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Remittances and financial development

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Remittances and financial development: Empirical evidence from heterogeneous panel of countries

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{ HYPERLINK "mailto:Mita.Bhattacharya@monash.edu" \h }Abstract

Remittances are the second largest source of external finance after foreign direct investment in the developing economies. In this study, we analyze the role of incoming remittances on financial development for fifty-seven highest remittance recipient economies. A long run equilibrium relationship is established between remittances and three alternative indicators of financial development. Estimates from the dynamic system-generalized method of moments (sys-GMM) reflect lower elasticity values for developing countries compared to the developed ones. Our findings are robust across countries, and highlight the necessity for strengthening institutional setups to increase the inflow of remittances, which will enhance financial development across countries. The role of foreign direct investment is found to be significant in most cases.

1. Introduction

Over the last three decades, remittances from migrant workers have increased significantly and become a key input to the national economic development in Asia, Latin America, Africa and the Pacific region. Following a recent report by the { HYPERLINK \l "_ENREF_65" \o "WorldBank, 2016 #20013" }, worldwide remittance flows are expected to exceed $601 billion in 2015. Out of this, the share of developing countries is estimated at $441 billion, nearly three times the amount of official development assistance (ODA). The top recipients were India, China, the Philippines, Mexico, and France. Smaller countries viz. Tajikistan (42 percent), the Kyrgyz Republic (30 percent), Nepal (29 percent), Tonga (28 percent), and Moldova (26 percent) were the largest recipients on the GDP shares.

Since the 2000s, the world economy has entered the third phase of financial globalization. Developing countries are now more integrated with the global financial system and more capital inflows. Financial globalization improves the functioning of the financial system by increasing access to funds and improving financial infrastructure. This globalization can reduce the problem of asymmetric information and can enhance the availability of credit.

In recent times, both private and public sectors have played significant roles in the growth of remittances. In the private sector, 'money transmission operators' (MTOs) such as the Western Union and MoneyGram are mushrooming in many countries, along with other domestic and foreign financial institutions. In the public sector, many countries have established government agencies to explore the development potential of the international migrant remittances. Countries like China, India, El Salvador and the Philippines have implemented policies at the government level, and other countries will follow in due course. With financial development, remittances are becoming more common across countries and can be a source of economic development. We explore whether the availability of these increased

funds in the form of remittances (both in dollar values and in percentage) are widening the credit access to the recipient countries and towards their overall financial development.

The literature on remittances is based on aggregate or micro level data either for a single or panel of countries. The findings are inconclusive due to the econometric methods researchers have used, data and period of study. For example, a bi-directional causality may exist between remittances and financial development. A well-functioning banking system with low transaction costs increases the volume of remittances as in Giuliano and Ruiz-Arranz, 2009; and **{** HYPERLINK \l "_ENREF_6" \o "Aggarwal, 2011 #19930" **}**. A bi-directional causality is reported between financial development and remittances in **{** HYPERLINK \l "_ENREF_31" \o "Gupta, 2009 #324" **}** and others. In contrast, remittances has no significant effect on financial development as established by **{** HYPERLINK \l "_ENREF_41" \o "Kumar, 2013 #50" **}**, while a negative effect on financial development is suggested by **{** HYPERLINK \l "_ENREF_18" \o "Brown, 2013 #339" **}**.

Previous cross-country studies assume homogeneity across the panel of countries. Following the statistics above, we notice that there are marked differences in remittance inflows across countries, particularly due to the level of financial development. Cross-sectional dependence may exist across countries due to socio-economic ties, financial liberalization and for many other factors. In addition, remittance sending countries have common receivers; changes in policies within these countries and external shocks such as a financial crisis may affect the recipients, and therefore, countries across our panel may not be independent.

In this paper, we address the gap in the literature in three ways. First, we examine the financial development-remittances nexus employing recent panel methodologies allowing for cross-sectional dependence and heterogeneity among recipients across the world. We consider a panel of top fifty-seven countries both from the developed and developing world over a period

of two decades. In particular, we analyze their integration into the world financial system and whether their financial development is affected by remittances with a reverse causality.

Our main objective is to test whether the level of financial depth in the recipient country is affected by remittances. Due to the presence of common shocks and unobserved components, models with panel data are more likely to exhibit a cross-sectional dependence in their errors. Cross-section dependence may arise due to economic and financial integration of countries and their financial entities over the last three decades, which has led to strong interdependencies between these countries. To this end, pair-wise cross-section covariance of the error term will differ across the individual countries. If panel data exhibits cross-sectional dependence, estimating models with homogeneous slope coefficients may yield misleading results. To our knowledge, this is the first study to account for cross-sectional dependence and heterogeneity while measuring the impact of remittance inflow on financial development combining both developing and developed economies.

Second, remittances are less likely to be pro-cyclical and are relatively stable as a source of major foreign capital inflows. Therefore, we test whether there is any structural break over the period of our analysis. Financial system plays a significant role in absorbing external shocks.

Third, we examine whether the financial development and the flow of remittances are complementary to each other by testing bi-directional causality between these two variables. Potential endogeneity biases due to measurement error, reverse causation, and omitted variables are common in establishing a relationship between remittances and financial development.[1]

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[1] Officially recorded measures are in error while estimated unrecorded remittances vary from 20 to 200 percent of official statistics as recorded in { HYPERLINK \l "_ENREF_27" \o "Freund, 2005 #19949" }. Better financial development might lead to larger official statistics due to recorded transaction through formal financial institutions. On the other hand, improved condition in financial development encourages lower transaction cost in transmitting remittances, therefore, increases the number of remittances. In the case of African Economic and Monetary Union, { HYPERLINK \l "_ENREF_23" \o "Donou-Adonsou, 2016 #20109" } find no evidence that

Our contributions towards the literature covers three aspects. We have selected fifty-seven highest remittance recipient economies, which has a good mixture of developed and developing countries. Given that these countries are the top recipients, we trace both short and long run effects of remittances on financial development. Second, we use three alternative indicators of financial development considering overall liquidity, market capitalization and credit towards private sector to capture the depth of financial market. Third, along with panel estimations, we use the dynamic system generalized method of moments (sys-GMM). Our findings reflect lower elasticity values for developing countries compared to the developed ones. Our findings are robust across countries, and highlight the necessity for strengthening institutional setups to increase the inflow of remittances, which will enhance financial development across countries. The role of foreign direct investment is found to be significant in most cases.

The rest of the paper is organized as follows. Section 2 presents a brief review of the literature covering the effects of remittances, FDI inflows and economic growth on financial development. In Section 3, we posit a simple model to establish our major hypotheses. This section also includes a description of the data. Section 4 analyses the empirical findings. Section 5 summarizes the major findings and describes policy implications.

2. A brief overview of the literature

We provide a brief overview of the literature as a backdrop towards our empirical model. We integrate studies from three aspects of the literature on financial development.

