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Remittances, Human Capital Nexus: Exploring the Role of Exchange Rate in Asia

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ABSTRACT

This paper analyses the impact of remittances on human capital through the interaction of exchange rate in Asia. There is considerable debate regarding the relative contribution of international migrant's remittances to sustainable economic development. Remittances are considered as temporary income. If exchange rate remains stable, then remittances will help in curtailing income hurdles of households as well as for government and helps to increase investment in education. Investment in education increases skill level of labor force and create an environment for long term growth. We use panel data of 54 Asian countries for the period of 1980-2020 and employ Hausman test and percentile analysis. The paper concludes that remittances have a positive and significant impact on human capital. However, the substituting relationship of remittances and exchange rate is observed in stimulating human capital in Asian countries. The developing countries having low growth, when exchange rate is overvalued (appreciate), it is not only pushing the economy further toward slower growth due to decrease in foreign competitiveness, increase in the current account deficit and increase unemployment but also cause to decrease main source of earning remittances growth in these countries. Therefore, this study

Keywords

Remittances, Exchange rate, Human capital, Fixed effects, Random effects, Hausman test

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suggests that the government of developing country implements such policies that helps in the stabilization of their currencies (manage floating exchange rate).

1. Introduction

Human capital is getting much importance around the world in the recent era of globalization. Human capital is considered as a most important productive asset even at a level of technological advancement (Adenutsi, 2010). Schultz (1961) describes that the main difference in the income level of developed and developing countries depends upon the quality of population which is directly related to the stock of human capital. Investment in education is considered as a way for a long term economic growth (Melton, 1965; Romer, 1990). To get the long term competitive advantage in emerging economies human capital plays an important role as compared to financial and physical capital. Human capital is an invisible asset that represents the capabilities, competencies, and commitment of people in particular areas (Mozumder & Islam 2017).

Most developing and emerging economies have not enough finance to invest in the education sector. That's why developing countries face low level of development, higher unemployment, and low wage rate due to higher population growth. As a result, young professionals and labors may have developed an irresistible desire to move abroad in search of jobs (Adenutsi, 2010). Remittances earned by migration included employee's compensation, migrant transfers, and worker remittances (Sghaier, 2021). Remittances are substantially considered as a financial injection for developing countries as it serves as a source to overcome the liquidity constraints for consumption and investment objectives in recipient countries (Nguyen & Nguyen, 2015).

Lucas and Stark (1985) also exposed two different motives of sending remittances back to home country such as self-interest and pure altruism motive. In self-interest motive people may spend their remittances to increase assets in home town by investing for homes, land and cattle's. Migrants sometimes invest in assets through remittances to increase their prestige and enhance their living standards. In pure altruism motive migrants spend money on their family members back in their home country. According to Becker (1974) when migrants considered pure altruism motive they derive positive utility by spending on consumption and overall wellbeing of family in the home country.

In general, the available empirical evidence also shows mixed results. Some studies show positive impact of remittance on education, some show negative and few show no impact of remittances on education (Akanbi, 2017; Awusi, 2016; Azam & Raza, 2016; Azizi, 2018;

Dietz et al., 2015; Mozumder & Islam, 2017; Naeem & Arzu, 2017; Pilařová & Kandakov, 2017). The controversy of literature indicates that there are some missing linkages between remittances and human capital and there are no direct linkages between the said variables. Therefore, this paper tries to find some other inconspicuous factors which play an intermediary role in explaining their relationship as one of the key determinants of remittances is the exchange rate. The exchange rate brings fluctuation in the number of remittances which is directed to home countries (Olubiyi, 2015; Pant & Budha, 2016; Rahman et al., 2019).

Lin (2011) explains that the remittances growth decrease with the appreciation of the real exchange rate. If migrant living's county currency appreciates due to any reason as compared to home country currency. The amount of remittances upsurge in the home country and households of the home country become rich and now they have more money after consumption expenditure then they invest in human capital (Yang, 2008).

This study tries to analyze the impact of remittances on human capital by exploring the role of exchange rate. We are motivated to do this in-depth analysis because human capital is considered as most crucial productive assets (Adenutsi, 2010) and remittances considered as lifeline for people as it became largest rising source of capital inflow as compared to FDI and official development assistance (ODA) in developing countries (world bank, 2019). This study significantly helps to understand that, how developing countries respond in case of transitory changes in the economic conditions. Outcome of this study significantly contribute that, with stable exchange rate, international remittances inflow will curtail income hurdles of households and government and helps both of them to increase investment in education. Investment in education will increase skill level of labor force and create environment for long term growth, which further pushes the country to sustainable development. The remaining part of the study is organized in the following section. Section II reviews the previous literature Section III is devoted to data and empirical specification. Section IV discusses empirical results and section V concludes the study.

