From Remittances to Renovations: Analyzing the Impact of Overseas Transfers on Construction Industry of Pakistan

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ARTICLE DETAILS	ABSTRACT
 	Objective: This study aims to analyze the impact of remittance inflows on the construction industry in Pakistan from 1973 to 2020. **Research Gap:** The international diaspora has steadily retained a strong relationship with their families in their home countries through the provision of remittances. These remittances are important financial inflows, impacting various macroeconomic variables through consumption and investment channels. However, the specific influence of remittances on the construction industry remains underexplored. **Methodology:** Autoregressive distributed lag model explores the long-run relationship among the concerned variables, while short-run results are analyzed through the error correction mechanism. **The Main Findings:** The long-run findings indicate that GDP growth rate, external loans, scheduled bank advances to the construction industry, remittances, inflation, and value of the rupee against the dollar demonstrate a positive and statistically significant effect on the construction industry. A 1% increase in remittances boosts construction activities by 0.08%. **Practical Implications of the Findings:** The results suggest that policy frameworks should be adopted to attract remittance inflows, fostering economic development, improving living standards, and generating employment opportunities. **Value:** Provision of adequate policy support for remitters, ensuring that remittance-driven investments are maximized to benefit Pakistan's economic landscape. © 2025 The authors. Published by PJES, IUB. This is an open-access research paper under the Creative Commons Attribution-Non-Commercial 4.0

1. Introduction

Globalization has not only improved the flow of goods and services across the world, but the flow of labor across borders has also increased. The migrant population grew from 70 million in 1960 to 281 million in 2020. Out of 281 million, 61 percent were in Europe and Asia in 2020, while the US has 51 million international migrants (International Organization for Migration, 2021). Pakistan is amongst the top ten remittance recipient countries with an amount of US $31.31 billion in 2021 (International Organization for Migration, 2021). The permanently rising remittance inflows into Pakistan are mainly driven by investments in real estate (Kock & Sun, 2011).

Inflow of remittances has diverse implications for Pakistan both at the macro level vis-à-vis the micro level.

At the micro level, remittances have significant effect on household income, living standards, poverty reduction, housing and welfare, and education and social development (Ahmed et al., 2010; Démurger & Wang, 2016; Hussain et al., 2021; Jayaweera & Verma, 2023). Whereas, at the macro level, remittances have a substantial effect (Ahmed et al., 2010; Ellahi & Omer, 2021; Kagochi & Kiambigi, 2012) on economic growth and development, the balance of payments, poverty alleviation, income distribution, consumption and domestic demand, investment, capital formation (especially in construction sector), financial sector development, foreign exchange reserves, and exchange rate stability.

The construction industry has been recognized as a major determinant of overall economic growth in Pakistan in recent years through backward and forward linkage effects. It includes the general construction of buildings of all kinds, in addition to new work, repair, additions and alterations, the erection of pre-fabricated buildings or structures on the site, and construction of a temporary nature. It also includes entire dwellings, office buildings, farm buildings, stores, and other public and utility buildings (PBS, 2010).

The construction industry has a 13.4 percent share in the industry, however, it documented a modest growth rate of 3.1 percent. Along with its contribution to industry, its contribution towards labor employment has also risen from 8 percent in 2018-19 to 9.5 percent in 2020-21. This increase in growth is mainly due to government support and investment from the private sector. The construction industry can be categorized into three subsectors, i.e., buildings, civil engineering (construction of roads and railways, utility projects, and other civil engineering projects), and specialized construction activities (demolition & site preparation, electrical, plumbing, and other construction installation activities). Moreover, buildings are divided into residential and non-residential components. This study focuses on the buildings and real estate business. Most of the construction, particularly the residential buildings, is sponsored by the Pakistani diaspora. This financing is mainly driven by two reasons, namely, remittances for self-interest and pure altruism for family members (Jayaweera & Verma, 2023).

