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IMPACT OF REMITTANCES ON EXPORTS AND ECONOMIC GROWTH: A CROSS COUNTRY ANALYSIS

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Abstract

We present robust results on the impact of remittances on exports and economic growth for panel data sets of 38 high-income and 50 middle-income countries for 2000-2020. First, we estimate the impact of remittances on exports after controlling economic growth. By panel dynamic panel estimation, when regressing remittances on exports, remittances show an inverse U-shaped relationship with a threshold value of ln(12.63) for high-income and ln(15.66) middle-income countries above which exports begin to rise. Economic growth is showing a positive and significant impact on exports. Second, we estimate the impact of remittances and exports on economic growth after controlling various macro determinants of economic growth. On economic growth, remittances present a U-shaped relationship with threshold value ln (12.63) for higher income and ln(15.66) for lower-income countries above which economic growth starts to decline. Exports are showing a positive and significant effect on economic growth. A 100% increase in exports leads to a 15% and 12% increase in exports of high-income and middle-income countries. The other variables like physical capital per labour and human capital are showing a positive and significant impact on economic growth. Government expenditure has a negative coefficient, thus, it deteriorates economic growth.

Keywords: Economic growth; exports; remittances; human capital; physical capital

1. INTRODUCTION

Remittances are part of income sent by migrant workers to their home country. According to the IMF, remittances refer to the value of income sent by a migrant worker residing outside the country for more than one year and recorded in a different section of the balance of payment (BOP) (Sutradhar, 2020). Remittances are an important source of income because of their size and impact on economic growth. Monetary transfers from migrant workers and others are $714 billion for the world and $554 billion for low and middle-income countries in 2019. It increased from 0.37% of GDP in 2000 to 0.76% in 2019 for the world. Remittances are more important for low-income and middle-income countries than high-income countries. Their percentage share of GDP increases from 0.17%

in 2000 to 0.28% in 2019 for high-income countries; 1.23% to 1.54% for middle-income countries, and 3.56% to 4.75% for low-income countries (World Bank estimates, 2020). Recorded remittances are about two-thirds of foreign direct investment (FDI) flows to developing countries due to migration between developing and developed countries and decline in transaction costs due to technological improvement (Meyar & Shera, 2017).

It is now widely recognized among economists that remittances play an important role in determining its economic growth. Revenues from remittances inflow can be used to directly finance physical and human capital like education and health (Barajas et al., 2009). They are a more stable source of funding than foreign portfolios or direct investments that tend to be more volatile. They also raise consumers' income and, therefore, lead to a positive multiplier impact on aggregate demand and output. They can be used as an alternative to debt to minimize consumer credit constraint problems (Guilamo & Ruiz, 2006). Empirically the positive impact of remittances is found by Giuliano and Ruiz-Arranz (2005); Gyan et al. (2008).

Despite these benefits, remittances also have costs for the economy (Amuedo-Dorantes and Pozo, 2004; Glytsos, 2002; López et al., 2007; Rodrik, 2007; Meyera and Sherab, 2016). It increases social inequality (Acosta et al., 2008), increases inflation (Tung et al., 2015), leads to corruption (Berdiev et al., 2013). The migration of an educated and skilled workforce, also known as brain drain, is harmful to most developing countries. Remittances have less impact on investment and saving for the economy, as they are mainly used for daily consumption and lead to indolence among the working class (Kapur and Mchale, 2005). Non-productive consumption leads to a rise in the exchange rate, making imports cheaper and exports costlier. According to Dahal (2014), there is a negative association between trade and the inflow of remittances. The reason is that remittances decrease the export performance through appreciation of exchange rate and decrease in trade balance because of the high price of non-tradable goods due to decline in labor supply.