2. Literature Review

There is a huge empirical literature that explains the impact of remittances on human capital. There exist positive, negative, and insignificant impacts of remittances on human capital. The positive linkages between remittances and exchange rate are supported through the direct channel at macro level data (Adenutsi, 2010; Amakom & Iheoma, 2014; Azizi, 2018; Mohamed & Sivarajasingham, 2019; Mozumder & Islam, 2017; Ngoma & Ismail, 2013). Adenutsi (2010) finds that in the low-income region of SSA, migrant remittances positively and significantly affect human capital development through long run enrollment in secondary school.

Moreover, Mozumder and Islam (2017) explore that remittances positively impact secondary school enrollment rate and average years of schooling. Another study by Azizi (2018) suggests that remittances help in improving the rate of school enrollment, school completion, and enrollment rate in private schools. Amakom and Iheoma (2014) confirm that the remittances inflow increases the income level in the country that cushions the literacy rate. Recently, the study of Mohamed and Sivarajasingham (2019) conclude that the remittances have long term equilibrium relationship with human capital in Sri Lanka through ARDL bound test. Ngoma and Ismail (2013) suggest that on average, an increase in remittances increases the years of schooling for both secondary and higher levels. As remittances lessen financial constraints and produce spillover impact in the remittances recipient countries for further schooling opportunities.

Sometimes remittances positively affect human capital through an indirect channel, which are some intermediate variables. Dzeha et al., (2018) highlight that when there is increase in the inflow of remittances it helps out in fulfilling technological expenses as a result that it spurs innovative processes, skill acquisition and training that increase human development in terms of education. Mohammed (2021) analyzes SSA countries from the period of 2004-2018 and he finds that remittances play an important role in human capital development especially in those countries which have well-developed institutions. Azam and Raza (2016) depict that immigrant remittances positively impact human capital development and suggest that the economic governance system strengthens the relationship between immigrant remittances and human capital. Borja (2020) finds that the secondary education enrollment ratio increase through remittances in those countries where the rate of corruption is low. According to Ziesemer (2012) remittances have a stronger impact on education through savings as the amount of high savings helps the government to increase public expenditures on education.

The studies at micro-level demonstrate that remittances are effective for children's education. Salas (2014) expounds that the probability of sending children to private schools increases with overseas remittances by controlling parents' absenteeism. Brempong and Asiedu (2015) discover that remittances increase the likelihood for households to enroll their children in primary school and secondary school. Hines and Simpson (2019) observe that more educational expenses are inclined toward those households who earn remittances from abroad for Kenya in 2009.

The previous literature supports the negative as well as insignificant impact of remittance on human capital such as Tsaurai and Ngcobo (2018), Akanbi (2017) and Dietz et al., (2015). Tsaurai and Ngcobo (2018) reveal that the remittances decrease investment in human capital because the amount of remittances utilizes in speculative activities of stock market instead of

investment in human capital. Akanbi (2017) suggest that migration in term of remittances negatively affect human capital due to low skilled emigrants for 19 SSA countries between the time span of 1990-2013. Dietz et al., (2015) find that the remittances negatively affect school attendance of children due to successful migration and work abroad even with a low level of education.

Awusi (2016) find that the remittances have insignificant impact on education of developed countries because in developed countries it is a legal right of people to attain education up to secondary level. Naeem and Arzu (2017) argue that remittances have insignificant effect on human development. They justify that other factors are important for human development instead of remittances these factors include FDI, foreign aid, and official development assistance. Moreover, Pilařová and Kandakov (2017) detect that remittances insignificantly bear on the attendance of high school youth aged 16 to 20 years. People intend to move abroad for a gain of high return jobs.

Earlier studies support exchange rate depreciation and appreciation both have different impacts on remittances growth. Olubiyi (2015) discover that depreciation of real exchange rate caused to decrease in remittances inflow in Nigeria. Real exchange rate depreciation shows that there are unfavorable economic conditions in back home country. Therefore, remittances inflow decrease. Exchange rate depreciation reduces remittances inflow in the country because value of cash held in form of assets decreases with the depreciation of exchange rate and migrants decide to cut down the amount of their remittances (Jijin et al., 2021; Omon, 2021). But some time depreciation increases the remittances inflow in the country because altruistic reason motivates migrants to remit more money back with currency depreciation for welfare purposes (Kuncoro, 2020; Rahman et al., 2019). Opposite to the depreciation effect, appreciation of exchange rate has different impact on human capital. For example, Lin (2011) postulated that exchange rate appreciates in Tonga it decreases the growth of remittances in term of Tonga domestic currency. Sometimes exchange rate cannot control magnitude of remittances flow.