Self-interest refers to the establishment of investments, particularly in real estate for remitters (Kock & Sun, 2011). Pure altruism depicts support for the family and siblings left behind. In either case, remittances are a contributing factor to construction growth (Bohra-Mishra, 2013; Kagochi & Kiambigi, 2012; Perez-Saiz et al., 2019). This phenomenon is particularly true in rural areas, but urban areas also have evidence in the form of the allocation of specific areas/blocks in different housing societies or colonies. Thus, the so-called construction boom, an increase in remittance inflows, and development around remittance-receiving areas have prompted the researcher to investigate this inclination.

Although literature (Hussain et al., 2021; Jayaweera & Verma, 2023; Kagochi & Kiambigi, 2012) has examined the consequences of remittances from different perspectives. There remains a research gap in the literature on Pakistan regarding the specific impact of remittances on the construction industry. This study intends to cover this research gap through an extensive investigation of remittance-construction linkage in the case of Pakistan. The objective of the study is to estimate the degree to which remittances shape the growth of industry in Pakistan. This paper adds to the existing body of knowledge by establishing a clear nexus between remittance inflows and growth in the construction industry. It argues that remittances not only increase household income but also boost construction activities. As a result, output expands, creating employment opportunities and promote overall economic growth. The research questions for this investigation encompass, what are the characteristics and volume of the remittances inflow to Pakistan and the effect of remittances on the construction industry output?

The findings of this study are valuable for policymakers, scholars, and investors in the construction and immigration sectors. In the budget 2023-24, the federal government has given special attention to the construction industry along with initiatives for external remitters, namely, special initiatives for overseas in the Naya Pakistan Housing scheme. Therefore, this study offers detailed understandings into the potential economic effects of remittances on the construction industry, especially buildings and infrastructure.

2. Literature Review

A number of studies have analyzed the multi-dimensional consequences of workers' remittances. Some studies have investigated the microeconomic or grass root-level impact of remittances and several others have investigated the macroeconomic impact of remittances on different variables. Jayaweera and Verma (2023) for Sri Lanka and Ahmed et al. (2010) for Pakistan have studied effect of remittances on housing and

household welfare. In these two case studies, an increase in remittances had significantly increase the household welfare and housing construction through consumption and investment channels. In contrast, Démurger and Wang (2016) analyzed household survey data and found a positive correlation with consumption instead of investment and also found a strong negative impact on expenditure on education for rural China. Similarly, Hussain et al. (2021) found a positive correlation between remittances and house/residential construction in a primary study of a village in the district Gujrat, Pakistan, with limited geographic coverage. By using qualitative anthropological methods, this study analyzed 23 migrants and found a strong correlation between remittances and construction of luxurious houses. Bohra-Mishra (2013) investigated a positive association between labor migration and investment in physical capital in Nepal.

At the macro level, Ellahi and Omer (2021) found a positive and significant effect of remittances on economic growth in Pakistan through consumption channels. Whereas, Ahmed et al. (2010) conducted research in two parts, where, the first half estimated the impact of remittances on sector outcome, poverty and inequality, and found an inverse impact of an increase in remittances on poverty and inequality. Remittances had a direct effect on investment and consumption. The second part evaluated the impact of remittances on welfare through a household cross-sectional study. Adams Jr (1998) analyzed panel data from 1992-1997 and found that remittances had a significant and positive effect on investment, asset accumulation, and financial development in rural Pakistan. Similarly, Fatima and Qayyum (2016) analyzed how asset accumulation is affected by three different sets of income i.e., labor income, external remittances, and internal remittances using probit model with maximum likelihood estimations. The result indicates that external remittances have a positive and significant accumulating effect on house assets for Pakistan. Likewise, Ahmed et al. (2018) found a significant increase in household assets due to external remittances using the Pakistan Social and Living-Standards Measurement Survey (PSLM) 2010-11 data.

Adams Jr and Cuecuecha (2010) found a statistically significant positive relationship between remittances and investment in human and physical capital in Guatemala. Similar results were found by a primary study for the rural area of El Salvador by McBride and Fransen (2007). For Nigeria, Owotemu et al. (2024) found surprising results that 87.5% of remittances were allocated to home purchases and construction. (Owotemu et al., 2024) further concluded that remittances significantly contribute towards economic development in countries where innovative policies have been designed to facilitate capital and labor flows. Kagochi and Kiambigi (2012) estimated the housing construction demand concerning remittances and found a highly significant relationship between remittances and construction in Kenya. Similarly, Perez-Saiz et al. (2019) analyzed the impact of remittances on aggregate demand through a network of input-output linkages for Sub-Saharan Africa and found a strong linkage effect of remittances across sectors and ultimately leading to an increase in aggregate demand. Zhao et al. (2017) found three different sets of variables that are significantly affecting construction costs in New Zealand. One of the sets is macroeconomic variables, which has 15 further sub-variables including GDP, exchange rate, and net migration.