2.1. Remittances- financial development

The literature on the effects of remittances on various dimensions of socio-economic development is voluminous. It covers the aspects of growth, household savings, small business investment, health, education, poverty, and inequality. An excellent review on the different

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remittance flow enhances income per capita while for Bangladesh, { HYPERLINK \l "_ENREF_7" \o "Al Mamun, 2016 #20110" } find that remittance flow significantly improves domestic labour productivity.

motives behind remittances is documented by **{** HYPERLINK \l "_ENREF_56" \o "Rapoport, 2006 #19977" **}**. Among cross-country studies, the effects of remittances on growth have been investigated considering financial sector development **{** ADDIN EN.CITE <EndNote><Cite><Author>Giuliano</Author><Year>2009</Year><RecNum>19950</RecNum><DisplayText>(Giuliano & Ruiz-Arranz, 2009)</DisplayText><record><rec-number>19950</rec-number><foreign-keys><key app="EN" db-id="fe50p90trred97evrw552x99fttxp9aswepa" timestamp="0">19950</key></foreign-keys><ref-type name="Journal Article">17</ref-type><contributors><authors><author>Giuliano, Paola</author><author>Ruiz-Arranz, Marta</author></authors></contributors><titles><title>Remittances, financial development, and growth</title><secondary-title>Journal of Development Economics</secondary-title></titles><pages>144-152</pages><volume>90</volume><number>1</number><dates><year>2009</year></dates><isbn>0304-3878</isbn><urls></urls></record></Cite></EndNote>**}**. The role of finance is found to be an important factor in determining remittances. Moreover, they find remittances are growth enhancing in the absence of financial development. The stabilizing effect on output is established by **{** HYPERLINK \l "_ENREF_19" \o "Chami, 2012 #19941" **}** while **{** HYPERLINK \l "_ENREF_47" \o "Mundaca, 2009 #19968" **}** reported a significant effect on growth for countries with greater financial development. [2]**{** HYPERLINK \l "_ENREF_20" \o "Clemens, 2014 #19943" **}**

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[2] Skill composition of workers as a major determinant of remittances for developing countries is established by **{** HYPERLINK \l "_ENREF_3" \o "Adams, 2009 #19927" **}**. Also, his findings suggest that the level of poverty in a labour-sending country does not have any positive influence on the level of remittances received. Other studies examine the effect of remittances on poverty reduction **{** HYPERLINK \l "_ENREF_4" \o "Adams, 2005 #19928" **}**; **{** HYPERLINK \l "_ENREF_66" \o "Yang, 2011 #19986" **}**; **{** HYPERLINK \l "_ENREF_2" \o "Acosta, 2007 #19922" **}**; and **{** HYPERLINK \l "_ENREF_35" \o "Hassan, 2015 #19956" **}**, income inequality **{** HYPERLINK \l "_ENREF_45" \o "McKenzie, 2007 #20403" **}**; **{** HYPERLINK \l "_ENREF_1" \o "Acosta, 2008 #19925" **}** **{** HYPERLINK \l "_ENREF_1" \o "Acosta, 2008 #19926" **}** and **{** HYPERLINK \l "_ENREF_11" \o "Amuedo-Dorantes, 2007 #19933" **}**) and education **{** HYPERLINK \l "_ENREF_34" \o "Hanson, 2003 #19955" **}**; and Acosta *et al.*, 2007). A study on remittance and allocation is provided in **{** HYPERLINK \l "_ENREF_48" \o "Musumba, 2015 #20108" **}** while the effect of remittances in reducing the effect on brain drain on economic development is provided in **{** HYPERLINK \l "_ENREF_43" \o "Le, 2011 #20111" **}**.

revisited the growth-remittances nexus and emphasised that studies with cross-countries may reflect findings with measurement issues and low explanatory power.

The literature on the impact of international remittances on financial development is still evolving. The financial system are often characterized by their ability to produce information about possible investments ex-ante, to monitor investments, to mobilize and pool savings and allocate capital. The dynamics exert corporate governance after providing finance, to facilitate the trading, diversification and management of risk, and to ease the exchange of goods and services ({ HYPERLINK \l "_ENREF_16" \o "Beck, 2000 #19939" }; { HYPERLINK \l "_ENREF_30" \o "Greenwood, 1990 #19499" }; { HYPERLINK \l "_ENREF_44" \o "Levine, 1997 #20397" }). Further, providing financial services to individuals will have a positive impact on savings { ADDIN EN.CITE

<EndNote><Cite><Author>Ashraf</Author><Year>2010</Year><RecNum>19935</RecNum><DisplayText>(Ashraf, Karlan, & Yin, 2010)</DisplayText><record><rec-number>19935</rec-number><foreign-keys><key app="EN" db-id="fe50p90trred97evrw552x99fttxp9aswepa" timestamp="0">19935</key></foreign-keys><ref-type name="Journal Article">17</ref-type><contributors><authors><author>Ashraf, Nava</author><author>Karlan, Dean</author><author>Yin, Wesley</author></authors></contributors><titles><title>Female empowerment: Impact of a commitment savings product in the Philippines</title><secondary-title>World development</secondary-title></titles><pages>333-344</pages><volume>38</volume><number>3</number><dates><year>2010</year></dates><isbn>0305-750X</isbn><urls></urls></record></Cite></EndNote> } and productive investments { ADDIN EN.CITE

<EndNote><Cite><Author>Dupas</Author><Year>2013</Year><RecNum>19947</RecNu

m><DisplayText>(Dupas & Robinson, 2013)</DisplayText><record><rec-number>19947</rec-number><foreign-keys><key app="EN" db-id="fe50p90trred97evrw552x99fttxp9aswepa" timestamp="0">19947</key></foreign-keys><ref-type name="Journal Article">17</ref-type><contributors><authors><author>Dupas, Pascaline</author><author>Robinson, Jonathan</author></authors></contributors><titles><title>Savings constraints and microenterprise development: Evidence from a field experiment in Kenya</title><secondary-title>American Economic Journal: Applied Economics</secondary-title></titles><pages>163-192</pages><volume>5</volume><number>1</number><dates><year>2013</year></dates><isbn>1945-7782</isbn><urls></urls></record></Cite></EndNote>}. Successful financial liberalization and the efficient operation of financial markets need strong institutional setups, such as legal infrastructure, bankruptcy codes, disclosure rules and prudential regulations. Overall, reform of the financial sector with "banking the unbanked" is necessary to improve remittance policies { ADDIN EN.CITE <EndNote><Cite><Author>Hansen</Author><Year>2012</Year><RecNum>19954</RecNum><DisplayText>(Hansen, 2012)</DisplayText><record><rec-number>19954</rec-number><foreign-keys><key app="EN" db-id="fe50p90trred97evrw552x99fttxp9aswepa" timestamp="0">19954</key></foreign-keys><ref-type name="Journal Article">17</ref-type><contributors><authors><author>Hansen, Peter</author></authors></contributors><titles><title>Revisiting the Remittance Mantra: A Study of Migration–Development Policy Formation in Tanzania</title><secondary-title>International Migration</secondary-title></titles><pages>77-91</pages><volume>50</volume><number>3</number><dates><year>2012</year></dates><isbn>1468-2435</isbn><urls></urls></record></Cite></EndNote>}.

The relationship between financial development and remittances is not fully established in the literature. Following **{** HYPERLINK \l "_ENREF_50" \o "Nyamongo, 2011 #19970" **}** and Aggarwal et al. (2011), formal channels of remittances encourage growth in the financial sector. This ambiguity occurs particularly when the recipients of such funds open accounts with commercial banks. Positive effects of remittances on banking include recipients needing to deposit funds in banks as a safe storage and recipients seeking other bank products or services. Credit outstanding may also increase due to remittances as banks may relax credit constraints on remittance recipients following the 'induced financial literacy' hypothesis. On the other hand, remittances may reduce demand for credit by relaxing households' financial constraints (Giuliano & Ruiz Arranz, 2009). Therefore, remittances can be a source of credit beyond official financial channels and foster non-bank transactions. We state here our first hypothesis.

