant countries but negatively in less dependent countries.

In the case specific to Ghana, the impact of remittances and financial development on economic growth provides that the joint impact of both the variables is much strong on economic growth than the individual impact. So, it can pe implied that, there should be a simultaneous implementation of measure to boost both the financial development and remittances flow to increase the economic growth.(Peprah, Ofori, and Asomani 2019)

Particularly to the Asian economies, the remittances have a positive and significant impact on economic growth. Ngoma, Ismail, and Siong Hook Law (2021), using the partial Gram-Schmidt orthogonalization procedure, provided that marginal effect of remittances improved with financial development while declined with institutional quality for the countries specially from South Asian region. They showed a complementary relationship between remittances and financial development. Interaction of foreign remittances, banking sector development and economic growth also confirms correlation in case of four South Asian countries receiving large number of foreign remittances.

Remittances and banking sector development enhance the per capita income in four South Asian countries having large diaspora of labour abroad. Though remittances and banking sector development plays positive role in enhancing the per capita income, but this relationship is not so strong, which imply that Asian countries need expansion in the banking sector to get benefits from remittances inflows (A. M. Noman and Uddin 2011). In the transition economies of Central and Eastern Europe and former Soviet, the positive impact of remittance on financial development is robust that other control variables, especially for credit-related indicators (Kakhkharov and Rohde 2020).

There is also debate on whether the remittance, economic growth and financial development relationship is unidirectional or not? In panel data analysis, most of the studies assume that there is possibility of economic growth hampering the future remittances inflows. Depken, Radić, and Paleka (2021) revealed that, at least in case of Croatia, there is strong and significant impact of remittances on economic growth but there is no impact of economic growth on remittances flow. They also identified that the shock to remittances impact GDP in a very short-lived manner. Coulibaly (2015) also showed that remittances impact financial development and there is no evidence that financial development determine the remittance transfers of the countries. An increasing flow of remittances also increase both the size and efficiency of the financial sector in receiving countries (Cooray 2012).

The direction of the relationship also depends on proxy for financial development. For example, considering liabilities as proxy to the financial development, remittances effect positively to financial development in some countries and financial development impact remittances positively in Ghana only. When credits are used as proxy for financial development, a positive impact of remittances on financial development only in Sudan while

no impact of opposite has been seen. Overall, across the Sub-Saharan Africa, the impact differs.(Coulibaly 2015)

A behavioural model of analysing the household's decision to remit the transfer implies that the financial development's impact on remittance is diverse and ambiguous phenomenon. On one hand, a developed financial structure can facilitate the incoming flows and provide environment for investment. Contrarily, this could also a case of dysfunctional credit markets and thus constraints for the remitters. Irrespective of the proxies used for the financial development, the volume of remittances is not affected by the financial development. But there exist a strong and significant positive impact of remittances flow on financial development. More developed the financial structure in country of origin, more volume of transfers.(Bettin, Lucchetti, and Zazzaro 2012)

In this trio, the impact of remittances on financial development is also important. This is identified that, particularly in the poor countries, the remittances are important source of economic growth (Dujava and Kalovec 2020). To understand the subject area, there are investigations that how remittances and financial development are inter-related. Aggarwal, Demirgüç-Kunt, and Pería (2011) confirmed a positive, significant, and robust relationship between financial development and remittances flow, at least in case of developing countries. This positive association is also robust to corrections for endogeneity problem. They found a positive impact of remittances on countries' bank deposits and credits over the time. There is also evidence of remittances acting as substitute to formal banking sector in sub-Saharan African countries. Opperman and Adjasi (2019) investigated the impact of remittances and remittance volatility on stock market and banking sector development. The evidence from the data suggest that remittances and remittance volatility is negatively related to the financial sector depth in the given region. They maintained that, increasing the net interest margins and overhead costs, remittance volatility is negatively impacting the banking sector.

Apart from effect of remittances on financial development, an interaction of remittances and human capital development is also found to have positive but insignificant impact on financial development for the transitional economies (Tsaurai and Hlupo 2019). So, it can be concluded that, the traditional economies should not over emphasize on building up remittances flow as measure for financial development.

Institutional quality and structure of the receiving country is also of great importance in defining this relationship. Remittances flow has no direct relation with economic growth, rather depend on institutional quality to play as catalyst in this effect (EL Hamma, 2019). Weak institutional structure in the developing countries to regulate the economy is a key hinderance in the remittances flow to create venture investment (Martinez, Cummings, and Vaaler, 2015). The case of 11 South-Mediterranean countries, a study by EL Hamma (2019), revealed that institutional qualities like investment environment, stable political standards, internal and external risks are the key determinants to enhance the quality of institution to provide a strong base for remittances flow to impact in positive way. The work of Martinez, Cummings, and Vaaler (2015) is important in this respect as they indicated that there exists significantly negative relationship between institutional informality and venture funding. The results further claimed that remittances increase the venture funding, but extent is varied by the informality level. For informality level substantially low, remittances exhibit not significant positive effect on venture funding availability.