This section sums up the available literature on the role of remittances in construction in different regions, and highlights the literature gap for a similar analysis for Pakistan.

3. Data and Research Methodology

This research uses time series dataset from 1973 to 2020 to study the link between the construction industry and remittances in Pakistan. Different data sources employed include the State Bank of Pakistan (SBP), Pakistan Bureau of Statistics (PBS), Economic Survey of Pakistan and World Bank Data. Gross Value Added (GVA) in terms of expenditures on construction activities measures the production of the construction industry. GVA is measured as the difference between expenditure on construction activities minus intermediate consumption [GVA = Construction expenditures – Expenditures on intermediate goods]. The expansion in the output of construction industry depends on four different sets of variables i.e. macroeconomic variables, housing-related variables, demographic variables, and financial variables. This study has chosen a mix of variables to cover all four dimensions of determinants (with remittances, as the primary variable of interest. Equation (1) presents the general functional form of the model,

$$CON = f(GGDP, INF, REM, EXR, ELP, SBAC, GUP, PDN) \qquad (1)$$

Where, the dependent variable CON is the value of the construction industry output in rupees measured in terms of expenditure on construction.

Under the category of macroeconomic variables, GGDP is the growth rate of gross domestic production (GDP). It is expected that performance of construction industry will increase with the increase in the GDP growth rate (Asamoah et al., 2019; Wu et al., 2023; YEE, 2015; Zhao et al., 2017). As the growth rate of GDP increases so does the income of the people as a result construction industry expands. INF represents inflation taken from GDP deflator, which captures the effect of overall prices in an economy. Thus, INF is expected to harm the construction industry (Asamoah et al., 2019; Yartey, 2014; Zhao et al., 2017). An increase in inflation reduces the consumers' purchasing power through input prices and real estate prices.

Financial category variables include: External loans of Pakistan (ELP) and Scheduled banks advances to construction (SBAC). Both ELP and SBAC can have a direct impact on the construction industry (Asamoah et al., 2019). Pakistan has completed various projects with the help of external loans, such as China-Pakistan Economic Corridor (CPEC). Similarly, the positive correlation of scheduled banks' advances to the construction-related deposits is due to the increased feasibility of construction industry expansion as these financing options for the construction industry become more supportive.

An exchange rate depreciation (EXR) in the rupee can have a mixed effect on construction activities. The depreciation may have a positive impact on construction through export competitiveness. With the increase in export competitiveness, exports of construction materials may rise, and imports may reduce, and vice versa. It can also raise construction through FDI in infrastructure or foreign financing of infrastructure projects (Asamoah et al., 2019). In contrast, depreciation may have a negative effect on construction output through inflationary pressure (Muhammed & Adindu, 2023; Zhao et al., 2017). Therefore, the effect of depreciation is dependent upon the macroeconomic environment. In the case of Pakistan, where there are several foreign-funded projects, the inflow of remittances, limited exports overall, rising export of cement, fluctuating FDI, and most importantly, construction and real estate are the parking lot of fraudulent money, and the result of the depreciation of the rupee could be either way.

Table 1: Descriptive Statistics

	Mean	Median	Max.	Min.	S.D.	Skewness	Kurtosis	Obs.
Construction	177551.5	76053.5	791191	2298	231464.4	1.5	4	48
Remittances	5612	2251.7	23132.3	136	6735.3	1.4	3.6	48
Exchange rate	49.738	38.694	161.616	9.907	40.076	0.932	3.096	48
Bank Advances	57993.97	12526.25	310733.1	341.200	84335.00	1.623	4.730	48
Inflation	10.102	8.927	38.511	3.258	6.434	2.274	9.734	48
GDP growth	4.8	4.9	8.7	-0.5	2	-0.3	2.9	48
Growth in Urban population	3.5	3.7	5.5	1.8	1	0	2.1	48
Population density	184.212	180.679	294.723	83.392	66.666	0.074	1.681	48
External loans	3133.306	2530	11900.76	355.00	2853.243	1.971	6.030	48

Source: Authors' Compilation.