Hypothesis 1: Remittances have a positive influence on financial development.

2.2. Foreign direct investment (FDI) -financial development

Globalization of capital in the form of FDI has increased significantly over the past few decades. FDI has been the largest source of capital flows in the case of developing countries. Consequently, FDI has become a major source of financing in the development process (Global Development Finance, 2005). Capital flows may promote financial development by increasing domestic financial intermediation. Therefore, the level of development of the financial system helps in mobilizing savings, allocating capital, and facilitating risk management. Therefore, the strong financial system facilitates capital flows and economic growth (e.g. **{** HYPERLINK \l "_ENREF_36" \o "Hermes, 2003 #19957" **}**; **{** HYPERLINK \l "_ENREF_8" \o "Alfaro, 2004 #19406" **}**; **{** HYPERLINK \l "_ENREF_26" \o "Durham, 2004 #19948" **}**. In principle, there are several ways in which a higher level of financial development can allow the host country to exploit FDI more

efficiently. Firstly, the provision of more credit facilities enables entrepreneurs who lack internal funds to purchase new machines, adopt new technology, and hire better-skilled managers and labors { ADDIN EN.CITE <EndNote><Cite><Author>Omran</Author><Year>2003</Year><RecNum>19972</RecNum><DisplayText>(Omran & Bolbol, 2003)</DisplayText><record><rec-number>19972</rec-number><foreign-keys><key app="EN" db-id="fe50p90trred97evrw552x99fttxp9aswepa" timestamp="0">19972</key></foreign-keys><ref-type name="Journal Article">17</ref-type><contributors><authors><author>Omran, Mohammed</author><author>Bolbol, Ali</author></authors></contributors><titles><title>Foreign direct investment, financial development, and economic growth: evidence from the Arab countries</title><secondary-title>Review of Middle East Economics and Finance</secondary-title></titles><pages>231-249</pages><volume>1</volume><number>3</number><dates><year>2003</year></dates><isbn>1475-3685</isbn><urls></urls></record></Cite></EndNote>}; Alfaro et al. 2004). The level of financial development in the host country may affect its ability to absorb the benefits from FDI.

A recent study by { HYPERLINK \l "_ENREF_60" \o "Soumaré, 2015 #19981" } empirically examined the causal relationship between FDI and financial development indicators using a panel data set on emerging markets. Their findings confirm the bidirectional causality between FDI and stock market development indicators; however, the authors suggest that the relationship between FDI and banking indicators are inconclusive. In a study of African countries, { HYPERLINK \l "_ENREF_52" \o "Otchere, 2015 #19973" } investigated the causal relationship between FDI and financial market development indicators. Their findings show the bidirectional causal relationship between FDI and financial development indicators. Their findings establish the significance of financial development in FDI inflows in Africa. Hermes

and Lensink (2003) also argued that the development of financial system plays an important role with FDI inflows and allocating the financial resources for the production activities. { HYPERLINK \l "_ENREF_9" \o "Alfaro, 2009 #19931" } reported that a well-developed financial system helps to gain significant benefits from the FDI inflows through the total factor productivity. { HYPERLINK \l "_ENREF_14" \o "Azman-Saini, 2010 #19936" } also found that the FDI inflows have a positive effect on the economic growth only after financial development exceeds a threshold level. We establish the second hypothesis as:

Hypothesis 2: FDI will affect financial development.

2.3. Economic growth -financial development

The empirical relationship between financial development and economic growth has been extensively studied across the developed and developing nations around the world. In the earlier literature, { HYPERLINK \l "_ENREF_58" \o "Schumpeter, 1934 #19980" } had discussed the significance of financial sector development in promoting the economic growth. He suggested that a well-functioning financial system plays an important role in allocating the limited financial resources among the production activities and also encourages technical innovations. These factors play a pivotal role in promoting the economic activities and development. Similarly, { HYPERLINK \l "_ENREF_40" \o "King, 1993 #19960" } and { HYPERLINK \l "_ENREF_39" \o "King, 1993 #12892" } documented that deeper, broader and a well-functioning financial system has a significant positive effect on the economic growth. The 'demand following' and 'supply leading' hypotheses were empirically investigated by { HYPERLINK \l "_ENREF_53" \o "Patrick, 1966 #19975" }. He argued in the 'supply leading' hypothesis that the causality runs from the financial development to economic growth while 'demand following' hypothesis indicates that the causality runs from the economic growth to financial development. The supply-leading hypothesis is empirically supported by { HYPERLINK \l "_ENREF_46" \o "McKinnon, 2010 #19967" }, King and Levine (1993a, b), { HYPERLINK \l "_ENREF_49" \o "Neusser, 1998 #19969" }, {

HYPERLINK \l "_ENREF_17" \o "Bojanic, 2012 #19940" }, and { HYPERLINK \l "_ENREF_37" \o "Hsueh, 2013 #19958" }. Studies by { HYPERLINK \l "_ENREF_32" \o "Gurley, 1967 #19952" }, { HYPERLINK \l "_ENREF_29" \o "Goldsmith, 1969 #19951" }, and { HYPERLINK \l "_ENREF_38" \o "Jung, 1986 #19959" } confirm the demand-following hypothesis.

There is a significant positive effect on the financial development indicators (private sector credit to GDP and private sector credit as a ratio to total credit) towards the economic growth. On the other hand, financial indicators like broad money supply to GDP has a negative impact on the growth { ADDIN EN.CITE <EndNote><Cite><Author>Adu</Author><Year>2013</Year><RecNum>19929</RecNum ><DisplayText>(Adu, Marbuah, & Mensah, 2013)</DisplayText><record><rec-number>19929</rec-number><foreign-keys><key app="EN" db-id="fe50p90trred97evrw552x99fttxp9aswepa" timestamp="0">19929</key></foreign-keys><ref-type name="Journal Article">17</ref-type><contributors><authors><author>Adu, George</author><author>Marbuah, George</author><author>Mensah, Justice Tei</author></authors></contributors><titles><title>Financial development and economic growth in Ghana: Does the measure of financial development matter?</title><secondary-title>Review of Development Finance</secondary-title></titles><pages>192-203</pages><volume>3</volume><number>4</number><dates><year>2013</year></dates ><isbn>1879-9337</isbn><urls></urls></record></Cite></EndNote> } . Bojanic (2012) investigated the relationship between financial development and economic growth for Bolivia. Their findings indicate the long-run equilibrium relationship among the variables and reflect unidirectional causality running from financial development towards economic growth. Hsueh et al. (2013) investigated the relationship between financial development and economic growth across ten Asian countries using a bootstrap panel causality test. Their findings support that the supply-leading hypothesis, meaning that financial development indicators play a significant

role in promoting the economic growth in some of the Asian countries, including China. Likewise, { HYPERLINK \l "_ENREF_61" \o "Uddin, 2013 #19982" } also examined the relationship between financial development and economic growth in Kenya. They found a long-run equilibrium relationship among the variables. Further, the authors suggested that the financial sector plays a significant and positive role in economic growth in the long-run. [3] We establish the third hypothesis as:

Hypothesis 3: Economic growth will affect financial development with a feedback effect.