Okodua and Olayiwola (2013) found a statistically insignificant negative impact of remittances on the Sub-Sahara African region's trade balance during 2002-2011. Bourdet and Falck (2006) found remittances had a Dutch Disease effect due to a rise in everyday prices and therefore harmed the competitive performance of exports in Africa. Also, the author saw an increase in the prices of non-tradable goods and exchange rates. Olubiyi (2014) identified a negative effect on exports and a positive impact on Nigeria's imports. Farzanegan and Hasan (2016) had concluded a positive trade deficit in the MENA region during 1980-2013.

Although the high international trade between countries, there is no evidence about the relationship in a large sample of countries. Also, researchers have either tried to study the relationship between exports and remittances or remittances and growth. The present study attempted to find the impact of remittances on exports and growth using a sample of high-income and middle-income countries. Low-income countries are excluded due to the absence of balanced panel data. The article is organized as the first part deals with the introduction. The second part deals with the econometric modeling; the third part with data and data sources; the fourth part deals with econometric techniques; the fifth part deals with the impact of remittances; and the sixth part deals with the relationship between remittances, exports, and economic growth and lastly, the conclusion.

2. ECONOMETRIC MODELING

The estimation of economic growth and its determinants across countries has been one of the central research problems among growth economists. The issue of economic growth raises the question of deriving force that determines the economic growth across countries. Classical economists saw an increase in capital stock and improved capital's productive capacity as a determinant of economic growth (Łukasz Piętak, 2014). The neoclassical model developed by Solow (1956) and Swan (1956) assumes that the economic growth of a country depends on capital per labor as:

$$y(t) = f(k(t)) \quad (1)$$

Where $y(t)$ is the output per labor of a country over period t, and $k(t)$ is the capital per labor.

The endogenous model of Romer (1986) and Lucas (1988) provided the alternative models of economic growth where the country's long-run economic growth is explained by the level of investment rather than by unexplained technological progress. Crafts (1996) demonstrated that investment in the endogenous growth model refers to a border concept like human capital formation and research and development (R&D). Mankiw, Romer, and Weil (1992) modified the Solow model by including the human capital in the basic Solow model and found 80% of income differences across countries can be explained. Therefore, human capital plays a vital role in the development of the economic growth of nations. The Solow model with human capital is as:

$$y(t) = f(k(t), H(t)) \quad (2)$$

Barro (1990) modified the endogenous growth model by including government spending as one of the explanatory variables in the endogenous growth model. With government spending as an input in the production function, a possible linkage arises between economic growth and government spending (Ghali, 1997). Government spending affects economic growth in both negative as well as positive manner. Advocates of positive impact argue that public spending provides valuable public goods like infrastructure and education. Also, public spending can increase economic growth by increasing the purchasing power of people. Simultaneously, the advocates of government spending's negative impact believe that government spending crowds out the private sector by transferring resources from the private sector. Also, the government sector is mostly less efficient (Mitchell, 2005). With the government sector, the model assumes:

$$y(t) = f(k(t), H(t), G(t)) \quad (3)$$

It is now widely recognized among economists that remittances and exports play an essential role in determining its economic growth. The economic growth model of a country, including remittances and exports, can be written as

$$y(t) = f(k(t), H(t), G(t), Rem(t), X(t)) \quad (4)$$

Where $Rem(t)$ are remittances, $X(t)$ are exports of a country. In terms of Cobb-Douglas production function, equation (4) can be written as:

$$y(t) = k(t)^{\alpha_1} H(t)^{\alpha_2} G(t)^{\alpha_3} X(t)^{\alpha_4} Rem(t)^{a} \quad (5)$$

For measuring the second-order polynomial effect of remittances on economic growth, we change $Rem(t)^{a}$ to $Rem(t)^{\alpha_5} \lfloor (Rem(t))^2 \rfloor^{\alpha_6}$, and taking the natural log of equation (5), the resulting regression equation can be written as:

$$\ln\big(y(t)\big) = \alpha_0 + \alpha_1 \ln\,(k(t)) + \alpha_2 \ln\,(H(t)) + \alpha_3 \ln\,(G(t)) + \alpha_4 ln\,(Rem(t)) + \alpha_4 ln\,(X(t)) \quad (6)$$