GUP refers to the growth in urban population, and PDN depicts population density. These demographic variables are included to capture the pace and distribution of urbanization. The urban population growth rate measures the degree to which the population is increasing, whereas the population density measures the distribution of population. The inclusion of these two variables capture the complete impact of urbanization on construction activities. In practice, these two variables are highly correlated and may generate multicollinearity issue in the model. To avoid the possible existence of multicollinearity this study has linearly combined GUP and PDN through Principal Component Analysis (PCA) to UPDN (Artigue & Smith, 2019). The Orthogonal linear combination of the growth rate of population and population density has a direct impact on the construction industry performance (Wu et al., 2023).

REM shows the remittances inflow and has a positive impact on the construction industry in two distinct ways (Bohra-Mishra, 2013). Firstly, through the consumption effect, people build houses for their family, and, secondly, through investment. Migrants finance investment in their native country to accrue assets (Ellahi & Omer, 2021; Hussain et al., 2021; Zhao et al., 2017).

Table 1 reports descriptive statistics, where the average value of construction output is 177,551.5 million

rupees during the analysis timeframe. Similarly, the average value of remittances is 5,612 million dollars. The average values for the EXR and SBAC are 49.73 million dollars and 57,993.97 million rupees, respectively. The average values for inflation, GDP growth, and Urban Population growth are 10.10%, 4.80%, and 3.5%, respectively. The mean values for all variables, except GGDP, are greater than their respective medians. This indicates that these variables have positively skewed distributions. In contrast, the median value for GGDP is greater than its mean, implying that GGDP is a negatively skewed distribution. The greater than 3 values of kurtosis suggest leptokurtic distribution, while the values of less than 3 indicate a platykurtic distribution (see Table 1).

3.1 Model Specification

Equation (2) presents the econometric model used for estimation

$$CON_t = \beta_0 + \beta_1 GGDP_t + \beta_2 INF_t + \beta_3 REM_t + \beta_4 ELP_t + \beta_5 SBAC_t + \beta_6 UPDN_t + \beta_7 EXR_t + \varepsilon_t \qquad (2)$$

Equation (3) presents the natural logarithm form of the model.

$$lnCON_t = \beta_0 + \beta_1 GGDP_t + \beta_2 lnINF_t + \beta_3 lnREM_t + \beta_4 lnELP_t + \beta_5 lnSBAC_t + \beta_6 UlnPD_t + \beta_7 EXR_t + \varepsilon_t \quad (3)$$

The unit root tests, the Augmented Dickey-Fuller (ADF) test (Dickey & Fuller, 1979), and the Phillips-Perron test (Phillips & Perron, 1988) assessed the stationarity of all the variables. This study applies an Autoregressive Distributed Lag (ARDL) technique, developed by Pesaran et al. (2001) to estimate equation (3). Equation (4) presents the model specification in logarithmic form,

$$\Delta lnCON_t = ln\theta_0 + \theta_1 lnCON_{t-1} + \theta_2 lnSBAC_{t-1} + \theta_3 lnUPD_{t-1} + \theta_4 GGDP_{t-1} + \theta_5 lnINF_{t-1} + \theta_6 lnREM_{t-1} + \theta_7 lnEXR_{t-1} + \theta_8 lnELP_{t-1} + \sum_{i=1}^{r} \varphi_{1i} \Delta ln(CON)_{t-i} + \sum_{j=0}^{s} \varphi_{2j} \Delta ln\, SBAC_{t-j} + \sum_{k=0}^{q} \varphi_{3k} \Delta\, lnUPD_{t-k} + \sum_{l=0}^{u} \varphi_{4l} \Delta\, GGDP_{t-l} + \sum_{m=0}^{v} \varphi_{5m} \Delta ln\, INF_{t-m} + \sum_{n=1}^{w} \varphi_{1i} \Delta ln\, REM_{t-n} + \sum_{p=0}^{x} \varphi_{2j} \Delta\, lnEXR_{t-p} + \sum_{q=0}^{y} \varphi_{3k} \Delta ln\, ELP_{t-q} + \varepsilon_t \qquad (4)$$