3 Empirical model and data

In emphasizing the role of our focus variable viz. remittances influence on financial development, we present the logic behind possible positive and negative effects of remittances on financial development. Promoting competition among money transfer operators reduces transaction costs. This competition increases remittances through formal channels. A well-functioning financial market may increase the flow of remittances by lowering costs of transactions. On the other hand, in a less developed financial system, remittances can be a substitute for inefficient or nonexistent credit markets by helping local entrepreneurs who may face collateral problems or high lending costs. In less developed financial systems, remittances are an alternative source to finance investment and help to overcome liquidity constraints. For other variables, our background discussion are from Section 2. Our model of financial development is expressed in Eq (1):

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[3] The literature on growth-finance nexus is extensive. A recent review can be found in { HYPERLINK \l "_ENREF_42" \o "Lauretta, 2015 #20106" }.

$$\ln(FD_{it}) = \beta_0 + \beta_1\ln(REM_{it}) + \beta_2\ln(FDI_{it}) + \beta_3\ln(GDP_{it}) + \eta_{it} \qquad (1)$$

where financial development (FD) is the dependent variable. Our explanatory variables are remittances (REM), and foreign direct investment (FDI) and gross domestic product (GDP) per capita, respectively. The subscripts i and t denote country and period, respectively, β_0 and, $\beta_{i's}$ are the constant and elasticities on REM, FDI and GDP respectively. η_{it} is an error term in the model.

Remittances contribute to eliminating credit constraints, increasing savings and deposit accounts and extending loan facilities **{ ADDIN EN.CITE <EndNote><Cite><Author>Anzoategui</Author><Year>2014</Year><RecNum>19934</RecNum><DisplayText>(Anzoategui, Demirgüç-Kunt, & Pería, 2014)</DisplayText><record><rec-number>19934</rec-number><foreign-keys><key app="EN" db-id="fe50p90trred97evrw552x99fttxp9aswepa" timestamp="0">19934</key></foreign-keys><ref-type name="Journal Article">17</ref-type><contributors><authors><author>Anzoategui, Diego</author><author>Demirgüç-Kunt, Asli</author><author>Pería, María Soledad Martínez</author></authors></contributors><titles><title>Remittances and financial inclusion: evidence from El Salvador</title><secondary-title>World Development</secondary-title></titles><pages>338-349</pages><volume>54</volume><dates><year>2014</year></dates><isbn>0305-750X</isbn><urls></urls></record></Cite></EndNote>}.** Therefore, in Eq. (1), we consider three alternative financial market development proxies to measure financial development (FD). These are broad money (BM) as a % of GDP, market capitalization (MCAP) as a % of GDP, and domestic credit to private sector as a % GDP (DCP).[4] The first measure BM is the sum of

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[4] GDP is gross domestic product, a measure of economic growth.

demand deposits other than those of the central government; bank and traveler's checks; currency outside banks; the savings, time and foreign currency deposits of resident sectors other than the central government; and other securities such as commercial paper and certificates of deposit. These reflect liquidity. Instead of an increase in the volume of bank stocks, the increment in the ratio of broad money to GDP reflects the wide use of currency in circulation { ADDIN EN.CITE <EndNote><Cite><Author>Demetriades</Author><Year>1996</Year><RecNum>19945</RecNum><DisplayText>(Demetriades & Hussein, 1996)</DisplayText><record><rec-number>19945</rec-number><foreign-keys><key app="EN" db-id="fe50p90trred97evrw552x99fttxp9aswepa" timestamp="0">19945</key></foreign-keys><ref-type name="Journal Article">17</ref-type><contributors><authors><author>Demetriades, Panicos O</author><author>Hussein, Khaled A</author></authors></contributors><titles><title>Does financial development cause economic growth? Time-series evidence from 16 countries</title><secondary-title>Journal of development Economics</secondary-title></titles><pages>387-411</pages><volume>51</volume><number>2</number><dates><year>1996</year></dates><isbn>0304-3878</isbn><urls></urls></record></Cite></EndNote> } . Market capitalization is measured by multiplying the share price by the number of shares outstanding. The final measure, DCP, includes the extent to which the private sector relies on financial corporations for financial resources such as loans, purchases of non-equity securities, and trade credits and other accounts receivable, which establish a claim for repayment.

Our measure of remittance is remittance inflows to GDP. Remittances are classified as current private transfers from migrant workers' resident in the host country for more than a year, irrespective of their immigration status, to recipients in their country of origin. Migrants' transfers are defined as the net worth of migrants who are expected to remain in the host country

for more than one year that is transferred from one country to another at the time of migration. Compensation of employees is the income of migrants who have lived in the host country for less than a year.[5] The FDI measures net inflows of foreign capital as a percentage of GDP while GDP per capita is measured in constant 2005 US dollars. The data for indicators of financial development, economic growth, remittance and foreign direct investment are taken from the World Development Indicators (WDI) series published by the World Bank.[6]

We consider fifty-seven countries receiving highest remittances which include both developed and developing economies. The annual data cover the period of 1992 to 2012. The sample countries and period are selected based on the availability of data. A list of the countries in our panel is attached in Appendix-I. For empirical analyses, all variables are considered in natural logarithms before commencing any econometric estimations.[7]

4 Empirical findings and discussion

4.1 Panel unit root test with cross-sectional dependence (no structural break)

For countries in our panel, we assume cross-sectional independence may distort the findings **{** ADDIN EN.CITE <EndNote><Cite><Author>Banerjee</Author><Year>2004</Year><RecNum>19938</RecNum><DisplayText>(Banerjee, Marcellino, & Osbat, 2004)</DisplayText><record><rec-number>19938</rec-number><foreign-keys><key app="EN" db-id="fe50p90trred97evrw552x99fttxp9aswepa" timestamp="0">19938</key></foreign-keys><ref-type name="Journal Article">17</ref-type><contributors><authors><author>Banerjee, Anindya</author><author>Marcellino, Massimiliano</author><author>Osbat,

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Chiara</author></authors></contributors><titles><title>Some cautions on the use of panel methods for integrated series of macroeconomic data</title><secondary-title>The Econometrics Journal</secondary-title></titles><pages>322-340</pages><volume>7</volume><number>2</number><dates><year>2004</year></dates><isbn>1368-423X</isbn><urls></urls></record></Cite></EndNote> **}** . We undertake empirical analysis that relates remittance to financial development and then apply panel estimation techniques with cross-country heterogeneity and dependence. These techniques improve the statistical reliability of our results. In particular, we apply a cross-sectional dependence (CD) test using the approach developed by **{** ADDIN EN.CITE <EndNote><Cite AuthorYear="1"><Author>Pesaran</Author><Year>2004</Year><RecNum>19976</RecNum><DisplayText>M Hashem Pesaran (2004); (M. Hashem Pesaran, 2007)</DisplayText><record><rec-number>19976</rec-number><foreign-keys><key app="EN" db-id="fe50p90trred97evrw552x99fttxp9aswepa" timestamp="0">19976</key></foreign-keys><ref-type name="Journal Article">17</ref-type><contributors><authors><author>Pesaran, M Hashem</author></authors></contributors><titles><title>General diagnostic tests for cross section dependence in panels</title></titles><dates><year>2004</year></dates><urls></urls></record></Cite><Cite><Author>Pesaran</Author><Year>2007</Year><RecNum>14663</RecNum><record><rec-number>14663</rec-number><foreign-keys><key app="EN" db-id="fe50p90trred97evrw552x99fttxp9aswepa" timestamp="0">14663</key></foreign-keys><ref-type name="Journal Article">17</ref-type><contributors><authors><author>Pesaran, M. Hashem</author></authors></contributors><titles><title>A simple panel unit root test in the presence of cross-section dependence</title><secondary-title>Journal of Applied

Econometrics</secondary-title></titles><periodical><full-title>Journal of Applied Econometrics</full-title><abbr-1>J Appl Econom</abbr-1></periodical><pages>265-312</pages><volume>22</volume><number>2</number><dates><year>2007</year></dates><publisher>John Wiley & Sons, Ltd.</publisher><isbn>1099-1255</isbn><urls><related-urls><url>http://dx.doi.org/10.1002/jae.951</url></related-urls></urls><electronic-resource-num>10.1002/jae.951</electronic-resource-num></record></Cite></EndNote>}.[8] This test employs the correlation coefficients between the time series for each panel country. The null hypothesis of the test is cross-sectional independence. The results of the CD test are reported in Table 1. The results indicate that the null hypothesis of cross-sectional independence is strongly rejected at the 1% significance level for all the variables. This suggests the presence of cross-sectional dependence across the panel.