Second, we want to derive the impact of remittances on exports of a country. Based on various literature, remittances have an essential role in determining exports. Therefore, we try to show that if remittances decide economic growth, then remittances are also responsible for determining the exports (X) of the country. In this way, the following equation will be estimated

$$\ln\big(Ex(t)\big) = \beta_0 + \beta_1 ln\,(Rem(t)) + \beta_2 ln\,((Rem(t))^2 + \beta_1 ln\,(y(t)) \quad (7)$$

GDP per capita is controlled in equation (7) to avoid omitted variable bias.

3. DATA AND DATA SOURCES

The present study uses balanced panel data of 38 high-income and 50 middle-income countries to verify the relationship between exports, remittances, and economic growth. The classification is based on world bank development indicators. The list of countries is in Table 1.

Table 1. List of countries

High-income Countries			**Middle-income Countries**			
Australia	Belgium	Canada	Albania	Algeria	Armenia	Bangladesh
Costa Rica	Croatia	Cyprus	Botswana	Brazil	Benin	Belarus
Czech	Denmark	Estonia	Burkina	Cambodia	Cameroon	Colombia
Finland	France	Germany	Dominican	Ecuador	Egypt	El Salvador
Greece	Hungary	Iceland	Guatemala	Haiti	Honduras	India
Ireland	Isreal	Italy	Iran	Jordan	Kenya	Kyrgyzstan
Japan	Latvia	Lithuania	Lithuania	Madagascar	Malaysia	Mali
Luxembourg	Malta	Mauritius	Moldova	Morocco	Nepal	Pakistan
Netherlands	Newzealand	Norway	Paraguay	Peru	Philippines	Romina
Panama	Poland	Portugal	South Africa	Sri Lanka	Sudan	Switzerland
Romania	Slovak	Spain	Uganda	Ukraine	Uruguay	Vietnam
Sweden	Switzerland	UK	Bolivia	Bulgaria	Costa	Gabon
US	Uruguay		Indonesia	Latvia	Mauritius	Panama
			Senegal	Togo		

Source: own elaboration

Our dataset includes the following variables:

1. Economic growth (y) is measured by GDP per capita (constant 2010 prices). The data is obtained from world development indicators (WDI).
2. The governmental expenditure (G) is measured by "general government final consumption expenditure (% of GDP)" from WDI.
3. The physical capital per labor (k) is constructed by dividing physical capital and labor force. To consider the physical capital, we consider gross fixed capital formation (% of GDP). Both labor force and gross fixed capital formation are derived from the WDI dataset.
4. Government spending on health (% of GDP) is used as a proxy of human capital (H). the data are derived from the WDI dataset.
5. Remittances (R) is measured by "Personal remittances, received."
6. Exports (X) are represented "Exports of goods and services (constant 2010 US$)".

4. ECONOMETRIC TECHNIQUES

For panel estimation, the number of periods should be greater than 10 (Beck, 2001). In our study, the period of time is 20 years, and we are therefore working with panel data set in which each country represents a single observation. There are various methods to measure panel data. One among them is pooling the data. Although pooling the data increases the number of observations, it violates the ordinary least square method (OLS). First, given cross-sections in panel data, there are chances of variation in error terms across different countries. For this purpose, we are estimating through panel fixed effect that captures countries effect either through dummies or through varying the intercept for each country. Second, there are chances of autocorrelation due to the temporal structure of data, therefore violating the primary assumption of OLS that errors are independent of each other.

The consequences of these limitations are that OLS estimated coefficients are still unbiased, but they are inefficient. To deal with these issues, we are using panel corrected standard errors (PCSE). This approach is mainly situated where the number of cross-section units is larger than time. Most previous work is based on the lagged dependent approach to deal with autocorrelation. Generalized Method of Moments (GMM) is mainly used as a lagged dependent approach. However, this method leads to a mistaken discount on the variable's importance if it does not vary over time (Achen, 2000). We estimate and report all these methods to strengthen our results.