Where *lnCON, lnSBAC, lnINF, lnREM*, *lnEXR* and *lnELP* refer to the natural logarithm of construction, scheduled banks advances to construction, inflation, remittances, exchange rate, and external loans of Pakistan, while GGDP is the growth rate of GDP. φ_i shows the long-run parameter for each variable (*i= 1, 2, ..., 8*), $ln\theta_0$ is the intercept term, ε_t is white noise random error term, and r, s, q, u, v, w, x, y are optimal lags.

The Schwartz Bayesian Criterion (SBC) or Akaike Information Criterion (AIC) chooses the optimal number of lags for the ARDL model. The F-Bounds test estimates the long-run relationship, and the Error Correction Model (ECM) estimates the short-run relationship and adjustment coefficient. Equation (5) specifies the ECM model,

$$ln(\Delta CON)_{t-1} = \sum_{i=1}^{r} \varphi_{1i} \Delta ln(CON)_{t-i} + \sum_{j=0}^{s} \varphi_{2j} \Delta ln\, SBAC_{t-j} + \sum_{k=0}^{t} \varphi_{3k} \Delta lnUPD_{t-k} + \sum_{l=0}^{u} \varphi_{4l} \Delta\, GGDP_{t-l} + \sum_{m=0}^{v} \varphi_{5m} \Delta ln\, INF_{t-m} + \sum_{n=1}^{w} \varphi_{1i} \Delta ln\, REM_{t-n} + \sum_{p=0}^{x} \varphi_{2j} \Delta\, lnEXR_{t-p} + \sum_{q=0}^{y} \varphi_{3k} \Delta ln\, ELP_{t-q} + \lambda ECM_{t-1} + u_t \qquad (5)$$

Where ECM is the error correction term, λ refers to the ECM coefficient indicating the speed of adjustment or feedback effect. It represents how much the disturbance in equilibrium is being restored, that is the degree to which any deviation from equilibrium in the preceding year is being corrected in the present year. The diagnostic tests employed are Jarque-Bera (JB) test to check the normality of residual distribution, Breusch-Godfrey (BG) LM test for serial correlation, ARCH test for heteroscedasticity, the model specification test (Ramsey RESET), and structural break in the data test (CUSUM and CUSUMQ).

4. Results and Discussion

At first, Table 2 presents the stationarity results, where GDP growth and logarithm of inflation are stationary at level. All other variables are stationary at the first difference. Hence, the study found a mix of I (0) and I (1) variables which endorses that the ARDL technique is suitable for determining long-run relationship.

Table 2: Stationarity Test Results

	ADF Test With Drift Only					Phillips-Perron Test With Drift Only				
	At Level		At 1st Difference			At Level		At 1st Difference		
Variable	Coefficient	Prob.	Coefficient	Prob.	Conclusion	Coefficient	Prob.	Coefficient	Prob.	Conclusion
LNCON	-0.01	0.54	0.38	0.00	I(1)	-0.02	0.18	-0.55	0.00	I(1)
GGDP	-0.62	0.00	-1.34	0.00	I(0)	-0.62	0.00	-1.34	0.00	I(0)
LNELP	-0.09	0.47	-1.46	0.00	I(1)	-0.09	0.47	-1.09	0.00	I(1)
LNSBAC	-0.03	0.60	-0.85	0.00	I(1)	-0.03	0.61	-0.85	0.00	I(1)
LNREM	-0.05	0.25	-0.54	0.00	I(1)	-0.05	0.41	-0.54	0.00	I(1)
LNINF	-0.73	0.00	-1.92	0.00	I(0)	-0.73	0.00	-1.41	0.00	I(0)
ULNPD	-0.01	0.88	-0.82	0.00	I(1)	-0.01	0.89	-0.57	0.00	I(1)
LNEXR	0.01	0.99	-0.63	0.00	I(1)	0.01	0.99	-0.63	0.00	I(1)

Source: Authors' Estimation.

