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Foreign Direct Investment-Domestic Investment Nexus in Pakistan

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Abstract: FDI may have positive or negative impact on domestic investment. The present study tries to find out the relationship FDI and domestic investment. FDI, financial market development and GDP growth rate are taken as independent variables and domestic investment as independent variable in the model. ADF, PP, Ng-Perron and Zivot-Andrews unit root tests are applied to find the level of integration. ARDL cointegration technique and its error correction model are applied to check the long run and short run relationships. The study finds that long run and short run relationships 7exist in the model. FDI, financial market development and economic growth have the positive and significant impact on the domestic investment.

Key words: FDI · Domestic Investment · Financial Market Development · Cointegration

INTRODUCTION

Impact of Foreign Direct Investment (FDI) on domestic investment is controversial. It depends on the nature of commodities, which the foreign investors produce in home country, level of competition and level of development in the host country. According to United Nations Conference on Trade and Development [1], FDI could be a compliment for domestic investment as it is an initiative to produce new commodities that have not been produced by the local firms. Moreover, FDI has a crowding-in effect by increasing income levels and enhancing demand for commodities produced by the local firms or to buying their commodities as inputs. On the other hand, FDI could have crowding-out effect when foreign investors become the competitors of the local firms by producing the same commodities and drive out the domestic firms from the competition and become a substitute of domestic investment. The impact of FDI on domestic investment also depends on the motive of foreign investors. If it is done for the purpose of removing trade barrier on imports of the recipient country, then it would not increase domestic investment. If it is done for comparative advantage, then it could help in raising domestic investment through forward and backward linkage effects. McKinnon [2] argued that financial market is necessary for entrepreneurial development. Domestic investor cannot get positive externalities from FDI if financial market is limited. Financial sector gives loan to private investors by pooling surplus funds from the economy. It helps in generating the funds through credit multiplier effect for potential entrepreneur who invest the money for the best return. Financial market also helps in raising aggregate demand through financial resources mobilization. So, it will help in raising economic activities and investment as well. Local or foreign investment will be done in those economies that are growing and have great market size. With the high economic growth, there will be great domestic market, great demand and great foreign investment as well to cover the demand from the economy.

Literature Review: Hymer [3] stated that FDI had a positive impact through the transfers of managerial and entrepreneurial skills in the host country but it was also a threat of confiscation to the local labor. Usually, FDI had a positive impact on domestic investment through increase in demand for other commodities and had an acceleration effect on investment. Streeten [4] stated that FDI could establish links with overseas banks and other organizations. It promoted the growth of entrepreneurship in the host countries. The impact of FDI

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depended on government involvement, who wanted to maximize welfare from FDI. Vernon [5] stated that FDI increased competition for local firms when the host countries switched from importing to exporting due to production of standardized products. According to Caves [6], FDI usually floated into oligopolistic markets where it could have scale economies. FDI could improve market structure by increasing competition through pricing and product strategies in order to get advantage of entering the market.

Grossman [7] claimed that FDI might have harmful effects on developing economies through increasing competition, lowering prices and could drive out local firms through competition. Horstmann and Markusen [8] stated the trade-off between concentrating production to economies of scale and promoting proximity to customers. The impact of FDI on domestic firms depends on the fact whether FDI adds competition or sends their profits back to the mother countries that can be earned by the local firms and helps in their expansion. According to Dunning [9], impact of FDI on market structure and efficiency of production depended on type of FDI, existing market structure and policies of the host country.

Dunning [10] used data from US owned firms in UK and found that foreign firms could be dominant producers and could create monopoly or oligopoly in the market. Rosenbluth [11] found a positive correlation between FDI and industrial concentration. He also found that average size of foreign firms was greater than that of domestic firms. Wilmore [12] found a positive relationship between FDI and level of concentration. Evans [13] used data of Brazil's pharmaceutical industry to find relationship between FDI and industrial concentration and concluded that FDI reduced the industrial concentration in developing economies. In case of single country's analysis, Van [14] found a direct positive impact of FDI on Canadian capital formation and a negative indirect impact on domestic investment.