5. EXPORTS AND REMITTANCES

Adnan Khurshid et al. (2018) pointed out that higher remittances tend to reduce a country's export performance. According to them, huge remittances appreciate the recipient country's exchange rate and, therefore, deteriorates international trade competitiveness. It leads to exports more expensive than imports and thus deteriorates the country's trade balance. We estimate the relationship between exports and remittances. We followed the U-shaped relationship between exports and remittances as presented in equation (7).

$$\ln\big(Ex(t)\big) = \alpha_0 + \alpha_1 ln\,(Rem(t)) + \alpha_2 ln\,((Rem(t))^2 + \alpha_3 \ln(Y(t), i) + U(t), i \quad (7)$$

Where $\ln\big(Ex(t)\big)$ represents the remittances of the country; $ln\,(Rem(t))$ is remittances of the country. Economic growth is controlled to prevent omitted variable bias.

Table (3) shows the post-estimation test on the model. The Hausman test rejects the RE model both in high income-countries and middle-income countries. The modified Wald test is used to detect heteroskedasticity, and the Wooldridge test to detect autocorrelation. The results suggest that the application of the PCSE method is more efficient than the FE model. The models are all significant considering FE, two-step difference GMM, and PCSEs models. The variables have expected signs in the PCSE model.

- In summary, we get that remittances present a significant negative impact on economic growth with coefficients -0.634 and -0.541 in high-income and middle-income countries, respectively. [Note that remittance and remittance-squared coefficients are insignificant in two-step difference GMM, which may be due to lagged dependent variable. When lagged dependent variable enters into a regression equation with serial-correlation {note there is autocorrelation in two-step difference GMM as shown by AR (1) and AR (2)} picks not only the effect of excluded variable but also of included variables (Achen, 2000)].
- The remittances coefficient is negative, and remittances-square is positive, so there is a U-shaped relationship between exports and remittances. We can find the threshold level of remittances determined by the minimum of a function by computing the derivative of exports on remittances through the PCSE regression model from table 2. The minimum exports obtained for remittances are value ln(15.31) in higher-income countries and ln(14.23) in middle-income countries. It implies that as remittances increases, the exports decrease until remittances reach the value of ln(15.31) in higher-income countries and ln(14.23)in middle-income countries. For values larger than value, ln(15.31) and ln(14.23) exports in higher-income and middle-income countries increase.
- The control variable of growth has a positive and significant effect on the export performance of high-income and middle-income countries. A 100 percent increase in economic growth leads to a 150% and 72% increase in exports of high-income and middle-income countries, respectively.

Table 2. Hausman test, autocorrelation, and heteroskedasticity

	Hypothesis	Test	High-income countries	Middle-income countries
Hausman Test	H0: Fixed effect	Chi^2 (Prob > Chi^2)	20.58***	15.71***
Wooldridge	H0: No autocorrelation	F	332.364***	74.81***
Modified Wald Test	H0: Heteroskedasticity	Chi^2 (Prob > Chi^2)	4100.65***	33912.69***

*Source: authors own calculation. ***shows the rejection of null hypothesis at p less than 0.01*

Table 3. FE, two-step difference GMM, and PCSE estimations (impact of remittances on exports)