We, therefore, apply (Pesaran, 2007) the cross-sectional augmented IPS (CIPS) panel unit root test which accounts for both heterogeneity and cross-sectional dependence across panels. The CIPS test in Table 1 confirms that the considered series are integrated of order I (1), and are statistically significant.

<div align="center">**Insert Table 1 near here**</div>

4.2 Panel stationarity test with structural breaks

Tests for stationarity in the presence of double structural breaks in the series have been developed by { HYPERLINK \l "_ENREF_21" \o "Clemente, 1998 #19944" }. We reject the null hypothesis of stationarity. A test statistic exceeding the critical value is significant. The country-specific findings, with the null of stationarity allowing for two structural breaks, are reported in Table 2. With this test, we are able to reject the null of stationarity for the measures of financial development for some of the countries. These countries include Botswana, Denmark, Mexico and Romania with the BM measure; Brazil, Cote d'Ivoire, El Salvador, Israel, Peru,

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[8] Xtcd command in STATA is used here developed by Markus Eberhardt.

Philippines, Sri Lanka and Sweden with the DCP measure and; Bulgaria, Cote d'Ivoire, Croatia, El Salvador, India, Japan, Malaysia, Peru, Russia, Tunisia and Turkey with the MCAP measure.

Insert Table 2 near here

With the REM series, the null of stationarity is rejected for Cote d'Ivoire, Fiji, Mauritius, and Turkey. We establish all three indicators of financial development and the REM, GDP and FDI variables are stationary for some of our selected countries in the panel. This result suggests that time series properties are heterogeneous across countries in the long run, with some of the selected countries having a unit root and integrated with order 1. Also, there is heterogeneity across recipients which are found to be non-stationary in the series with our different measures of financial development.

In the case of Brazil, the first break date for BM is 1995. For Russia, the first break date for MCAP is 1995. The number of years within two break dates varies among countries. Break dates for all of them are between 1991 and 2006. During this period, there was a surge in oil demand, a financial crisis in Asia, the emergence of information technology and financial integration across these countries have altered significantly due to these shocks and changes the overall environment of trends in remittances.

4.3 Panel cointegration tests

In the next step, we establish long-run dynamics between financial development and remittances using the panel cointegration tests developed by **{** HYPERLINK \l "_ENREF_62" \o "Westerlund, 2007 #19983" **}** and **{** HYPERLINK \l "_ENREF_63" \o "Westerlund, 2008 #19984" **}**. These tests have good small-sample properties and high power about popular residual-based panel cointegration tests.[9]

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[9] Detail mathematical steps are omitted here to conserve space.

The estimated values of the Westerlund (2007) panel cointegration test are presented in Table 3 along with asymptotic *p*-values (when it is not restricted to be homogeneous) and bootstrapped *p*-values (when it accounts for cross-sectional dependence). The findings indicate that the null hypothesis of no cointegration is strongly rejected in the case of REM-BM, DCP, MCAP, FDI and GDP using the bootstrapped *p*-values. Further, the null hypothesis is not rejected for the case of DCP-REM using the bootstrapped *p*-values, however, based on asymptotic *p*-values, one statistic rejects the null hypothesis. Overall, the results of the Westerlund (2007) panel cointegration test confirm that financial indicators and remittances have a strong long-run equilibrium relationship. This result implies that both financial indicators and remittances share a common trend in the long run.

Insert Table 3 near here

For additional robustness checks, we also performed the Westerlund and Edgerton (2008) cointegration test in checking structural breaks and cross-section dependence. The test is based on the LM unit root test approach of { HYPERLINK \l "_ENREF_57" \o "Schmidt, 1992 #19979" } and { HYPERLINK \l "_ENREF_10" \o "Amsler, 1995 #19932" }. The strength of the test lies in its ability to account for serially correlated and heteroskedastic errors, cross-sectional dependence, unit-specific time trends and unknown structural breaks in both the slope and intercept of the cointegrated regression that might be located at different units and different dates. The findings are presented in Table 4. Both of the test statistics indicate a long-run relationship between remittances and various measures of financial development. Remittances make individuals financially literate in the long run. Therefore, its aggregate level enhances financial development.

Insert Table 4 near here

4.4 Long-run elasticities

4.4.1. Full sample

The cointegration tests reflect a long-run equilibrium relationship. To find the financial indicators' elasticities, we run a Pooled Ordinary Least Squares (POLS) and the dynamic system Generalized Method of Moment (GMM). In order to avoid instrument proliferation, we restrict the maximum number of instruments. The rationale behind this estimator is to correct for endogeneity bias and thereby allow for standard inference. The findings from both techniques are presented in Table 5. For the POLS results, a 1% increase in remittances increases BD by 0.04%, and for the GMM estimation, a 1% increase in remittances increases BD by 0.04%. The highest elasticity value (0.09%) is with the market capitalization index while the lowest value (0.03%) is with the DCP measure of financial development for both estimation techniques. Except for the BCBD measure (which is insignificant), for each of the specification with POLS and GMM techniques, we establish a positive and strong significant effect of remittances on financial development. Overall, our findings suggest that an increase in remittance inflow will enhance financial development for the selected panel of countries. For the system GMM, FDI variable has a positive and significant influence on two financial indicators (viz, DCP and MCAP). We further examine the relationship by employing the growth rate of these variables. The result shows that remittance enhances financial development.

Insert Table 5 near here

4.4.2. Robustness checks

To further examine the differences in remittance patterns across developed and developing regions, we re-estimate the model in sub-samples. We repeat the sys-GMM estimations for sub-sample of countries. The results are reported in Table 6. The sign and significance are found to be similar in both groups. However, remittance has a significant effect on the three measures of financial development in the case of developing countries but has a significant

effect on two out of three measures of financial development for the sub-sample of developed economies. The recorded effect has smaller coefficients (range 0.005 to 0.099) for developing countries than in developed countries (range 0.059 to 0.146). FDI variable is positive and significant for two measures of financial development (viz. DCP and MCAP) for developed countries while the coefficient is negative and significant (-0.012) only for BM measure in the case of developing countries. The capital flows in the form of FDI has a different impact on financial development both for developed and developing countries in the presence of remittances flow.