The ARDL co-integration method estimates the long-run relationship between variables. SBC and AIC criteria determine appropriate lag length, which suggests AR (2) process. The aim is to examine the hypothesis of no long-run association between the variables with an F-statistic (Wald) test. The calculated value of the F-statistic is 27.69 (Table 3), which is larger than the critical value of the upper bound at a 1% significance level. This provides evidence not to accept the joint null hypothesis of no co-integration relationship. Therefore, the results suggest the existence of a long-run relationship between the study variables.

Table 3: Bounds Test Results

Level of Significance	Lower Bound [I(0)]	Upper Bound [I(1)]	F-Statistic Calculated (Wald Test)
1%	2.73	3.90	
5%	2.17	3.21	F = 27.69
10%	1.92	2.89	

Source: Authors' Estimation.

Table 4 displays the long-run ARDL (1, 2, 1, 0, 1, 2, 0, 2) model results, which relies on the SB Criterion for appropriate lag length. Results reveal that GDP growth has a positive influence on the construction industry output, indicating a 0.05% expansion in the construction industry following a 1% growth in GDP. This relationship conforms with Wu et al. (2023), Asamoah et al. (2019), and YEE (2015). A rise in the growth rate of GDP eventually boosts household income, which in turn expands the construction industry (Kagochi & Kiambigi, 2012; Yartey, 2014; Zhao et al., 2017). Furthermore, total external loans and scheduled bank advances to the construction industry both have a direct impact on the construction industry. Results specify that an increase of 1% in total external loans and scheduled bank advances to the construction industry leads to a corresponding 0.19% and 0.21% boost in the construction industry output. These two variables confirm that the financing options for the construction industry help boost its output.

The inflow of remittances directly affects the construction industry. A 1% rise in remittances inflow increases activities in the construction industry by 0.085 percent. This relationship between the remittance inflows and the construction industry is supported by Adams Jr and Cuecuecha (2010); Ahmed et al. (2010); Fatima and Qayyum (2016); Jayaweera and Verma (2023); Kagochi and Kiambigi (2012); McBride and Fransen (2007); Zhao et al. (2017); Owotemu et al. (2024), and Perez-Saiz et al. (2019).

Inflation also significantly affects the construction industry output, but the relationship is not as per economic theory. A 1% increase in inflation helps to stimulate the construction industry by 0.27 percent, ceteris paribus. The outcome specifically explains a unique economic phenomenon that exists in Pakistan. Inflation can affect the construction industry through substitution and direct effects. Under the direct effect, inflation negatively impacts through input prices and interest rates. Higher input costs generally reduce construction activities. Moreover, the construction industry may face difficulties in borrowing funds when interest rates increases due to inflation leading to an adverse impact on the construction sector.

Table 4: Long Results of ARDL (1, 2, 1, 0, 1, 2, 0, 2) Based on SAC and AIC (Restricted Constant and No Trend)

Variable	Coefficient	T-Statistic	Prob. Value
GGDP	0.0504***	1.9291	0.0636
LNELP	0.1873*	2.8017	0.0090
LNSBAC	0.2095*	3.9263	0.0005
LNREM	0.0849**	2.0258	0.0521
LNINF	0.2708*	3.6040	0.0012
ULNPD	0.0614	0.7433	0.4633
LNEXR	1.0105*	7.2859	0.0000
Constant	2.9135*	3.8693	0.0006

Note: ***, **, and *, show significance at the 10%, 5% and 1% levels, respectively.
Source: Authors' Estimation.

In contrast, inflation can create a positive substitution effect on the construction sector. Construction and real estate provide an alternative option for hedging against inflation during high inflation. Real estate is considered a tangible asset, and inflation can be dealt with through the purchase of these assets, and the same is true for housing demand. In Pakistan, the return on real estate and construction is one of the highest of all time and across industries. Consequently, the demand for investment in real estate and construction is on the higher side despite inflationary pressures. During the study period, the government of Pakistan has often kept construction and real estate on the favorable side regarding taxes. During this time, the government announced almost 13 amnesty schemes, with construction and real estate being common sectors in nearly all of them, benefiting from tax reductions. This has also provided an impetus for a surge in the construction industry, despite high inflationary pressures. Moreover, a surge in government spending, mainly on road infrastructure, dams, and airports, indicates the government's commitment to sustaining economic growth during periods of high inflation. All these factors in Pakistan imply that the negative effect of inflation is offset by the positive substitution effect, resulting in an overall direct and significant impact on the construction industry.