Chen [15] found that FDI concentrated in those industries where profitability was high to recover the innovation cost. However, he did not conclude the exact relationship of FDI and competition. Feldstein [16] used the US data and checked the macro economic impact of FDI on domestic investment. He found a negative relationship between FDI and domestic investment which confirmed that FDI was a substitute for domestic investment. In case of developing economies, Bosworth *et al*. [17] found that FDI increased domestic investment and had greater impact on domestic investment than bank loans and portfolio investment. In case of developing and developed economies, De Mello [18] found a positive relationship between FDI and domestic investment in the broad panel but a negative relationship in case of OECD countries.

Lipsey [19] found a negative and insignificant impact of FDI on domestic investment. Agosín and Mayer [20] found a strong crowding-in effect of FDI on domestic investment. They further explored the degree of impact in different regions and found that FDI had stronger crowding-in effect for Africa than for Asia and also had strong crowding-out effect for Latin America. Agrawal [21] found that FDI had a positive impact domestic investment. Driffield [22] found that FDI reduced the industry-specific concentration and increased competition amongst domestic firms and reduced welfare loss which could be possible in case of monopoly powers. Razin [23] found a long run positive relationship between FDI and domestic investment and that FDI had larger impact on domestic investment than loan inflows or portfolio investment. Hejazi [24] found that FDI increased total domestic investment significantly and had insignificant impact for non-service industry in Canada.

Kim and Seo [25] used the vector autoregressive model to find relationship amongst domestic investment, FDI and economic growth in Korea. They found that FDI had a negative and insignificant impact on domestic investment and domestic investment had a significant and negative impact on FDI. FDI could also generate imperfect competition in developing economies.

Barrios *et al*. [26] used data of Irish manufacturing firms and found that initially FDI created competition and afterward positive spillovers out-weighted negative spillovers in local firms. So, FDI had a positive impact on development of local firms. Desai *et al*. [27] used the aggregate data of OECD countries and found a negative impact of FDI on domestic investment. Using the German data, Lipponer [28] found the insignificant negative relationship between FDI and domestic investment. Mukherjee and Suetrong [29] found bi-directional causality between FDI and privatization and FDI enhanced the privatization process in transition economies which could help in raising domestic investment.

MATERIALS AND METHODS

To capture the impact of FDI on domestic investment, the study uses domestic investment as percentage of GDP as dependent variable and uses FDI and financial market development as percentage of GDP and GDP growth rate as independent variable.

Model of study is as follows:

$$DIG_t = f(FDIG_t, FMDG_t, GR_t)\ t= 1972, 1973, \ldots\ldots 2010 \quad (1)$$

where

DIG_t = Domestic Investment as percentage of GDP.
$FDIG_t$ = Foreign Direct Investment inflows as percentage of GDP.
$FMDG_t$ = Domestic credit to private sector as percentage of GDP is a proxy for Financial Market Development.
Gr_t = GDP Growth Rate annual percentage.

The study checks the stationarity of data by applying Augmented Dickey Fuller (ADF) unit root test developed by Dickey and Fuller [30], which is as follows:

$$\Delta y_t = \alpha + \delta Y_{t-1} + \gamma_1 \Delta Y_{t-1} + \gamma_2 \Delta Y_{t-2} + \ldots\ldots + \gamma_m \Delta Y_{t-m} + u_t \quad (2)$$

The ADF equation takes the lags of dependent variables to remove serial correlation. The equation (2) can also be regressed with time trend to check the trend stationary time series. Phillips and Perron (PP) [31] ignore the $\gamma_1 \Delta Y_{t-1} + \gamma_2 \Delta Y_{t-2} + \ldots\ldots + \gamma_m \Delta Y_{t-m}$ from ADF equation. PP test removes the serial correlation by giving ranks to the residuals. Equation of PP test is as follows:

$$\Delta y_t = \alpha + \lambda T + \delta Y_{t-1} + u_t \quad (3)$$

PP test uses the modified statistic Z_t and Z_δ which are as follows:

$$Z_t = \left(\frac{\hat{\sigma}^2}{\hat{\pi}^2}\right)^{1/2} .t_{\delta=0} - \frac{1}{2}\left(\frac{\hat{\pi}^2 - \hat{\sigma}^2}{\hat{\pi}^2}\right).\left(\frac{T.SE(\hat{\delta})}{\hat{\sigma}^2}\right) \quad (4)$$

$$Z_\delta = T\hat{\delta} - \frac{1}{2}\frac{T^2.SE(\hat{\delta})}{\hat{\sigma}^2}\left(\hat{\pi}^2 - \hat{\sigma}^2\right) \quad (5)$$