Insert Table 6 near here

4.5 Causality test

Finally, the direction of causality between financial development indicators and remittances is explored using a pairwise **{ ADDIN EN.CITE <EndNote><Cite><Author>Dumitrescu</Author><Year>2012</Year><RecNum>19946</RecNum><DisplayText>(Dumitrescu & Hurlin, 2012)</DisplayText><record><rec-number>19946</rec-number><foreign-keys><key app="EN" db-id="fe50p90trred97evrw552x99fttxp9aswepa" timestamp="0">19946</key></foreign-keys><ref-type name="Journal Article">17</ref-type><contributors><authors><author>Dumitrescu, Elena-Ivona</author><author>Hurlin, Christophe</author></authors></contributors><titles><title>Testing for Granger non-causality in heterogeneous panels</title><secondary-title>Economic Modelling</secondary-title></titles><periodical><full-title>Economic Modelling</full-**

title></periodical><pages>1450-1460</pages><volume>29</volume><number>4</number><dates><year>2012</year></dates><isbn>0264-9993</isbn><urls></urls></record></Cite></EndNote>**}** panel causality test. This test assumes coefficients to be different across the panel. The test requires all variables to be stationary; we, therefore, apply the test on the first difference of the series. The results are reported in Table 7. The short-run pairwise causality test results show no evidence of a feedback relationship between financial development indicators and remittances with an exception of DCP, where causality only runs from REM to DCP. The causality test results imply that remittances drive financial development and the indicator of financial development is sensitive to this causal effect.

Insert Table 7 near here

5 Conclusion and policy implications

Due to increasing financial integration, migrant remittances have been of particular interest for academics and policy advisers particularly in developing countries. What is the effect of remittances on financial development? Is there any evidence that remittances are different across countries depending on the degree of financial development? Is the relationship stable over time? To shed some light on these important questions, the paper explores the relationship between remittances and financial development for highest recipients from the developing and developed world while allowing economic growth and FDI inflows as additional controls. We consider cross-country differences and independence of the series for remittances over a period of two decades. Our findings are robust for different indicators of financial development. We find heterogeneity and cross-sectional dependence across countries. Different structural break dates are found across our sample countries. The only cross-country study is Aggarwal et al.

(2011) who considered only developing countries. The study does not consider cross-sectional heterogeneity and interdependence across countries.

Our findings suggest that there is a significant association between remittance inflows and financial development in the long run. Particularly, the inflow of remittances has a substantial positive impact on financial development. This indicates that lowering the transaction costs of remittances will encourage a larger share of remittances to flow through formal financial channels. In this respect, FDI inflows play a greater role in influencing financial development.

In future, policies should be formulated to establish more appropriate channels to remit to these countries; this will enhance the functioning of their financial systems. Our findings do not, however, give insights on all the channels through which remittances may affect the financial sector. In particular, we did not explore other possible characteristics of the countries, such as the institutional aspects that may explain this effect. Strengthening the institutional setup is necessary to reduce informal channels and to reduce transaction cost. Significant progress has been made in this regard in the recent years. For example, the introduction of cell phone encryption technology has facilitated faster, low-cost money transfers between the OECD countries, the recipient countries such as the Philippines, and various countries of Africa. This technology reduces transaction cost both in terms of time and fees associated with MTOs and banks. Remittance inflows will have a significant positive impact on financial development with feedback effects. These remittance inflows will enhance capital access with lower cost to entrepreneurs. In the future, with an increase in skilled migration, remittances will become a major source of development with the financial development deepens in these countries.

Future research in this area should assess the roles of the various formal and informal channels of remittances in identifying the growth and development effects across countries

along with the progress of financial development. In this respect, FDI inflows will play a greater role in enhancing financial development. Availability of quality data on remittances particularly for developing countries would help in unfolding individual characteristics of recipient countries and how these remittances are channeled into economic growth and financial development.

References

{ ADDIN EN.REFLIST }

Table 1: Tests for cross-sectional independence and unit root

Variable	Level		First difference		Level	First difference
	CD test				CIPS test	
	Test-value	Correlation				
BM	78.170***	0.440	9.76***	0.055	2.233	-3.808***
DCP	16.640***	0.204	3.88***	0.022	-0.907	-4.378***
MCAP	62.980***	0.350	44.91***	0.210	-1.363	-6.548***
REM	36.040***	0.092	7.19***	0.204	-0.755	-1.851**
FDI	29.140***	0.163	13.22***	0.076	3.833	-4.258***
GDP	145.580***	0.814	37.01***	0.215	6.018	-1.630***

Note: BD: Broad money; DC: Domestic credit to the private sector; MC: Market capitalization; REM: Remittances inflow; FDI: FDI inflows; GDP: GDP per capita. Except GDP all other variables are scaled by GDP. The critical values (constant and trend) of CIPS test at 1% and 5% -2.92 and -2.75, respectively. Here ** and *** indicate the rejection of null hypothesis of cross-sectional independence and the null hypothesis of unit root at 5% and 1% level of significance respectively.

Table 2: Country-specific KPSS stationarity tests with two Structural Breaks (Additive Outlier-AO)