Furthermore, institutional quality also remained a resilient factor in developing financial infrastructure and so channelling the remittances correctly. The role of banking sector is necessary to channel the injections to the economy (Azizi, 2020). An underdeveloped institutional structure results in lack of trust of depositors and thus, the recipient chooses not to deposit money in the banks rather to invest int real estate or other assets (Kakhkharov and Rohde 2020).

Moreover, it is also found out that this effect of the remittances on financial sector is even larger in the countries where less banks are owned by government. With low ownership of banks by government lead to increase deposits mobilization, liquid assets and disbursed credits with increasing remittances flow (Cooray 2012). This financial structure is quite common in the developing countries under investigation.

An in-depth analysis of data from 60 low- and middle-income countries shows that only the availability of financial environment do not play growth enhancing impact of remittances. It is the gross-root level usage of financial services by the locals, which make remittances flow valuable for economic growth. This is interesting to notice that up to 25 percentile, the remittances are useful for the financial inclusion in the middle-income while higher for low-income countries. (Chuc et al. 2022)

The remittance effect is strong in poor countries mainly because of the low savings rate, underdeveloped financial markets, and low human capital level. Which means that it is not only the level of economic development which makes this relationship effective but also financial infrastructure which plays big part (Dujava and Kalovec 2020). Both the institutional quality and existing financial depth plays an important role in channelling the remittances receipt to further enhance financial development in countries(Kakhkharov and Rohde 2020).Inoue (2018) also found that remittances have more significant impact on the countries have less developed financial structure. So, the countries in South Asia, Caribbean and Latin America, where financial sector is lagging, should focus more on channelling the remittances through proper financial institutions.

Contrarily, Ahamada and Coulibaly (2011) suggest that the higher the level of financial development in home county, more stabilizing will be the role of remittances flow in GDP growth. So, for a remittance receiving country, it is wise to target the economic policies towards improving the financial system of the country to get maximum benefits from remittances flow.

Kim (2021) also confirmed a positive and significant role of remittances and institutional quality on financial development of the countries. Infect, he also found that better institutional quality enhances the effect of remittance on financial development. Channelled through the mainstream financial institutions, remittances flow creates a room for improving the financial institutions, reduce liquidity constraints, enhance credit mobility, and lessen information asymmetry.

There are some cultural attributes which also play important role in the subject area. The economic impacts of the remittances divide the cultural attributes as some being positively and other being negatively related in helping remittances to play its role in economic growth of countries. Piteli, Buckley, and Kafouros (2019) linked the economic impacts of the remittances with cultural attributes for the Emerging Market Countries (EMCs). They proved that attributes such as masculinity and power distance increase the economic effects of remittances while individualism and avoidance relate in negative ways. In other words, given the same level of remittance flow for different countries, the economic impacts can be totally different based on the cultural attributes.

Eggoh, Bangake, and Semedo (2019) observed that the impact of other international transfers like foreign direct investment (FDI) or Aid has no significance on economic

growth. Further, the nonlinear part of this relationship depends on the current situation of financial development and investment. They also found that that beyond certain threshold, investment starts impacting economic growth negatively. Similarly, Peprah, Ofori, and Asomani (2019) found out that the financial development beyond 70 percent will hamper the economic growth. It means that financial development could have adverse impact on economic growth if it exposed to over-expansion.

3. Methodology

This study uses panel data fixed effect model to estimate the economic relationship. First model captures the impact of remittances on economic growth using least square technique without taking into account any special role of financial development (as in Giuliano and Ruiz-Arranz 2009), but simply controlling for the effect. The estimation model is as follows:

$$GDP_{it} = \beta_0 + \beta_1 GDP_{it-1} + \beta_2 Rem_{it} + \beta_3 ControlVar + \varepsilon_{it} \,,$$

where GDP stands for Gross Domestic Product, Rem_{it} is the personal remittances as percentage of GDP and control variables are Gross Capital Formation, Domestic Credit to Private Sector, Money Supply and Gross Savings. The β_2 capture the impact of remittances on economic growth. The β_3 will measure the impact of other control variable, β_{in} is country specific constant and ε_{it} is the error term.