Ng and Perron [32] developed efficient and a modified version of PP test by using generalized least square detrendingdata y_T^d. This procedure is also efficient for large negative errors and can do better estimation than PP test. The efficient and modified PP tests are as follows:

$$MZ_\alpha^d = (T^{-1}(y_T^d)^2 - f_0)/2k, \quad (6)$$

$$MSB^d = \left(k/f_0\right)^{1/2}, \quad (7)$$

$$MZ_t^d = MZ_\alpha^d \times MSB^d, \quad (8)$$

$$MPT_T^d = ((\bar{c})^2 k + (1-\bar{c})T^{-1})(y_T^d)^2 / f_0, \quad (9)$$

Zivot and Andrews [33] test uses the sequential ADF test to find the significant unknown break with the following set of equations.

$$Model\ A:\ \Delta Y_t = \mu_1^A + \gamma_1^A t + \mu_2^A DU_t(\lambda) + \alpha^A Y_{t-1} + \sum_{j=1}^{k} \beta_j \Delta Y_{t-j} + \varepsilon_t \quad (10)$$

$$Model\ B:\ \Delta Y_t = \mu_1^B + \gamma_1^B t + \gamma_2^A DT_t^*(\lambda) + \alpha^B Y_{t-1} + \sum_{j=1}^{k-1} \beta_j \Delta Y_{t-j} + \varepsilon_t \quad (11)$$

$$Model\ C:\ \Delta Y_t = \mu_1^C + \gamma_1^C t + \mu_2^C DU_t(\lambda) + \gamma_2^C DT_t^*(\lambda) + \alpha^C Y_{t-1} + \sum_{j=1}^{k-1} \beta_j \Delta Y_{t-j} + \varepsilon_t \quad (12)$$

where $DU_t(\lambda)$ is 1 and $Dt_t^*(\lambda) = t - T\lambda$ if $t > T\lambda$, 0 otherwise. $\lambda = {}^{T_B}\!/_{T}$, T_B represents a possible break point. Equation is tested sequentially for T_B=2,3,....,T-1, where T is the number of observations after adjustment of differencing and lag length *k*. Model (A) allows for a structural break in the intercept of the series, Model (B) allows for a structural break in the trend of a series, while Model (C) allows structural break in both intercept and trend. After testing the unit root problem in time series, cointegration technique will be applied on the basis of selected lag length for each variable in the equation (1) developed by Pesaran *et al*. [34]. The study uses the Schwarz Bayesian Criterion (SBC) to find the optimum relevant lag length. To find the cointegration amongst domestic investment, FDI, financial market development and GDP growth rate, ARDL model is as follows:

$$\Delta DIG_t = \delta_{e0} + \delta_{e1} DIG_{t-1} + \delta_{e2} FDIG_{t-1} + \delta_{e3} FMDG_{t-1} + \delta_{e4} GR_{t-1} + \sum_{i=1}^{p} \beta_{e1i} \Delta DIG_{t-i} + \sum_{i=0}^{q} \beta_{e2i} \Delta FDIG_{t-i} + \sum_{i=0}^{r} \beta_{e3i} \Delta FMDG_{t-i} + \sum_{i=0}^{s} \beta_{e4i} \Delta GR_{t-i} + \lambda_e D_{DIG} + \varepsilon_{et} \quad (13)$$

In equation (13), first difference of DIG_t is the dependent variable, the null hypothesis is (H_0: $\delta_{e1}=\delta_{e2}=\delta_{e3}=\delta_{e4}=0$) and alternate hypothesis is ($\delta_{e1}\neq\delta_{e2}\neq\delta_{e3}\neq\delta_{e4}\neq 0$) which shows existence of long run relationship in the model, δ_{e0} is a constant and ε_{et} is error term. D_{DIG} is included in equation for structural break and to complete information. This is also shown as F_{DIGt} (DIG_t/ $FDIG_t$, $FMDG_t$, GR_t). If cointegration exists in the model, then long run and short run coefficients will be calculated. Error correction term can be used to find the short-run relationship in the model. Error correction model is as follows:

$$\Delta DIG_t = \gamma_e + \sum_{i=1}^{p} \beta_{e1i} \Delta DIG_{t-i} + \sum_{i=0}^{q} \beta_{e2i} \Delta FDIG_{t-i} + \sum_{i=0}^{r} \beta_{e3i} \Delta FMD_{t-i} + \sum_{i=0}^{s} \beta_{e4i} \Delta GR_{t-i} + \phi_e D_{DIG} + \varphi_e ECT_{t-1} + \zeta_{et} \quad (14)$$

φ_e is showing the speed of adjustment from short run disequilibrium to long run equilibrium. Afterwards, diagnostic tests will be used to check the normality, functional form, heteroscedasticity and serial correlation in the model. CUSUM and CUSUMsq statistics will be used to ensure the stability of parameters.