Literature shows the linkages between exchange rate and human capital like as Guo et al., (2019) enunciate that with an exchange rate appreciates in china as compared to the U.S dollar, then the cost of foreign education will decrease and more students will decide to go abroad to study. Moreover, Jeanneney and Hua (2011) conclude that the with an appreciation of the currency workers increase their education level as education cost decrease and the benefit from education increase with high expected returns of education. But Gylfason et al., (1999) give counter argument, if appreciation in exchange rate due to any reason which cause to slowdown economic activities like as lower income level and lower investment in human

capital.

However, some studies advocate that exchange rate depreciation opposing to appreciation effect, decrease human capital such as Ogege (2019) infer that a rise in the exchange rate (depreciation) affects negatively on education index. Kaur and Sirohi (2013) suggest that the Indian Students who are planning for foreign education or currently studying abroad are pinch by rupee depreciation. Javid and Ahmad (2014) discover that exchange rate devaluation increase the educational cost and decreases the amount of budget for students forcing the student to search for an alternative to full fills their educational expense. Emmanuel (2017) also supports above stated relationship and finds that one-year previous lagged exchange rate increase or decrease government expenditure on human development (health and education) also increase or decrease in Nigeria during the period from 1986 to 2015.

Few studied in literature analyzed the combined impact of remittances and exchange rate on human capital. Yang (2005) concludes that positive exchange rate shock in migrant destination country leads to an appreciation of migrant's currency against the domestic currency. Migrants send the greater amount of remittances that is associated with greater investment in child's schooling, less child labor, and more educational expenditure in households of the origin country. Moreover, Yang (2008) also gives similar results that the exchange rate favorable shocks help in the appreciation of migrant's currency. As a result, it raises the amount of households' overseas remittances and increases their expenditures in non-consumption areas like educational expenditures. So, a longer stay of children in school will decrease the child labor force and increase capital intensive entrepreneurship.

This study intended to fill the gap by novel findings of this research to check the influence of remittances variation on human capital at the macro level of panel of 54 countries through the channel of the exchange rate. As this question is not discussed at broader aspect earlier and only one study which is time series and based on Philippines data by Yang (2008).

3. Methodology and Data

On the theoretical side, two theories link the impact of remittance on human capital through the exchange rate. Friedman (1957) gives permanent income hypothesis which postulates that people face random variation in their income level on annual basis. This variation may be due to promotion, lottery, transfer payment and remittances that receive from migrants for a short span of time. The pattern of consumption does not change with the change of remittances receipts because the average propensity to consume is the function of permanent income. Therefore, the extra amount of remittances would be saved or invested e.g. physical capital or human capital.

The second theory is given by Mundell (1963) and Fleming (1962) which is known as the Mundell Fleming condition. This condition explains that the government has two options either to choose credibility or flexibility. Calvo and Reinhart (2002) explain that in the credibility fixed exchange rate exist and announcements about the fluctuation of exchange rate are made in advance. Such announcements eliminate the volatility of the exchange rate as a result it attracts international inflow of capital like in the form of remittances. On the other hand, flexibility link with the flexible exchange rate. According to flexibility, when there is a flexible exchange rate no clear announcements are made about the change in the exchange rate. Therefore, exchange rate flexibility may reduce the level of international inflow of capital like remittances.

In order to examine the impact of the remittances on human capital, we follow the model posited by Ngoma and Ismail (2013) with little modifications the model has taken the following functional form:

$$H_{it} = \beta_0 + \beta_1 R_{it} + \beta_2 ER_{it} + \beta_3 (R_{it} * ER_{it}) + X_{it}\beta' + \lambda_i + \varepsilon_{it} \ldots\ldots\ldots\ldots\ldots (1)$$

i and *t* denote the number of countries and number of observations in the panel over time. Where, H_{it} represents the human capital (human capital Index (HCI) based on years of schooling and returns to education). Where, β_0 shows intercept term, R_{it} represents the worker's remittances as a percentage of GDP, ER_{it} is the real effective exchange rate index, X_{it} vector represents control variables that potentially have an effect on human capital, λ_i is the unobserved country specific fixed effect variables such as institutional and geographical factors and ε_{it} is the time varying error term. β_1 denotes, the elasticity of the human capital according to worker's remittances, β_2 interpret, the elasticity of the human capital according to real effective exchange rate and β_3 represents the elasticity of the human capital according to worker's remittances through the index of the real effective exchange rate. It shows either exchange rate compliment or substitute remittances impact on human capital. If we take differential of Eq (l) with respect to the remittances, it takes the following form:

$$\frac{\partial H_{it}}{\partial R_{it}} = \beta_1 + \beta_3 ER_{it}$$

If (β_3>0) then it will complement the relationship and impact of remittances on human capital strengthening by exchange rate. If (β_3<0) then it will substitute the relationship and impact of remittances on human capital weakened by exchange rate.