As described in the previous section, this study is mainly interested in the hypothesis that financial development of the recipient country specific potential impact of remittance on growth. An interaction term will be used to test this hypothesis. The equation analyses the impact of remittances through financial development is given by:

$$GDP_{it} = \beta_0 + \beta_1 GDP_{it-1} + \beta_2 Rem_{it} + \beta_3 FinDev_{it} + \gamma_1 (Rem_{it} . FinDev_{it}) + \beta_5 ControlVar + \varepsilon_{it},$$

Where this study implies gross savings as proxy for financial development. The remittance variable interacted with financial development variable to test the hypothesis that it is significantly impacting the economic growth or playing any part in boosting the growth. γ_1 is the coefficient to capture this impact. A negative coefficient would mean that remittances are more effectively enhance the growth in presence of weak financial system while the positive sign would indicate opposite.

Since the aim of this study is to analyse the said relationship in both the country specific and time specific aspects, fixed effect model is quite favourable in such circumstances. An important feature of fixed effect is that it considers variables as country specific features and should not be correlated with other countries. It is also suitable in correcting the possibility of autocorrelation in the model. This model is much efficient in identifying the type of variables which change over time (Meyer and Shera 2017). Contrary to the random effect, fixed effect also considers explanatory variables as non-random.

Various studies have already used this method of estimation. Topxhiu and Krasniqi (2017) used fixed effect model in identifying the relevance of remittances in promoting economic growth in Western Balkan countries. Meyer and Shera (2017) also used this technique for their study on impact of remittances on economic growth for a pool of countries selected. Sutradhar (2020) applied pooled OLS fixed and random effect model to explore the case of four south Asian countries.

4. Data

As described in the literature review, there is different coverage of variables and regions being considered to study the subject in different studies. Based on the analysis of existing literature, it can be said that the combination of key variables and pool of countries plays important role in estimating the impact of remittances and financial development on economic growth. The measures for key indicators like financial development and banking sector strength were chosen to represent the true picture of these indicators. Also, the pool of countries selected for this study falls in the category of middle-income countries. The main purpose is to scale the data and study the impact with similar economic conditions.

Whole dataset covers a period of past 30 years spanning between 1990-2020, and all the data is taken from World Development Index (WDI) databank. 36 countries from developing world are used in this thesis. The selected countries are Algeria, Argentina, Bangladesh, Belize, Benin, Bolivia, Botswana, Burkina Faso, Cameroon, Congo Republic, Costa Rica, Dominican Republic, Ecuador, El Salvador, Fiji, Gabon, Ghana, Guatemala, Guinea, Guinea-Bissau, Indonesia, Jamaica, Kenya, Madagascar, Morocco, Nicaragua, Niger, Nigeria, Pakistan, Peru, Philippine, Sierra Leone, Sri Lanka, Sudan, Togo and Tunisia.

Pertaining to the data selection and methodology, most of the previous studies attempted to investigate the impact using a set of countries at different level of economic development

rather than small regional set or low-income countries (Cazachevici, Havranek, and Horvath 2020). In this study, the due consideration has been given to this particular concern. I have selected countries based on their economic conditions, which is mostly middle- or low-income countries. The financial infrastructure is not much developed in such countries to plug the high inflow of remittances into the economic stream in well-organised manner.