	High-Income Countries			Middle-Income Countries		
	FE	two-step difference GMM	PCSEs	FE	two-step difference GMM	PCSEs
X (t-1)		.957*** (.021)			-.0877 (.1361)	
y|	1.495*** (.046)	.023 (.027)	1.261*** (.049)	1.35*** (.050)	-.031 (.030)	.719*** (.037)
R	-.338*** (.037)	-.034 (.036)	-.643*** (.1202)	-.131*** (.048)	.044 (.042)	-.541*** (.087)
R^2	.011 *** (.001)	.002 (.001)	.021*** (.003)	.005*** (.001)	-.002 (.001)	.019*** (.002)
C	12.385*** (.605)	.914* (.497)	16.49*** (1.179)	13.14*** (.650)	-.636 (.792)	20.53*** (.788)
Specification	947.21***	101242.33***	3973.55***	722.77***	420.42***	1080***
Autocorrelation			.901			.935
AR (1)		-4.77***			-2.63***	
AR (2)		-2.91***			-0.35	
Sargan test		361.80***			162.23***	
Hansen test		33.93**			44.61***	
Instruments		23			23	
Observations	760	722	760	1117	1026	1117

Source: authors own calculation; t-statistics in parenthesis;
****shows p less than 0.01, **p less than 0.05 and *p less than 0.10.*

6. REMITTANCES, EXPORTS, AND ECONOMIC GROWTH

In this section, we present a growth equation as a function of remittances (R), Exports (Ex), capital stock per labor (k), government expenditure (G), and human capital (H). Hence the growth equation is as:

$$\ln(Y(t),i) = \alpha_0 + \alpha_1 \ln(R(t),i) + \alpha_2 ln\,((R(t),i)^2) + \alpha_3 \ln(k(t),i) + \alpha_4 \ln(G(t),i) + \alpha_5 \ln(X(t),i) + \alpha_6 \ln(H(t),i) + U(t),i \quad (8)$$

Table 5 suggests the heteroskedasticity and autocorrelation, and therefore PCSEs model is better than FE mode. The results of the equation presented in Table 6. In summary statistics, the results indicate

- We find an inverse-shaped quadratic relationship between remittances and economic growth as the remittance's coefficient is positive, while as squared of remittances is negative. The threshold value for remittances is ln (12.63) for higher income and ln(15.66) for lower-income countries.

Thus as remittances increases, the economic growth increases until remittances reach the value of ln(12.63) in higher-income countries and ln(15.66) in middle-income countries. For values larger than value, ln(12.63) and ln(15.66) economic in higher-income and middle-income countries decreases. The main reason is that large remittances deteriorate the export performance of countries.

- Exports are showing a significant positive coefficient on economic growth. A 100% increase in exports leads to a 15% and 12% increase in exports of high-income and middle-income countries.
- Capital per labor is showing a significant positive impact on economic growth. 100% increase in capital per labor leads to 55% and 52% increase economic growth of high-income and middle-income countries.
- Government expenditure has a deteriorating effect on economic growth. Its coefficient is negative and significant. A 100% increase in government expenditure leads to an 8% and 6% decrease in high-income and middle-income countries' economic growth.
- Another variable, human capital, in the form of government expenditure on health is positive and significant. A 100% increase in human capital spending leads to an increase in 8% and 11% increase in economic growth.

Table 5. Hausman test, autocorrelation, and heteroscadcity

	Hypothesis	Test	High-income countries	Middle-income countries
Hausman Test	H0: Fixed effect	Chi^2 (Prob > Chi^2)	12.99**	148.47***
Wooldridge	H0: No autocorrelation	F	199.859***	533.563***
Modified Wald Test	H0: Heteroskedasticity	Chi^2(Prob > Chi^2)	26298.19***	27444.37***

*Source: authors own calculation. ***, ** shows the rejection of null hypothesis at p less than 0.01and 0.05, respectively*

Table 6. FE, two-step difference GMM, and PCSE estimations (impact of remittances and exports on Economic growth)

	High-Income Countries			Middle-Income Countries		
	FE	two-step difference GMM	PCSEs	FE	two-step difference GMM	PCSEs
y(t-1)		.867*** (.016)			.812*** (.042)	
G	.131*** (.027)	-.001*** (.026)	-.083* (.054)	.098*** (.018)	-.051** (.021)	-.062** (.026)
K	.223*** (.009)	.116 (.013)	.551*** (.054)	.182*** (.013)	.144** (.032)	.522*** (.042)