Data: Data on domestic investment, foreign direct investment, domestic credit to private sector and GDP growth rate have been taken from World Bank [35]. Data has been taken from the period 1972 to 2010.

RESULTS AND DISCUSSION

The results of ADF, PP and Ng-Perron unit root tests are given in the Table (1).

Table (1) shows that DIG_t, $FDIG_t$ and $FMDG_t$ are non-stationary at level. GR_t is stationary at 1% level of significance with intercept and with both intercept and trend with ADF, PP and Ng-perron tests. Ng-Perron test show that GR_t is stationary at 5% level of significance in MSB and MPT test and not stationary in MZ_a and MZ_t tests with both intercept and trend.

After checking the unit root tests on all variables, the study applies Zivot-Andrews unit tests to check whether time series becomes stationary when a significant structural break is included in the analysis. Table (2) shows the results of Zivot-Andrews unit root test. DIG_t is non-stationary with significant breaks in 1983, 1990 and 1986 in models A, B and C of Zivot-Andrews test respectively. $FDIG_t$is stationary at 5% level of significance with breaks in 1999 and 1995 in models B and C respectively. It was not stationary in tests applied in Table (1). $FMDG_t$ is stationary with significant break for the year 1990 in intercept and non-stationary with significant breaks in trend for the year 2003 and in both intercept and trend for the year 1990. GR_t is stationary at 5% level of significance with significant break in intercept for the year 1985, significant break in trend for the year 1986 and significant break in both intercept and trend for the year 1986.

Table (3) shows that all variable are stationary at their first difference. Most of the variables are stationary at 1% level of significance. $dDIG_t$ is stationary at 5% level of significance in Ng-Perron (MSB) with both intercept and trend. $dFMDG_t$ is stationary at 5% level of significance in Ng-Perron (MZ_a and MZ_t) with both intercept and trend. dGR_t is stationary at 5% level of significance in Ng-Perron (Mz_a, MZ_t and MPT) with both intercept and trend. There is evidence for mix order of integration I(0) and I(1). So, ARDL model is suitable to apply here. The study finds the optimum lag length for ARDL model by using SBC and then includes dummy variable D_{DIG} in the ARDL model to complete the information in the model. Optimum lag length is 1 for $dDIG_t$, 0 for $dFDIG_t$, 1 for $dFMDG_t$ and 0 dGR_t. The study selects year 1986 for break period and puts 0 from 1972 to 1986 and 1 afterwards in D_{DIG}. The calculated F-statistic for selected ARDL model is given in Table (4).

Table (4) shows that F-statistic is 7.162. Which is greater than upper bound value and null hypothesis of no cointegration is rejected at 1% level of significance. So, the long run relationships exist amongst variables in the model. After testing the long run relationship, the long run estimates are calculated on the bases of selected ARDL model. The results are given in Table (5).

Table 1: Unit Root Tests at Level

			Ng-Perron			
Variable	ADF	PP	MZ_a	MZ_t	MSB	MPT
Model Specification: Intercept						
DIG_t	3.313(5)	1.452(9)	2.469(4)	2.809	1.069	7.541
$FDIG_t$	2.961(6)	-0.777(3)	6.168(1)	22.064	3.570	17.080
$FMDG_t$	-2.293(0)	-2.591(2)	-6.084(1)	-1.677	0.276	4.237
GR_t	-5.258**(1)	-5.269**(2)	-15.489**(1)	-2.707**	0.178*	0.643**
Model Specification: Intercept and Trend						
DIG_t	2.778(5)	1.356(7)	2.890(3)	1.521	0.526	8.713
$FDIG_t$	-0.379(4)	-1.919(3)	-12.050(1)	-1.339	0.152	5.962
$FMDG_t$	-2.907(0)	-3.071(2)	-0.802(0)	-1.895	0.236	11.648
GR_t	-5.471**(0)	-5.470**(1)	-14.559(0)	-2.878	0.173*	5.505*