GDP is measured in US dollars is the measure for economic growth of the country. Rana, Anik, and Mohanto (2020) have also used the real GDP in absolute terms to analyse the impact of remittance on economic growth. For the year 2020, the absolute value of GDP in US dollars along with GDP per capita measure is provided in Figure 2.
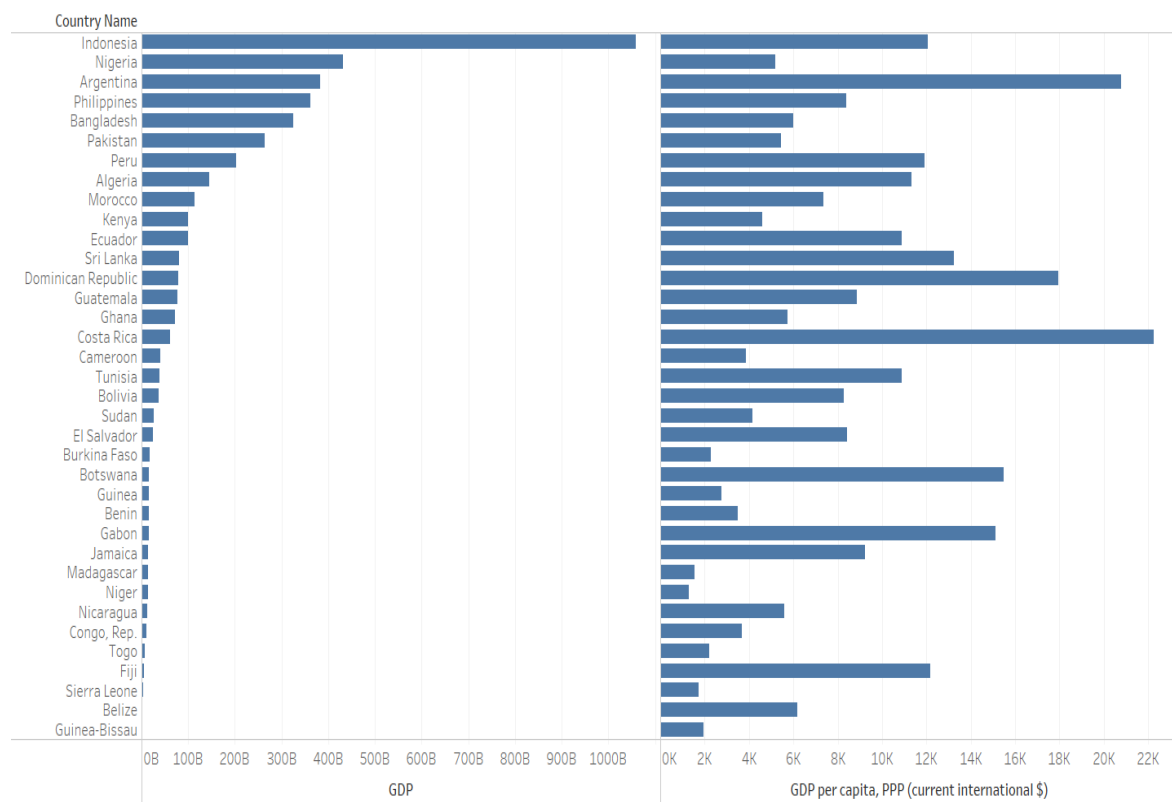
Figure 2: Comparison of GDP(US $) and GDP per capita for the selected countries
Source: World Development Index (WDI, 2020)

To mease the volume of the remittance inflows, personal remittances in US dollars are used. Personal remittances is most commonly used measure in literature to be implied (Giuliano and Ruiz-Arranz 2009; Kim 2021). This data mostly includes workers' remittances, compensation of employees and also migrants' transfers (Piteli, Buckley, and Kafouros

2019). This data of remittances does not include remittances through any informal channel such as hawala or hundi.

As shown in Figure 3, the remittances inflow to the countries selected for this study is almost in the same range throughout the panel. This is also the reason for selecting the countries having homogeneous data for the remittances. Here the intensity of the colour shows the volume of remittances received, darker the shade, higher the amount received in the year 2020.
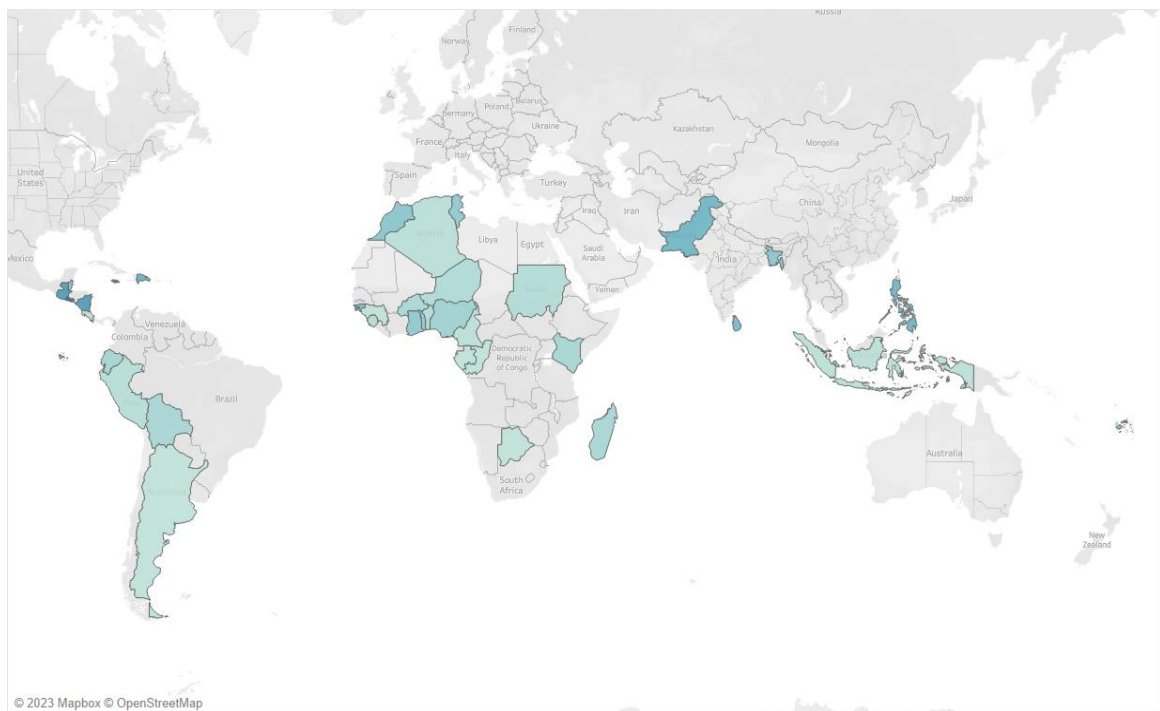
Figure 3: Remittances received as percentage of GDP
Source: World Development Index (WDI, 2020)