Country	BM t-statistic	TB1	TB2	DCP t-statistic	TB1	TB2	MCAP t-statistic	TB1	TB2	REM t-statistic	TB1	TB2	FDI t-statistic	TB1	TB2	GDP t-statistic	TB1	TB2
Argentina	-5.107	1996	2005	-1.424	2005	2008	-3.156	2000	2005	-2.824	2003	2011	-7.339*	1997	2001	-4.131	2000	2007
Australia	-2.862	2000	2007	-3.249	1998	2004	-4.956	1996	2000	-2.062	2002	2006	-0.166	2000	2003	-3205	1998	2004
Bangladesh	-4.027	1996	2002	-3.039	2001	2007	-4.010	1994	2005	-3.713	2001	2006	-4.871	1999	2006	-2697	2001	2007
Barbados	-5.469	1998	2002	-3.243	1998	2002	-3.377	1993	1993	-4.514	1998	2004	-4.710	2002	2006	-3428	1997	2004
Bolivia	-4.674	1993	2008	-4.230	1993	2003	-3.622	1998	2000	-4.380	1998	2004	0.222	2001	2003	-3360	1999	2007
Botswana	-5.609*	1998	2002	-2.244	2000	2005	-4.024	1998	2003	-4.102	2002	2010	-5.732*	1995	1999	-3617	1996	2004
Brazil	-2.857	1995	2004	-7.770*	1995	2006	-1.616	1998	2003	-2.817	1998	2006	-3.147	1997	2003	-1.120	2003	2007
Bulgaria	-3.290	1994	2004	-4.575	1994	2003	-8.936*	1999	2004	-2.081	2002	2006	-5.980*	1998	2004	-3879	2001	2005
China	-3.761	1998	2006	-2.360	2000	2008	-5.007	1997	2005	-5.123	1993	1998	-5.494	1997	2005	-2879	1999	2006
Colombia	-3.666	1997	2006	-2.921	1997	2006	-3.938	2000	2006	-2.916	2000	2006	-5.787*	1993	2005	-0.828	2004	2008
Costa Rica	-1.605	1994	2002	-4.245	1998	2004	---	---	---	-2.826	1996	2002	-3.272	2003	2008	-2875	2000	2007
Cote d'Ivoire	-4.612	1996	2007	-6.144*	1995	2008	-6.766*	1995	2005	-7.194*	1995	2005	-2.094	1996	1999	-4383	1996	2001
Croatia	-2.197	1996	2002	-3.243	2002	2006	-5.843*	2003	2007	-4.033	2002	2007	-3.876	2002	2009	-5329	1999	2004
Czech Republic	-3.350	1999	2007	-3.289	1999	2006	-2.936	2003	2009	-2.964	1997	2003	-5.834*	1998	2000	-3120	2000	2005
Denmark	-5.975*	1998	2007	-0.635	1997	2001	-4.103	1996	2005	-3.990	1993	2005	-7.220*	1998	2002	-3133	1996	2001
Ecuador	-4.736	1997	2005	-4.057	1993	2007	-4.203	1997	2002	-3.037	1997	2009	-4.859	1997	2005	-4.413	2003	2007
Egypt, Arab Rep.	-1.983	2000	2010	-2.847	1997	2008	-1.826	1998	2007	-3.347	1996	2004	-5.200	2004	2008	-3119	1998	2006
El Salvador	-4.865	1995	1998	-15.829*	1995	1998	-6.973*	1999	2004	-4.621	2001	2005	-4.432	1995	2009	-3610	1997	2004
Fiji	-3.525	1996	2003	-4.862	1997	2003	-4.395	1999	2009	-7.024*	1999	2001	-5.457	1997	2003	-4769	1996	2002
Ghana	-2.955	1998	2002	-4.684	1997	2005	-3.979	2002	2010	-3.705	1997	2007	-5.151	2002	2007	-2383	2000	2007
Hungary	-3.337	1995	2006	-2.948	2001	2006	-2.649	2001	2006	-5.362	2001	2004	-0.748	2004	2006	-3.819	1998	2003
Iceland	-3.164	2000	2010	-1.822	1996	2002	-4.729	2000	2010	-3.117	2004	2007	-1.552	2002	2005	-2.796	1999	2005
India	-3.550	1995	2005	-4886	2001	2007	-6.821*	2004	2007	-4.655	1997	2006	-3.385	1996	2005	-2.665	2000	2006
Indonesia	-3.112	2003	2007	-4.265	2000	2003	-5.331	2000	2003	-3.879	1995	2002	-5.053	1998	2003	-3.163	2004	2008
Iran, Islamic Rep.	-4.937	2002	2006	-3.612	2001	2006	-5.256	1998	2011	-3.134	1997	2006	-3.323	1999	2006	-3.176	1999	2004
Israel	-4.101	1998	2004	-6.871*	1998	2006	-3.744	2000	2004	-3.945	1996	2006	-3.596	1996	2004	-7.965*	1996	2006
Japan	-2.522	2000	2010	-3.013	1997	2002	-6.058*	2004	2007	-5.169	1999	2007	-3.196	1996	2004	-3.750	1997	2006
Jordan	-3.326	2000	2006	-2.849	2002	2010	-2.073	2000	2005	-3.634	2005	2009	-2.983	1998	2004	-3923	2001	2005
Kenya	-2.827	1995	1999	-4.828	1998	2010	-5.331	1997	2002	-4.185	1996	2004	-6.964	1995	2005	-4.121	2000	2006
Korea, Rep.	-4.359	1998	2002	-3.771	1998	2002	-6.122	1995	2002	-4.509	1996	2004	-6.150*	1997	2001	-3.056	1996	2003
Malaysia	-4.114	1996	2006	-2.598	1996	2001	-5.883*	1994	1996	-4.442	2000	2007	-4.965	1998	2001	-12.386*	1997	2004
Mauritius	4.876	1996	2002	-2.988	1999	2007	-4.815	1999	2004	-8.238*	2002	2005	-7.477*	1998	2006	-2.750	1999	2007
Mexico	-7.195*	1994	2008	-3.374	1997	2006	-4.514	1999	2004	-1.395	2002	2009	-3.781	1995	2005	-6.497*	1997	2004
Morocco	-3.725	1997	2004	-3.009	1996	2006	-1.588	1993	2005	-0.844	1997	2002	-3.023	2002	2008	-3.434	2000	2006
Namibia	-3.734	2006	2010	-4.829	1995	2002	-0.921	1993	1997	-3.284	1997	2007	-7.910	1996	2004	-3.087	2001	2005
New Zealand	-3.140	1993	2006	-3.852	1996	2005	-4.583	1999	2006	-4.880	1998	2004	-3.060	1998	2006	-3.546	1998	2003

Table 2: Country-specific KPSS stationarity tests with two Structural Breaks (Additive Outlier-AO)-Continued																		
Nigeria	-4.685	1999	2007	-2.798	1998	2007	-5.013	2004	2009	-5.954	2006	2009	-5.056	1996	2007	-5.145	2001	2005
Oman	-4.107	1994	2006	-4.122	1999	2008	-3.264	1993	2005	-2.275	2000	2005	-4.388	2004	2009	-3.589	1999	2003
Pakistan	-4.277	2005	2010	-5.313	2005	2008	-3.485	2003	2005	-4.496	1996	2003	-4.378	2003	2010	-3.413	2001	2005
Panama	-4.382	1998	2003	-4.017	1998	2003	-3.028	1993	1999	-4.161	1998	2002	-4.419	1993	2000	-2.677	2001	2008
Paraguay	-3.262	2004	2008	-4.161	2002	2008	---	---	---	-4.442	1995	2004	-4.921	2000	2007	-3.751	1999	2007
Peru	-1.975	2000	2004	-7.260*	1997	2004	-5.903*	2003	2005	-3.616	2000	2006	-5.962	1997	2005	-2.945	2003	2007
Philippines	-8.745	1995	2007	-6.675*	1997	2004	-3.780	1996	2006	-2.758	1996	2002	-7.109	1998	2005	-2.851	2001	2007
Poland	-3.564	1998	2007	-2.446	2000	2009	-5.642	1996	2003	-3.795	2001	2009	-3.414	1996	2004	-2.981	1997	2005
Romania	-9.402*	2001	2006	-4508	2002	2006	-3.632	1998	2002	-2.094	1995	2004	-2.596	1999	2010	-3.567	2002	2005
Russian Federation	-3.725	2002	2006	-4.390	1999	2005	-7.596*	1995	2002	-6.590	2000	2007	-3.499	1996	2004	-2.476	2001	2005
South Africa	-3.285	1998	2004	-4.534	2000	2007	-5.441	2003	2007	-3.041	1994	1998	-4.474	1999	2004	-4.011	2001	2005
Sri Lanka	-3.209	2003	2006	-13.667*	1996	2005	-3.158	1997	2002	-2.474	1999	2006	-7.653*	1997	2006	-2.730	1999	2007
Sweden	-5.458	2002	2006	-6.378*	1998	2006	-5.077	1996	2000	-3.825	1996	2011	-4.081	1997	2010	-3.638	1997	2003
Switzerland	-3.405	1997	2008	-3.411	2000	2004	-4.145	1996	2009	-5.220	2000	2004	-6.065*	1996	2003	-4.660	1998	2005
Thailand	-2.284	1999	2010	-5.312	2002	2006	-3.755	1995	2000	-4.565	2002	2010	-2.732	1996	2008	-3.604	2003	2007
Trinidad and Tobago	-4.456	2002	2006	-4.954	1994	2002	-2.591	1998	2007	-5.717	1995	2005	-6.041*	1997	2004	-5.631*	1999	2004
Tunisia	-4.439	2001	2008	-2.755	1997	2009	-5.659*	1998	2007	-3.779	1997	2001	-4.766	2003	2008	-3.083	1998	2005
Turkey	-3.604	1998	2006	-2.596	1997	2006	-7.632*	1996	2005	-5.611*	2000	2003	-4.521	2000	2006	-2.830	1999	2005
United Kingdom	-2.859	1998	2005	-2.699	2000	2005	-4.747	1996	2001	-3.777	1998	2004	-4.660	2006	2008	-3.462	1997	2002
United States	-4.463	1998	2006	-4.753	1996	2003	-3.886	1996	2005	-0.829	1996	2000	-2.987	1997	2003	-3.634	1997	2003
Venezuela, RB	-3.023	1996	2004	-3.832	2001	2005	---	---	---	-3.137	1993	2000	-5.575	1995	2003	-8.079*	2000	2005

Note: Variable notations are from Table 1. * denotes significance at the 5% level, critical value is 5.490. TB1 and TB2 are two structural breaks. --- denotes values are not available due to insufficient observations.