As this paper uses panel data, pooled OLS, fixed effect (FE) and random effect (RE)

models employ to analyze the impact of remittances on human capital. Hausman test is use to decide among FE and RE, which one is most appropriate for this study. According to the Hausman test, if error term and regressors are not correlated then fixed/random effects techniques both are appropriate for study. But test suggests that if the error term is correlated with any regressors, then the random effects technique gives inconsistent results and the fixed effects technique is appropriate for study.

3.1 Data, Variables Definition and Data Sources

This study uses the data set of 54 Asian countries for the period of 41 years from 1980-2020

Table 3.1: Variable Description

Category	Variables	Definition	Expected sign	Source
Dependent variable	Human capital	Index of human capital per person, based on years of schooling and returns to education for country "i" at time "t"	N/A	PWT 10.0
Independent variables	Remittances	Worker's remittances, (% of GDP) for country "i" at time "t"	(+/-)	WDI
	Exchange rate	Real effective exchange rate index (CPI-based) for country "i" at time "t"	(+/-)	Brugel database
Control variables	Openness	Trade as (% of GDP) for country "i" at time "t"	(+)	WDI
	Population	(Annual %) of population growth for country "i" at time "t"	(-)	WDI
	Economic development	Measured through GDP per capita (constant 2015 US$) for country "i" at time "t"	(+)	WDI
	Inflation	Inflation measured through consumer price index by (annual %) for country "i" at time "t"	(+)	WDI
	Foreign direct investment	Net inflows of foreign direct investment as (% of GDP) for country "i" at time "t"	(+)	WDI
	Savings	Measure by Gross domestic savings as percentage of GDP	(+)	WDI
	Democratic development	POLITY2 for country "i" at time "t" ranges from -10 (full autocracy) to +10 (full democratic)	(+)	Polity V

Source: Compiled by researchers from WDI, PWT, Brugel Database, POLITY V

Our main focus is on Asian region and only 54 countries are selected on the basis of availability of data during the considered period. In addition, data of many variables was collected from World Development indicators (2021) and the data of human capital was taken from PWT.

4. Preliminary Findings, Results and Discussion

Descriptive statistics include mean, minimum, maximum, and standard deviation of each variable. In Table 4.1 descriptive statistics give the overview of the data. Some variables have negative sign in their minimum values like as population growth rate which has minimum value of -4.533 which observed in Syrian country in the year 2014. It was due to civil war that started in 2011. The war has brought devastation to Syria. There has been a huge loss in terms of human deaths and refugee crisis (Khan & khan, 2017). Maximum value of population growth is observe 17.512 for Qatar in year 2007. At that time the country has the highest share of immigrants in the world because approximately 87% of the population in the state of Qatar were foreigners (Seshan, 2012). Further, serious efforts were made related to health status to accomplish the MDGs (Al-Thani et al., 2014).

Inflation rate which has minimum and maximum value of -18.109 and 3373.76 respectively. In 2004 deflation was experienced with the value of -18.109 in Bhutan. While, hyperinflation with the value of 3373.76 was observed in Armenia in 1994 due to dissolution of the Soviet Union (Shifflett, 2021). Lowest FDI value -37.173 experienced in Mongolia in the year 2016. Inflow of FDI into Mongolia decreased drastically owing to many wrong steps taken by Mongolia's political leadership. Such as piece of legislation related to "Strategic Entities Foreign Investment Law" passed in 2012 (Orji et al., 2018). Huge FDI inflow gained in Hong Kong in 2015 with figure of 58.519. This was became possible due to corporate restructuring there (UNCTAD, 2016). Gross domestic savings in Timor-leste was -136.873 in 2002 due there independence (Freitas, 2013). Higher volume of savings gained in Turkmenistan in 2010 with value of 87.827.