To measure the financial development, there is wide variety of literature using different measures to estimate financial depth of the economy. Most frequent and logical variables are used for this purpose. Traditional quantity-based indicators for financial development are employed following the work of Giuliano and Ruiz-Arranz (2009); Bettin and Zazzaro (2012); and Ngoma, Ismail, and Siong Hook Law (2021). Based on the findings from literature and economic theory, such variables mostly include: liquid liabilities of financial system (M2), domestic credit provided by banking sector (Credit), bank deposit (Deposit), Savings and loans.

- **Liquid Liabilities of Financial System (M2)**

  This include the most liquid liabilities of the banking system mostly comprises of currency, demand and interest bearing liabilities of banks and other financial institutions. M2 is taken as percentage of GDP in the model.

- **Credit Provided by Banking Sector**

  This particular measure highlights the level of the intermediation of the banking sector in the economy (Giuliano and Ruiz-Arranz 2009). This measure include the credit provided by the banking sector to the general public and other private sector. Domestic credit to private sector (DCPS) as percentage of GDP is used in this study.

- **Investment**

  To measure the level of investment in the economy, Gross Fixed Capital Formation as a perecentage of GDP is used as proxy in the model. Ngoma, Ismail, and Siong Hook Law 2021 also used this measure cosidering it represents investments in machinery, plant, equipment and in land improvement.

- **Savings**

  Savings provide the level of effeciancy of overall financial system of the economy. On one hand, savings promote investment in the economy and hance directly promote growth. On the other hand, this is an important proxy for measure of financial deepening (Qin and Otieno Ndiege 2013). In this study, this variable is also used as proxy for finanacial development in interaction term. Some studies also reveals that, if not much, a cosiderable portion of remittances injected into savings and investments (Adams 1991). Gross Savings as percentage of GDP is useed in the model.

While calculating the estimations for the model, independant variable personal remittances are taken in log values (LREMD) to scale the data. As mention earlier, gross capital formation (GCFC), domestic capital to private sector (DCPS), money supply (MS) and savings are taken as percentage of GDP. Moreover, lag values of the log of GDP (LGDP (-1)) in absolute term is also added as independant variable in the model. In the estimations, a total of 1033 observations are considered for the 36 countries and 30 years data.

5. Results

This section presents main results. Based on the approach and data described above, the models are estimated to analyse the impact of remittances and financial development on the economy. Table 1 provides the estimation results of the models detailed in previous section. Model without interaction term (Model 1) provides the estimation without the interaction term of financial development with remittances while model with interaction term (Model 2) provide the results with interaction term.

Table 1:
Remittances, financial development, and growth.

	Estimations Without Interaction Term (Model 1)	Estimations With Interaction (Model 2)
Remittances	0.0341***	0.0270***
	(0.0051)	(0.0061)
Gross Capital Formation	-0.0008	-0.0007
	(0.0007)	(0.0007)
Domestic Capital to Private Sector	-0.0006	-0.0008
	(0.0006)	(0.0006)
Money Supply	-0.0011*	-0.0012*
	(0.0005)	(0.0005)
Savings	0.0022***	-0.0063
	(0.0006)	(0.0042)
GDP (-1)	0.9383***	0.9378***
	(0.0111)	(0.0111)
Remittances*Savings		0.0004*
		(0.0002)
C	0.8782***	1.0229***
	(0.1959)	(0.2081)
R-squared	0.995	0.995
Total Observations	1033	1033
Number of Countries	36	36
Hausman test (p-value)	0.0000	0.0000

Robust Standard errors in parenthesis. *Significant at 10%; ** Significant at 5%, *** significant at 1%.

Hausman test shows that fixed effects model is appropriate in this case as the the null hypothesis of the test is rejected (Table 1).

Regression without interaction term in Table 1 (Model 2) shows that remittances and GDP are positively related and significant as if there is 1 percentage point increase in remittances, there will 0.027% increase in GDP.