The degree of urbanization (a combination of the growth rate of urban population and population density) has a direct but insignificant impact on the construction output, as it improves, so does the level of construction (see Table 4). Construction activities increase by 1.01% following a 1% increase in the value of the dollar. This result conforms with that of Asamoah et al. (2019). During the study years, the rupee value depreciated and ranged from Rs. 9 in 1973 to Rs. 170 in June 2020 against one dollar, but construction activity has gone up during the same period. The first possible explanation is export competitiveness, as the exports of cement were zero in the earlier years, but in 2020 these increased to US $ 259.4 million. Alternatively, the increased cement exports could have contributed to the positive impact of rupee depreciation on the construction industry. Secondly, rupee depreciation can also affect the construction industry positively through foreign-funded projects. The depreciation increases the funding capacity in terms of rupees with the same amount of dollars. Hence, construction activities can be expanded. Thirdly, rupee depreciation may divert people's investments to real estate instead of investing in stock, currency, or gold.

Table 5 indicates the short-run results of the Error Correction Model (ECM). The ECM coefficient is the speed of adjustment parameter and shows how quickly the equilibrium is restored. The ECM coefficient is -0.3616, which is negative and highly significant at the 1% level of significance. The negative sign indicates that if the equilibrium deviates from its long-run equilibrium, it will converge towards the equilibrium at the speed of 36.16% per year, and gives evidence of the existence of a long-run relationship between the underlying variables (Kagochi & Kiambigi, 2012). Moreover, the short-run model confirms the short-run effects of remittances, GDP, exchange rate, and inflation in the construction industry.

Table 5: Short-Run Results of Error Correction Model (1, 2, 1, 0, 1, 2, 0, 2)

Variable	Coefficient	t-Statistic	p-Value
D(GGDP)	0.0068*	2.514	0.018
D (GGDP (-1))	-0.0093*	-3.415	0.002
D(LNELP)	0.1444*	7.009	0.000
D(LNREM)	-0.0709*	-2.508	0.018
D(LNINF)	0.0268*	2.863	0.008
D (LNINF (-1))	-0.0485*	-4.778	0.000
D(LNEXR)	0.1438	1.493	0.146
D (LNEXR (-1))	-0.6323*	-6.639	0.000
ECM (-1)	-0.3616*	-17.829	0.000

Note: ***, **, and *, point to significance at the 10%, 5% and 1% levels, respectively.
Source: Authors' Estimation.

Table 6: Diagnostic Tests

Test	Critical value	(Calculated) Test Statistic	p-value
Normality (JB)	$\chi^2_{0.05(2)} = 5.99$	0.0095	0.99
BG LM	$\chi^2_{0.05(1)} = 3.84$	6.2026	0.045
ARCH	$\chi^2_{0.05(1)} = 3.84$	1.1189	0.28
Ramsey Reset	$F_{0.05(1,28)} = 4.20$	0.4032	0.53

Source: Authors' Estimation.