	High-Income Countries			Middle-Income Countries		
	FE	two-step difference GMM	PCSEs	FE	two-step difference GMM	PCSEs
H	.086*** (.020)	-.006 (.024)	.081*** (.041)	.096*** (.012)	.044*** (.016)	.116*** (.019)
Q	.041*** (.013)	.021 (.018)	.101*** (.035)	-.086*** (.018)	.013 (.030)	.094** (.040)
Q^2	-.0017*** (.000)	-.001 (.000)	-.004*** (.001)	-.002*** (.000)	-.001 (.000)	-.003*** (.001)
X	.238*** (.009)	.015 (.013)	.149*** (.035)	.175*** (.011)	-.126 (.133)	.124*** (.020)
C	-3.36*** (.339)	-.084 (.239)	.724 (.559)	-1.12*** (.371)	1.88 (1.64)	-.316 (.452)
Specification	1344.36***	86711.52***	1306.78***	847.37***	14495.78***	1796.45***
Autocorrelation			.85			.91
AR (1)		-2.58**			-3.98***	
AR (2)		-3.42***			-1.52	
Sargan test		439.37***			306.15***	
Hansen test		35.43***			35.03**	
Instruments		26			27	
Observations	760	722	760	1117	1026	1080

Source: authors own calculation; t-statistics in parenthesis;
****shows p less than 0.01, **p less than 0.05 and *p less than 0.10.*

7. CONCLUSIONS

The paper examines the impact of remittances on exports and economic growth using a sample of high-income and middle-income countries over 2000-2019. The article first estimates the effect of remittances on the export performance of sampled countries. After controlling the economic growth, the regression shows the U-shaped relationship between exports and remittances. The minimum exports obtained for remittances are value ln(15.31) in higher-income countries and ln(14.23) in middle-income countries. It implies that as remittances increases, the exports decrease until remittances reach the value of ln(15.31) in higher-income countries and ln(14.23)in middle-income countries. For values larger than value, ln(15.31) and ln(14.23) exports in higher-income and middle-income countries increase. The U-shaped relationship suggests that a large proportion of income from remittances is used for non-productive purposes and not for investment motives. The control variable of economic growth is showing a positive and significant impact on export performance.

The second estimation of the paper examines the impact of remittances and exports on economic growth after controlling the various macroeconomic determinants of economic growth. Exports are showing a positive and significant

effect on economic growth. A 100% increase in exports leads to a 15% and 12% increase in exports of high-income and middle-income countries. After controlling exports and other macroeconomic variables in the partial regression equation, remittances show an inverse U-shaped effect. The threshold value for remittances is ln (12.63) for higher income and ln(15.66) for lower-income countries. Thus as remittances increases, the economic growth increases until remittances reach the value of ln(12.63) in higher-income countries and ln(15.66)in middle-income countries. For values larger than value, ln(12.63) and ln(15.66) economic in higher-income and middle-income countries decreases. Therefore, policymakers should persuade remitters to invest their income in productive sectors. Remittances have a Dutch disease effect; that is, the inflow of remittances raises the exchange rate and decreases the export performance. By increasing the trade competitiveness policies, the government can reduce the intensity of Dutch disease. Also, governments should put more stress on migration policies and the productive use of these incomes. In future papers, researchers should identify various informal channels to measure the value of an exact number of remittances and their impact. Also, measuring the amount of brain drain should be a different research topic.

The other variables like physical capital per labor and human capital are showing positive and significant impact on economic growth. Therefore, the government should frame policies that help in increasing physical capital per labor and human capital. Government expenditure has a negative coefficient, thus, deteriorates economic growth. Further research should include the impact of institutional factors on economic growth. Although it is challenging to have long panel data sets of institutional factors, their importance cannot be ignored.

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