However, because the probability value is greater than 0.05 and the t-statistic is less than 2, the association between gross fixed capital production, savings and domestic credit private sector, and GDP is statistically insignificant and there is not statistical evidence that the relationship would be different from zero. They are however included as relevant control variables.

In case of money supply, which is statistically significant, 1% increase in money supply is associated with 0.00012% decrease in GDP. There is a strong autocorrelation in the GDP as 1% change in GDP brings 0.93% change in GDP next period.

Turning to the Model 2 of Table 1, one can see that the estimates of main control variables remain unchanged. The relationship of economic growth and remittances is also not altered with the point estimate of the coefficient somewhat smaller.

Regression with interaction term in Table 1 (Model 2) shows if there is 1% change in remittances, results 0.034% change in GDP. There is positive and statistically significant relationship between dependent and independent variables. On the other hand, the relationship of gross fixed capital formation and domestic credit to private sector with GDP is statistically insignificant as the probability value is greater than 0.05 and t-stat is less than 2.

Interaction of remittances and saving have positive relationship with GDP, if there is 1% increase in Interaction of Remittances and saving, it results in 0.0004% increase in GDP. It is also elaborated in this model that 99% variation in dependent variable is explained by independent variable.

The relationship of money supply on GDP is negative, a 1% increase in money supply will result in 0.001% decrease in GDP and is statistically significant. Saving and LoglagGDP have positive relationship with GDP and both are statistically significant. If there is 1%

increase in saving there will 0.002% increase in GDP. While relationship between GDP and lag of GDP is positive, a 1% increase in lag of GDP will result is 0.93% increase in GDP.

Value of R-squared is very close to one which means that overall model is a good fit suggesting that much the variation in dependent variable is explained by independent variable. This is expected result for the panel model with fixed effects and autoregressive terms.

The paper shows positive and significant relationship between remittances and economic growth. Giuliano and Ruiz-Arranz (2009) also found a strong positive and significant coefficient for this relationship. Similarly Ur Rehman and Hysa (2021), Sobiech (2019); Noman and Uddin (2011), Dujava and Kalovec (2020) find this relationship as in this study. This positive result confirms that remittances, through formal banking channel, does impact economic growth of country in positive manner.

The positive impact of remittances on economic growth suggests that developing countries should stress more on channeling these inflows to the mainstream of the economic activities. Remittances also plays part in development of the financial sector by contributing into the deposit pool and credits through banking sector (Aggarwal, Demirgüç-Kunt, and Pería 2011).

Regarding financial development, the main model shows a positive and significant impact of savings (used as a proxy for financial development) on GDP but this impact is negative and insignificant in non-linear model. In this study, the impact of Gross Capital Formation and Domestic Capital to Private sector remained insignificant for both linear and non-linear model. Moreover, money supply does shows a negative and significant impact on GDP.

The interaction of the remittances and savings have positive and significant impact on the economic growth. The result complies with the economic theory that both the financial development and remittances flows together enhance the economic growth of the countries. This simply implies that a more feasible environment for the financial activities like savings and investment would boost the positive impact of remittances on economic growth. These results are inline to Ngoma, Ismail, and Siong Hook Law (2021) where the interaction of remittances and financial development showed a positive and significant impact on GDP. So, it can be said that both remittances and financial development are complementary in boosting-up economic growth in the developing countries. Channeling the remittances flow

through efficient financial system of savings and investment, the marginal growth impact can be enhanced in the receiving country (Ngoma, Ismail, and Siong Hook Law 2021).

These results of interaction term are contrary to what Giuliano and Ruiz-Arranz (2009) found in their study with different proxy for financial measure. Ur Rehman and Hysa (2021) also found this interaction as negatively impacting GDP in case of WBC. But positive interaction term in this study indicate that these countries have financial infrastructure which support the impact of remittances on economic growth.

6. Robustness Analysis

This section presents additional analysis providing evidence that the results are robust to various changes of the model and data used.

In order to assess the possibility of multicollinearity of the explanatory variables in regression models, the the variance inflation factor (VIF) are estimated for each variable. It is a measure of the amount of multicollinearity in the model, and is calculated as the ratio of the variance of the variable's estimated regression coefficient to the variance of the coefficient when that variable is not included in the model. A VIF of 1 indicates that there is no multicollinearity among the explanatory variables, while a VIF between 1-5 indicates that moderate multicollinearity is present. As a general rule of thumb, VIF less than 5 is not the cause of the concern.

It is found that the VIF for all variables in these models are less than 5, with an average value of 2.1. This suggests that there is moderate multicollinearity present which is expected in the macro economic data like this. So all variables had VIF values below threshold, indicating that multicollinearity is not a concern and that the models are well-suited for the data.