Table 4.1: Variable Description

Variable	Obs	Mean	Std. Dev.	Min	Max
HC	1,509	2.264	0.061	1.035	4.352
Remitt	1,434	4.862	7.156	0	44.126
REER	1,819	117.215	68.9530	0.38	964.6
POPG	2,210	2.060	1.753	-4.533	17.512
GDPPC	1,884	10264.78	15661.57	13.898	111657.4
TO	1,779	94.864	66.769	0.021	442.62
INF	1,707	14.294	108.183	-18.109	3373.76
FDI	1,879	3.391	5.813	-37.173	58.519
GDS	1,703	23.285	23.985	-136.873	87.827
POLITY2	1,563	-1.287	6.822	-10	10

Source: Own estimation

Then to explore the expected relationship between variables, the correlation matrix is presented in Table 4.2 presented the relationship between the dependent variable (human

capital) and explanatory variables Personal remittances, GDP per capita, trade openness, FDI and savings have a positive relationship with human capital. While real effective exchange rate population and inflation have a negative relationship with human capital.

Table 4.2: Correlation Matrix

VAR	HC	Remitt	REER	POP	GDP PC	TO	INF	FDI	GDS	POLITY 2
HC	1	-	-	-	-	-	-	-	-	-
Remitt	0.097	1	-	-	-	-	-	-	-	-
RERR	-0.11	-0.01	1	-	-	-	-	-	-	-
POP	-0.19	-0.009	0.07	1	-	-	-	-	-	-
GDPPC	0.49	-0.283	0.062	0.371	1	-	-	-	-	-
TO	0.336	0.07	-0.031	0.133	0.29	1	-	-	-	-
INF	-0.18	-0.048	-0.244	-0.08	-0.146	-0.15	1	-	-	-
FDI	0.316	0.08	2E-04	0.371	0.172	0.576	-0.08	1	-	-
GSD	0.086	-0.676	0.037	0.216	0.515	0.155	-0.08	0.052	1	-
POLITY 2	0.086	0.013	-0.124	-0.28	-0.13	-0.17	0.011	-0.13	-0.2	1

Pooled regression and fixed effect model results report in Table 4.3 and Table 4.4. Both have the same effects but the magnitude of all coefficients is different. Worker's remittances have a statistically significant and positive impact on human capital at the 1% in all columns of Table 4.3 and Table 4.4. Estimated results of remittances concluded that remittances play an important role in enhancing human capital development in Asia.

The significance of remittances shows that an increase in remittances loosens income constraints, especially in developing countries. As emigrants get better income opportunities in host countries, it prompts them to send a handsome amount of remittances back for increasing investment in human capital and enhancing welfare by keeping altruistic motives in mind. These findings are consistent with the studies of (Adenutsi, 2010; Azam & Raza, 2016; Huay et al., 2019; Mohamed & Sivarajasingham, 2019).

The coefficient of the real effective exchange rate is significant and has an inverse impact on human capital. When the exchange rate appreciates in an economy due to any reason, it causes to slowdown economic activities, income level and lowers the investment in human capital (Gylfason et al., 1999).

Table 4.3: Pooled Regression

Variables	(1) Baseline	(2) (Remitt + REER)	(3) (Remitt + REER + Control)	(4) (Remitt + ER + Control + interaction)
Constant	2.337***	2.425***	1.888***	1.823***
	(0.000)	(0.000)	(0.000)	(0.000)
REMITT	0.990***	0.104***	0.852***	0.243***
	(0.000)	(0.000)	(0.000)	(0.000)
REER	-	-0.678***	-0.110***	-0.669**
		(0.000)	(0.000)	(0.044)
REMITT* REER	-	-	-	-0.139***
				(0.012)
POP	-	-	-0.822***	-0.810***
			(0.000)	(0.000)
GDPPC	-	-	0.484***	0.492***
			(0.000)	(0.000)
TO	-	-	0.195***	0.203***
			(0.000)	(0.000)
INF	-	-	-0.282***	-0.275***
			(0.000)	(0.000)
FDI	-	-	0.966***	0.937***
			(0.000)	(0.000)
GDS	-	-	0.391***	0.380***
			(0.000)	(0.000)
Polity2	-	-	0.849***	0.784***
			(0.000)	(0.000)
Observations	1,047	1,008	782	782
Countries	36	34	29	29
Wald-test	20.84***	35.36***	804.04***	820.26***
	(0.000)	(0.000)	(0.000)	(0.000)
R-Square	0.0204	0.0349	0.5375	0.5425

Note: Dependent variable is human capital index, Remitt is remittances inflow, REER is index of real effective exchange rate, POP is population growth, GDPPC is per capita GDP, TO is trade openness, INF is inflation, FDI is foreign direct investment, GDS is gross domestic savings, Polity2 is used for democracy. In parentheses p-value is given, *, **, *** suggest level of significance respectively at 10%, 5% and 1% level.