Figure 1: The CUSUM residuals and the CUSUMSQ
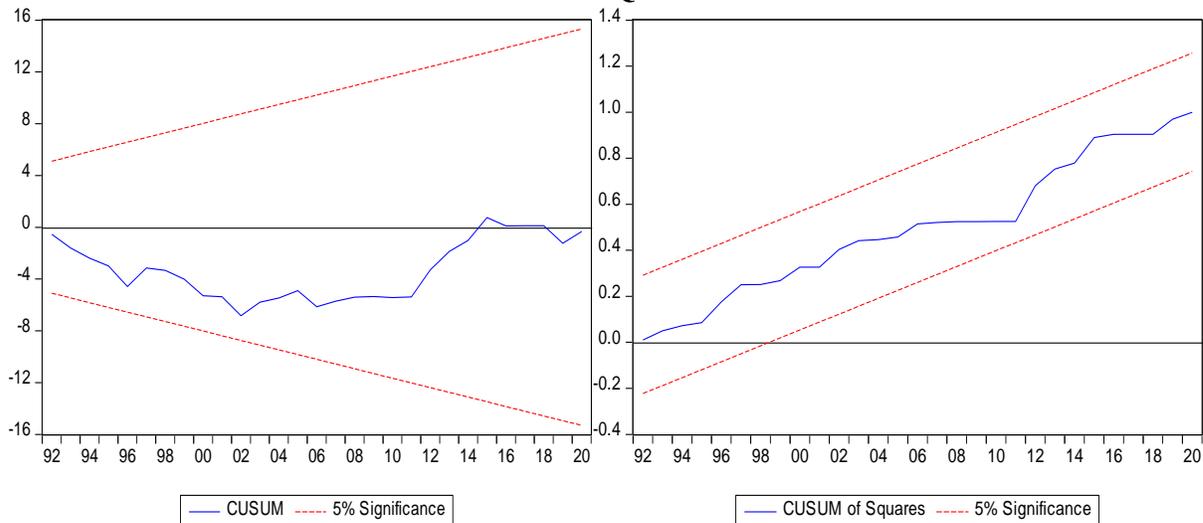
Source: Authors' Estimation.

Finally, all the diagnostic tests except the serial correlation LM test suggest that the problems of non-normality, heteroscedasticity, instability, and inconsistency do not exist in the model. However, an autocorrelation problem exists at the 5% significance level (see Table 6).

The cumulative sum of (CUSUM) residuals and the cumulative sum of squared (CUSUMSQ) residuals are plotted in Figure 1. These plots show that the CUSUM and CUSUMSQ of residuals lie within the two straight lines at the 5% significance level, endorsing that the model parameters are structurally stable, suggesting the reliability and consistency of the model.

5. Conclusion

Considering the contributions of the construction industry to overall economic growth and development, understanding its determinants is imperative. Remittances are a vital determinant for the construction industry output, particularly in housing construction. Hence, the primary goal of this research is to assess how remittance inflows influence the construction industry in Pakistan. The growth rate of GDP, external loans, scheduled bank advances to the construction industry, remittance, inflation, urbanization, and the value of

the rupee against the dollar are considered significant determinants of the construction industry. These determinants are chosen from four key dimensions, strongly linked to the construction industry, including the macroeconomic environment, financial aspects, housing-related variables, and demographic factors. This research evaluates the impact of remittance inflow on the construction industry using data from 1973 to 2020. To explore the long-run relationship amid the study variables, the auto-regressive distributed lag methodology is used, while short-run results are analyzed through error correction mechanism. The findings indicate that the growth rate of GDP, external loans, scheduled bank advances to the construction industry, remittances, inflation, and the value of the rupee against the dollar exhibit a statistically significant direct effect on the construction industry.

Evidence proposes that remittances have a direct and significant impact on the construction industry in Pakistan but the underutilization of remittances (70% of remittances funds consumption) (de Padua et al., 2024) does not bring the possible benefits. Thus, measures to increase the inflow of remittances with their effective utilization, especially for the construction industry, are two important policy implications.

Pakistan has already adopted several policy initiatives to boost remittance inflow. The State Bank of Pakistan (SBP) has started different schemes like Pakistan Banao Certificates (PBC) and Roshan Digital Accounts (RDA), along with tax exemptions on foreign remittances. Similarly, Naya Pakistan Housing Scheme and the construction amnesty scheme had boosted remittance-driven projects. The link between the construction industry and remittances can be further strengthened by (a) offering low-interest loans for the international diaspora. (b) creating a public-private partnership for remittance-funded housing schemes. (c) collaborating with established housing societies. (d) establishment of construction firms with guaranteed loans for expatriates. (e) tax rebates for remittance-funded projects. (f) reduction of fraud and risks through government portals.

This transformation of remittances into of construction industry will not only contribute in economic growth and development, instead it will also address housing shortages and the creation of millions of jobs.

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No potential conflict of interest.

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