Furthermore, in order to check for the reverse causality, the whole model is estimated with all the independant variables in lag values. Table 2 shows the estimates for the model with lag values. It is observed that values of interest variables are very similar to the original model so the potential issue of reverse causality can be rejected.

Table 2

Model with all independat variables in lag values

	Estimations Without Interaction Term (Model 1)	Estimations With Interaction (Model 2)
Remittances (-1)	0.0294***	0.0204***
	(0.0006)	(0.0055)
Gross Capital Formation (-1)	0.0006	0.0007
	(0.0007)	(0.0007)
Domestic Capital to Private Sector (-1)	-0.0017**	-0.0018**
	(0.0006)	(0.0006)
Money Supply (-1)	0.0006	0.0005
	(0.0005)	(0.0005)
Savings (-1)	0.0007	-0.0129***
	(0.0006)	(0.0038)
GDP (-1)	0.9324***	0.928***
	(0.0108)	(0.0108)
Remittances*Savings (-1)		0.0007***
		(0.0002)
C	0.0643***	1.3320***
	(0.1891)	(0.2017)
Total Observations	1033	1033
R-squared	0.994	0.994
Number of Countries	36	36

Robust Standard errors in parenthesis. *Significant at 10%; ** Significant at 5%, *** significant at 1%.

For further robustness analysis and to confirm the stability of the estimations, the same model is run with the different chunks of data. Table 3 represent the estimations based on the first half of the data where time period is between 1991 and 2005. As expected with smaller sample, the statistical significance is lower, but the parameters of interest have the same signs and are not inconsistent with the main results.

Table 3

Estimations with data between 1991-2005

	Estimations Without Interaction Term (Model 1)	Estimations With Interaction (Model 2)
Remittances	0.0289***	0.0243*
	(0.0082)	(0.0102)
Gross Capital Formation	-0.0029	-0.0027
	(0.0017)	(0.0017)
Domestic Capital to Private Sector	-0.0004	-0.0004
	(0.0016)	(0.0016)
Money Supply	-0.0016	-0.0017
	(0.0011)	(0.0012)
Savings	0.0012	-0.0047
	(0.0012)	(0.008)
GDP	0.8547***	0.8529***
	(0.0296)	(0.0297)
Remittances*Savings		0.0003
		(0.0004)
C	2.9468***	3.0720***
	(0.6196)	(0.6409)
Total Observations	510	510
R-squared	0.991	0.991
Number of Countries	36	36

Robust Standard errors in parenthesis. *Significant at 10%; ** Significant at 5%, *** significant at 1%.

Table 4 represent estimations with second half of the whole period under investigation where period is between 2006 to 2020.

Table 4

Estimations with data between 2006-2020

	Estimations Without Interaction Term (Model 1)	Estimations With Interaction (Model 2)
Remittances	0.02240**	0.0326**
	(0.0100)	(0.0130)
Gross Capital Formation	-0.0007	-0.0005
	(0.0008)	(0.0008)
Domestic Capital to Private Sector	0.0003	0.0003
	(0.0009)	(0.0009)
Money Supply	-0.0028**	-0.0028**
	(0.0009)	(0.0009)
Savings	0.0049***	-0.0136*
	(0.0008)	(0.0071)
GDP	0.8470***	0.8442***
	(0.0176)	(0.0178)
Remittances*Savings		0.0004
		(0.0003)
C	3.3169***	3.1806***
	(0.3613)	(0.3780)
Total Observations	523	523
R-squared	0.997	0.997
Number of Countries	36	36

Robust Standard errors in parenthesis. *Significant at 10%; ** Significant at 5%, *** significant at 1%.

Similarly, Table 5 represent the estimations on data of first 20 years comprises of 1991 to 2010. Results demonstrate that the overall direction of the relationship remained constant with this variant of data.

Table 5

Estimations with data between 1991-2010

	Estimations Without Interaction Term (Model 1)	Estimations With Interaction (Model 2)
Remittances	0.0335***	0.0237**
	(0.0068)	(0.0083)
Gross Capital Formation	-0.0006	-0.0003
	(0.0012)	(0.0012)
Domestic Capital to Private Sector	-0.0010	-0.0011
	(0.0011)	(0.0010)
Money Supply	-0.0015	-0.0017*
	(0.0008)	(0.0008)
Savings	0.0019*	-0.0101
	(0.0009)	(0.0058)
GDP	0.9518***	0.9494***
	(0.0182)	(0.0182)
Remittances*Savings		0.0006*
		(0.0003)
C	0.5938	0.8289*
	(0.3487)	(0.3657)
Total Observations	690	690
R-squared	0.992	0.992
Number of Countries	36	36

Robust Standard errors in parenthesis. *Significant at 10%; ** Significant at 5%, ***
significant at 1%.