Regarding the interaction of remittances and exchange rate the value of the coefficient of interaction in both tables' column 4 exhibited that when exchange rate appreciates it decreases the remittances growth in terms of domestic currency. Government and people face a decrease in income earned through migrant's remittances as a result they decrease to investing in human capital. It means that exchange rate appreciation substitutes (weaker) the remittance's impact on human capital (Lin, 2011; Nekoei, 2013; Yang, 2008).

Table 4.4: Fixed effects regression

Variables	(1) Baseline	(2) (Remitt + REER)	(3) (Remitt + REER + Control)	(4) (Remitt + ER + Control + interaction)
Constant	2.281***	2.362***	1.803***	1.743***
	(0.000)	(0.000)	(0.000)	(0.000)
REMITT	0.100***	0.106***	0.766***	0.242***
	(0.000)	(0.000)	(0.000)	(0.000)
REER	-	-0.667***	-0.109***	-0.649**
		(0.000)	(0.000)	(0.045)
REMITT*REER	-	-	-	-0.146***
				(0.007)
POP	-	-	-0.744***	-0.734***
			(0.000)	(0.000)
GDPPC	-	-	0.611***	0.615***
			(0.000)	(0.000)
TO	-	-	0.233***	0.241***
			(0.000)	(0.000)
INF	-	-	-0.242***	-0.237***
			(0.000)	(0.000)
FDI	-	-	0.914***	0.885***
			(0.000)	(0.000)
GDS	-	-	0.405***	0.391***
			(0.000)	(0.000)
POLITY2	-	-	0.817***	0.748***
			(0.000)	(0.000)
Observation	1,047	1,008	782	782
Countries	36	34	29	29
F-stat	21.02***	17.58***	99.21***	90.78***
(p-value)	(0.000)	(0.000)	(0.000)	(0.000)
R-square	0.0204	0.0349	0.5455	0.5499
Hausman test			66.31***	52.36***
			(0.000)	(0.000)

Note: See table (4.3) for level of significance and variable description. Hausman test suggest that fixed effect model is appropriate for this study.

Regarding the group of control variables, population annual percentage growth has a negative and statistically significant impact on human capital at the 1 percent level. With an increase in population size burden on the available resources of the finance sector increases. It became difficult for families and the government to maintain existing education levels. As a result, population growth decreases human capital investment (Hassan et al., 2013; Mohammed, 2021; Rosenzweig, 1988).

Table 4.5: Interactive effect of remittances and exchange rate

Variables	POLS	FEM	REM
Constant	1.823***	1.743***	1.8227*
	(0.000)	(0.000)	(0.000)
REMITT	0.243***	0.242***	0.243***
	(0.000)	(0.000)	(0.000)
REER	-0.669**	-0.649**	-0.669**
	(0.044)	(0.045)	(0.044)
REMITT * REER	-0.139***	-0.146***	-0.139***
	(0.012)	(0.007)	(0.012)
POP	-0.810***	-0.734***	-0.810***
	(0.000)	(0.000)	(0.000)
GDPPC	0.492***	0.615***	0.492***
	(0.000)	(0.000)	(0.000)
TO	0.203***	0.241***	0.203***
	(0.000)	(0.000)	(0.000)
INF	-0.275***	-0.237***	-0.275***
	(0.000)	(0.000)	(0.000)
FDI	0.937***	0.885***	0.937***
	(0.000)	(0.000)	(0.000)
GDS	0.380***	0.391***	0 .380***
	(0.000)	(0.000)	(0.000)
Polity2	0.784***	0.748***	0.784***
	(0.000)	(0.000)	(0.000)
Observations	782	782	782
Countries	29	29	29
Wald-test, F-Stat	820.26***	90.78***	820.26***
(P-value)	(0.000)	(0.000)	(0.000)
R-square	0.5425	0.5499	0.5425
Hausman test		52.36***	
		(0.000)	

Note: See table (4.3) for the level of significance and variable description. POLS is pooled regression, FEM and REM is (fixed/random) effect models. Hausman test suggest that fixed effect model is appropriate for this study.

GDP per capita is used as a proxy to measure the economic development level for countries. The coefficient value of GDP per capita affects human capital positively and significantly at a 1 percent level. When economic development expands, it increases income per capita and wealth. Capacities of people and countries increase to build skills, training, and investment in human capital (Cohen & Soto, 2007; Mozumder & Islam, 2017; Tsaurai & Ngcobo, 2018).