Table 3: Cointegration test based on cross-sectional dependence: Westerlund (2007)

Test	BM			DCP			MCAP		
	Value	p-value[a]	p-value[b]	Value	p-value[a]	p-value[b]	Value	p-value[a]	p-value[b]
G_τ	-3.147	0.000	0.280	-3.024	0.000	0.423	-3.234	0.000	0.193
G_α	-17.866	0.000	0.130	-18.912	0.000	0.127	-15.009	0.000	0.480
P_τ	-52.896	0.000	0.000	-21.458	0.000	0.123	-25.412	0.000	0.000
P_α	-42.728	0.000	0.000	-16.035	0.000	0.187	-16.849	0.000	0.057

Note: Variable notations are from Table 1. The Westerlund (2007) test takes the null hypothesis of no cointegration. The test is estimated using constant and trend with one lag and lead. Where, *, ** and *** indicate the significance level at 10%, 5% and 1% respectively. [a] The p-values are for a one-sided test based on the normal distribution. [b] The p-values are for a one-sided test based on 300 bootstrap replications.

Table 4: Panel Cointegration tests with cross-sectional dependence and structural breaks: Westerlund and Edgerton (2008)

	$Z_\tau(N)$		$Z_\emptyset(N)$		$Z_\tau(N)$		$Z_\emptyset(N)$		$Z_\tau(N)$		$Z_\emptyset(N)$	
Model	value	p-value	value	p-value	value	p-value	value	p-value	value	p-value	value	p-value
	BM				DCP				MCAP			
No break	-3.616	0.000	-7.750	0.000	-5.897	0.000	-9.607	0.000	-7.854	0.000	-10.578	0.000
Level Break	-5.843	0.000	-4.347	0.000	0.808	0.210	-1.790	0.037	0.026	0.490	-0.169	0.433
Regime Shift	-4.787	0.000	-5.358	0.000	-0.500	0.309	0.190	0.575	-1.277	0.101	-3.003	0.001

Note: Variable notations are from Table 1. The test is conducted using Campbell and Perron (1991) automatic procedure to select the lag length. We consider three breaks determined by grid search at the minimum of the sum of squared residuals. The p-values are for a one-sided test based on the normal distribution.

Table 5: System-GMM for the full sample

Model	Pooled OLS			System-GMM			System-GMM(Growth Rate)		
Variables	BM	DCP	MCAP	BM	DCP	MCAP	BM	DCP	MCAP
Lag dependent				0.899***	0.732***	0.580***	0.019	0.150***	-0.085***
				(0.011)	(0.012)	(0.015)	(0.019)	(0.021)	(0.030)
REM	0.038***	0.029**	0.070***	0.038***	0.032***	0.087***	0.023***	0.035***	0.100***
	(0.008)	(0.013)	(0.022)	(0.002)	(0.003)	(0.015)	(0.007)	(0.009)	(0.038)
FDI	0.031	0.029	0.138**	-0.006***	0.016***	0.033***	-0.006*	-0.009	0.029
	(0.027)	(0.028)	(0.051)	(0.002)	(0.002)	(0.011)	(0.004)	(0.007)	(0.028)
GDP	0.181***	0.367***	0.453***	0.043***	0.257***	0.141***	-0.234***	0.574***	-1.658***
	(0.009)	(0.020)	(0.028)	(0.011)	(0.025)	(0.026)	(0.050)	(0.056)	(0.292)
Development dummy				Sig.	Sig.	Sig.	Sig.	Sig.	Sig.
AR(2) test (p-value)				0.60	0.22	0.89	0.70	0.41	0.50
J-test (p-value)				0.43	0.49	0.36	0.18	0.09	0.19
Observations	1,168	1,166	1,151	1,118	1,115	1,095	1,061	1,058	1,034

Note: Variable notations are from Table 1. Standard errors in parentheses, *** $p<0.01$, ** $p<0.05$, * $p<0.1$. Development dummy follows the classification of countries by income according to the World Bank.

Table 6: System-GMM across Developed and Developing Countries

Variables	Developed			Developing		
	BM	DCP	MCAP	BM	DCP	MCAP
Lag dependent	0.875***	0.760***	0.429***	0.905***	0.826***	0.683***
	(0.032)	(0.016)	(0.032)	(0.009)	(0.022)	(0.024)
REM	0.020	0.059***	0.146***	0.036***	0.005*	0.099***
	(0.016)	(0.018)	(0.017)	(0.007)	(0.003)	(0.013)
FDI	0.003	0.040***	0.065**	-0.012***	0.004	-0.003
	(0.003)	(0.004)	(0.029)	(0.004)	(0.006)	(0.012)
GDP	0.105*	0.252***	0.323***	0.011	0.097***	0.216***
	(0.057)	(0.052)	(0.116)	(0.009)	(0.020)	(0.028)
AR-2(pvalue	0.06	0.59	0.88	0.98	0.04	0.99
J-stat	1.00	1.00	1.00	0.99	0.99	0.99
Observations	406	406	403	712	709	692

Note: Variable notations are from Table 1. Standard errors in parentheses, *** $p<0.01$, ** $p<0.05$, * $p<0.1$. Here, the developing countries are 36 and the developed countries are 21.

Table 7: Heterogeneous panel causality test: Pairwise Dumitrescu-Hurlin (2012) panel causality test

Null Hypothesis:	W-Stat.	Zbar-Stat.	Prob.
DCP does not homogeneously cause MCAP	3.561	2.937	0.003
DCP does not homogeneously cause BM	3.332	2.513	0.012
MCAP does not homogeneously cause DCP	4.149	4.427	0.000
MCAP does not homogeneously cause GDP	8.457	15.463	0.000
MCAP does not homogeneously cause FDI	3.801	3.585	0.000
REM does not homogeneously cause DCP	4.329	5.032	0.000
REM does not homogeneously cause GDP	3.043	1.719	0.085
FDI does not homogeneously cause BM	1.688	-1.802	0.071
GDP does not homogeneously cause BM	4.102	4.562	0.000
GDP does not homogeneously cause DCP	7.391	13.177	0.000
GDP does not homogeneously cause FDI	3.318	2.519	0.011

Note: Variable notations are from Table 1.
Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1. Only significant ones are reported.

Appendix-I: List of Countries

Argentina	Ghana	Pakistan
Australia	Hungary	Panama
Bangladesh	Iceland	Paraguay
Barbados	India	Peru
Bolivia	Indonesia	Philippines
Botswana	Iran, Islamic Rep.	Poland
Brazil	Israel	Romania
Bulgaria	Japan	Russian Federation
China	Jordan	South Africa
Colombia	Kenya	Sri Lanka
Costa Rica	Korea, Rep.	Sweden
Cote d'Ivoire	Malaysia	Switzerland
Croatia	Mauritius	Thailand
Czech Republic	Mexico	Trinidad and Tobago
Denmark	Morocco	Tunisia
Ecuador	Namibia	Turkey
Egypt, Arab Rep.	New Zealand	United Kingdom
El Salvador	Nigeria	United States
Fiji	Oman	Venezuela, RB