Table 6 shows the estimates of the data for last twenty years between 2001 and 2020.

Table 6

Estimations with data between 2001-2020

	Estimations Without Interaction Term (Model 1)	Estimations With Interaction (Model 2)
Remittances	0.0466***	0.0406***
	(0.0082)	(0.0105)
Gross Capital Formation	-0.0002	-0.0003
	(0.0008)	(0.0008)
Domestic Capital to Private Sector	0.0002	-0.0002
	(0.0007)	(0.0007)
Money Supply	-0.0024***	-0.0024**
	(0.0007)	(0.0007)
Savings	0.0029***	-0.0028
	(0.0008)	(0.0064)
GDP	0.8918***	0.8927***
	(0.0137)	(0.0137)
Remittances*Savings		0.0003
		(0.0003)
C	1.7457***	1.8397***
	(0.2383)	(0.2598)
Total Observations	695	695
R-squared	0.996	0.996
Number of Countries	36	36

Robust Standard errors in parenthesis. *Significant at 10%; ** Significant at 5%, *** significant at 1%.

Overall, the robustness analysis shows that the direction of the underlying variables is quite stable. There are some exceptions in the significance level of certain variables but that could the aspect related to the time frame, since the overall time is divided in different parts.

7. Conclusion

Remittance inflows are major source of external finance for developing countries. Having a major portion of skilled labour residing in foreign countries, heavy inflow of remittances to the developing countries has started over the last decalde. As the levels are important at the macroeconomic level, the impact of remittances on economy of receiving country is studied in this thesis. Remittances require a financial channel to play a role in national economy of the receiving country (Giuliano and Ruiz-Arranz 2009) and local factos can play a big role in the amplification of the extra resources on the economy. So the question arises is that how well the financial activities plays role in trigering the impact of remittances on economic growth? How does the impact of remittances on economic grwoth is being influenced by financial development? In this study, this role of remittances and financial development in economic growth is also analysed.

This study analyses the impact of remittances and financial development on economic growth. The study mainly includes developing countries for the analysis as the major receivers of remittances. The data of 36 developing countries shows a positive association between remittances and financial development, and economic growth. Results show that remittances have strong positive and statistically significant impact on economic growth of receiving country. The interaction of remittances and financial development also showed an economically sizable positive and statistically significant impact. To conclude, it can be maintained that in the presence of a developed financial system, remittances impact the national GDP in positive way.

The results of the paper offer various policy implications. Firstly, inflow of remittance be strengthened through formal banking channels. This will promote the culture of credits and savings which further strengthen financial infrastructure and thus economy. Secondly, savings be encouraged through improved transparency. This can only be done in the presence of more developed financial infrastructure and improved economic freedom in the country. Third, financial development be supported through robust policies. A more covered and larger sized banking sector could be acheived by robust policies. A more user freindly and cost-efficient financial system is needed to stuimulate the remittances accross the board.

Although this study explained the overall relationship of the underlying variables but it does not fully covered all the possible channels for the impact to happens. There are numerious other factors involved in triggering the growth impact of remittances. The importance of

institutional infrastructure and cultural traits can never be undermined in this respect. Also, the potential moral hazards associated to remittances have not explained in this paper. As a way forward, there is much more yet to be explained in this area. For example there could be an investigation of the role of digitalization in stimulating remittances and so economic growth. Further avenues like a detailed look into all the possible channels and their potential outcomes.

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Riikidevaheliste eraülekannete ja finantssektori arengu mõju majanduskasvule: arenevate majanduste paneelandmete analüüs

Riikidevahelised eraülekanded ehk see raha, mida väljarändajad saadavad tagasi oma kodumaale, on muutunud paljude arengumaade jaoks kõige olulisemaks piiriüleseks rahavooks ületades sageli välisinvesteeringute mahtu. Eraülekannete mõju vastuvõtva riigi majanduskasvule sõltub paljudest kohalikest teguritest, sealhulgas selle riigi finantsarengust. Finantssektori suurus ja areng võib hõlbustada lisaressursside mõju võimendumist majanduses. Käesolevas magistritöös hinnatakse eraülekannete mõju 36 arengumaal ajavahemikus 1991–2020 paneelandmete mudeliga. Tulemused näitavad, et eraülekanded toetavad riigi majanduskasvu. Lisaks võimendab vastuvõtva riigi finantsarengu suurus eraülekannete mõju majanduskasvule. Tulemused demonstreerivad kohalike tegurite olulisust selles kuidas rahvusvahelised rahavood majandust mõjutavad.

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