The variable of trade as a percentage of GDP is used to measure trade openness. Results reveal that the coefficient of trade openness has a positive and highly significant impact on

years of schooling at a 1% level. The main reason for low human capital investment is financial barriers. These financial barriers are decreased by financial development through an increase in the level of trade openness. It boosts education expenditures by the government and investment in human capital (Chinn & Ito, 2002; Mozumder & Islam, 2017; Ozcan, 2018).

The consumer price index is used to measure inflation's impact on human capital and it effect on years of schooling adversely. Because the general level rise in prices affect negatively general public and government budget and erodes the purchasing power of money. With the rising levels of prices, it became difficult for people to maintain the existing level of education, because they have to spend their resources fulfilling their basic necessities instead of investing in education (Kamalu & Ibrahim, 2021; Sahoo & Sethi, 2020). Foreign direct inflows positively and significantly affect human capital at a 1% level.

When foreign investment increase in country, it affects human capital directly and indirectly. Through direct means, foreign companies provide scholarship opportunities to their employees to upgrade their technical know-how and skills. Through indirect means FDI provides employment opportunities in the host countries, it pushes financial development and income level up that support investment in human capital (Blomström & Kokko, 2002; Michie, 2001; Tsaurai & Ngcobo, 2018).

Proxy of gross domestic savings is used here to check savings impact on average year schooling and returns to education. Savings exert a positive, and significant effect at a 1% level on human capital. Higher savings rate at the aggregate level significantly contributes to improving per capita income. Likewise, when gross domestic savings increase, it endorses long-run productive investments such as education, and health because, the financial sector of any country is able to invest in the productive sector and to fulfill private sector credit demands due to higher domestic savings (Leff, 1969; Mozumder & Islam, 2017). Polity2 is the composite measure used as a proxy of democratic development. Polity2 affects positively, and significantly at 1% level to human capital. A government that is selected through a democratic way, spends more on education (Klomp & de Haan, 2013; Mozumder & Islam, 2017).

Regression analysis of POLS, FEM, and REM displayed that remittances have a direct and positive impact on HC and confirmed the permanent income hypothesis and altruistic model of sending remittances. The exchange rate has a direct but negative impact on HC. Indirect impact represents exchange rate weaker the remittances effect on human capital. To find the overall impact of variables through percentile analysis Table 4.5 is build.

Table 4.6 is developed by using Table 4.5. 25th, 50th, and 75th percentile of exchange rate and remittances are considered for estimation in the table given below.

Table 4.6: Impact of remittances at different levels of exchange rate

REER	POLS	FEM	REM
P25= 93.55	0.011***	0.010***	0.011***
	(0.000)	(0.000)	(0.000)
P50= 105.19	0.976***	0.089***	0.976***
	(0.000)	(0.000)	(0.000)
P75= 122.63	0.727***	0.632***	0.727***
	(0.000)	(0.000)	(0.000)

Notes: POLS is pooled regression, FEM and REM is (fixed/random) effect models. P25, P50, and p75 are the 25th percentile, 50th percentile and 75th percentile coefficient values of REER respectively. *, **, *** are 10, 5 and 1 % significance level respectively.

Results of POLS, FEM and REM in Table 4.6 indicate that the remittances effect positive the human capital at all percentile of real effective exchange rate.

Conclusion

This paper uses panel data set to analyze the impact of remittances, exchange rate on human capital of 54 Asian countries from 1980 to 2020. Techniques of pooled and fixed effect models were applied for panel data analysis. Hausman test was utilized to decide among (fixed and random) effect models. At last, percentile analysis was carried out to check the overall impact of interaction term. Our pooled and fixed effects estimations reveal that the direct effects of remittances on human capital are positive and significant. It indicates that remittances are fostering human capital in Asia. As an increase in remittances loosens income constraints, especially in developing countries and pave the way for investment in human capital in term of education.

According to the direct effects of exchange rate on human capital, there exist negative relationship between remittances and human capital. If a country exposed to any external or internal shock that leads to increase in the exchange rate (appreciation) in the home country. Which slowed down the overall economic activities in the economy by decreasing foreign exports, and manufacturing sector production. As a result, it pushed down the growth rate and investment in human capital. The indirect effects of remittances through exchange rate exerted a negative effect and explain that exchange rate substitutes the remittance's ability to increase human capital. When the exchange rate increases its lead to decrease remittances growth as the amount of remittances decreases in terms of domestic currency. Government and people face a decrease in income earned through migrant's remittances as a result they decrease to invest in human capital.

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Appendix

Table A1: List of countries included into sample

Status of countries	Countries	Status of countries	Countries	Status of countries	Countries
LI	Afghanistan	UMI	Jordan	HI	Qatar
UMI	Armenia	UMI	Kazakhstan	LMI	Philippine
UMI	Azerbaijan	LMI	Kiribati	LMI	Samoa
HI	Bahrain	HI	Korea, Rep	HI	Saudi Arabia
LMI	Bangladesh	HI	Kuwait	HI	Singapore
LMI	Bhutan	LMI	Kyrgyzstan	LMI	Solomon Island
HI	Brunei Darussalam	LMI	Lao Democratic Republic	LMI	Sri Lanka
LMI	Cambodia	UMI	Lebanon	LI	Syria
LI	DPR Korea	HI	Macao SAR	LMI	Tajikistan
UMI	Fiji	UMI	Malaysia	UMI	Thailand
UMI	Georgia	UMI	Maldives	LMI	Timor-Leste
HI	Hong Kong	LMI	Mongolia	UMI	Turkey
LMI	India	LMI	Myanmar	UMI	Turkmenistan
LMI	Indonesia	LMI	Nepal	HI	UAE
LMI	Iran	HI	Oman	LMI	Uzbekistan
UMI	Iraq	LMI	Pakistan	LMI	Vanuatu
HI	Israel	LMI	PNG	LMI	Viet Nam
HI	Japan	UMI	PRC	LI	Yemen
	Total = 18		Total = 18		Total = 18

***** HI (High income), UMI (Upper middle income), LMI (Lower middle income), LI (Low income)

***Source**:* Compiled by the researcher from (World Development Indicator, 2021).

Table A2: Compact prior literature on remittances effects on human capital

Macro studies

Author(s)	**Country, Period, Technique**	**Dependent variable**	**Explanatory variables**	**Findings**
Aslam and Sivarajasingham (2019)	Sri Lanka, f 1975-2017, ARDL, Dicky-fuller, ECM	HDI	Remittances, Education expenditures, Health expenditures	Remittances have positive significant impact in long-run and short-run
Adenutsi (2010)	Sub Saharan African countries, 1987-2007, Fixed effect	HD	Remittances, trade openness, inflation, education expenditures	Remittances have positive significant long run impact
Azam and Raza (2016)	(Lower, lower middle, upper middle and high) income countries, 1996-2013, fixed effects	Secondary school enrollment	Remittances, GDP per capita, FDI, governance	Migrant remittances have positive significant impact, remittances impact became stronger through economic governance
Ngoma and Ismail (2013)	Developing countries, 1970-2010, GMM	Average years of secondary and tertiary schooling	Remittances, GDP per capita, POP growth,	Remittances have a positive impact
Azizi (2018)	Developing countries, 1990-2015, IV approach	Education	Remittances, Education expenditures, labor force participation rate, mortality rate	Remittances raise, school completion, school enrollment rate and private school enrollment
Mozumdar and Islam (2013)	Global perspective,19960-2010, GLS	educational attainment, gross attendance and enrollment rate	Remittances, GDP per capita, gross domestic savings, polity2, inflation, trade openness, education expenditures	Remittances increase average years schooling and secondary enrollment
Tsaurai and Ngcobo (2018)	Emerging economies, 1995-2014 , Pooled OLS, Fixed effects, Random effects	HDI	Remittances, stock market, liquidity, inflation, trade, GDP per capita, openness, FDI,	Remittances have positive direct impact, stock market liquidity weaken remittances impact

Naeem and Arzu (2017)	Developing Countries, 2014, least square, ARCH	HDI	Remittances, Gender Inequality Index, Trade as a GDP, government effectiveness	Remittances have positive but insignificant impact
Mohammed (2021)	Sub Saharan African countries, 2004-2018, GMM	HDI	Remittances, inflation, POP growth, democracy, economic freedom, GDP growth	Remittances have a positive impact, while institutions substitute the remittances impact on HD.
Hassan et al. (2013)	Pakistan, 1981-2011, ARDL	Secondary school enrollment	Remittances, POP growth, per capita income, FDI,	Remittances have an adverse impact

Source: Own compilation

Note: GLS (Generalized least square), OLS (Ordinary least square), IV (Instrumental variable), (GMM (Generalized method of the moment), ARDL (Auto regressive distributed lag bound testing), HDI (Human development index), FDI (foreign direct investment), POP (population)