Note: * and ** show stationarity of variables at the 0.05 and 0.01 level respectively. Brackets contain the optimum lag length

Table 2: Unit Root Tests: Zivot-Andrews

Variable	k	Year of Break	α	$t_{\hat{\alpha}}$	Type of Model
DIG_t	0	1983	-0.357	-3.259	A
	4	1990	-0.881	-4.417	B
	0	1986	-0.810	-5.069	C
$FDIG_t$	1	1999	-0.657*	-4.692	B
	4	1995	-1.718*	-5.392	C
$FMDG_t$	1	1990	-0.675*	-4.812	A
	1	2003	-0.605	-4.164	B
	1	1990	-0.700	-4.762	C
GR_t	5	1985	-1.618*	-4.902	A
	3	1986	-0.837*	-4.515	B
	0	1986	-1.159*	-5.159	C

Note: * and ** show stationarity of variables at the 0.05 and 0.01 level respectively

Table 3: Unit Root Tests at First Difference

			Ng-Perron			
Variables	ADF	PP	MZ_a	MZ_t	MSB	MPT
Model Specification: Individual Effects						
$dDIG_t$	-2.923*(4)	-4.413**(3)	-16.903**(2)	-3.111**	0.028**	0.047**
$dFDIG_t$	-5.067**(4)	-3.421**(6)	-139.200**(1)	-26.35**	0.018**	0.032**
$dFMDG_t$	-4.978**(0)	-4.967**(5)	-16.349**(1)	-2.835**	0.173**	1.587**
dGR_t	-6.296**(2)	-9.367**(7)	-15.195**(4)	-3.236**	0.106**	0.635**
Model Specification: Individual Effect and Individual Linear Trends						
$dDIG_t$	-4.855**(4)	-5.784**(1)	-26.896**(2)	-4.846**	0.167*	2.223**
$dFDIG_t$	-6.983**(4)	-4.281**(5)	-212.840**(1)	-10.295**	0.048**	0.483**
$dFMDG_t$	-5.030**(1)	-5.614**(5)	-19.083*(1)	-2.922*	0.151**	5.334*
dGR_t	-6.189**(2)	-9.145**(6)	-17.356*(0)	-2.769*	0.093**	4.942*

Note: * and ** show stationarity of variables at the 0.05 and 0.01 level respectively. Brackets contain p-value

Table 4: ARDL Bound Test: Using ARDL (1,0,1,0)

		At 0.05		At 0.01	
VARIABLES (when taken as a dependent)	F-Statistic	I(0)	I(1)	I(0)	I(1)
$d(DIG_t)$	7.162**	3.615	4.913	5.018	6.610

** Means at 1%, 5% significant levels reject the null hypotheses of no cointegration

* Means at 5% significant level reject the null hypotheses of no cointegration

Table 5: Long Run Results: Dependent Variable is DIG_t

Regressor	Parameter	S.E.	T-Statistic	P-value
$FDIG_t$	1.857	0.709**	2.620	0.012
$FMDG_t$	0.190	0.058***	3.265	0.003
GR_t	0.128	0.039***	3.316	0.003
C	9.188	1.414***	6.496	0.000
D_{DIG}	6.527	2.455**	2.658	0.013

Note: *, ** and *** show statistically significance of parameters at the 0.10, 0.05 and 0.01 respectively

Table 6: Error Correction Model: Dependent Variable is $dDIG_t$

Regressor	Parameter	S.E.	T-Statistic	P-value
$dFDIG_t$	0.173*	0.093	1.873	0.071
dGR_t	-0.046	0.049	-0.941	0.354
$dFMDG_t$	0.127***	0.039	3.202	0.003
dC	0.517***	0.171	3.018	0.005
dD_{DI}	0.774*	0.399	1.937	0.062
ECT_{t-1}	-0.124***	0.041	-3.002	0.005

Note: *, ** and *** show statistically significance of parameter at the 0.10, 0.05 and 0.01 level respectively. S. E. is standard error

Table 7: Diagnostic Tests

	LM version	P-value
Serial Correlation (χ^2)	2.327	0.127
Functional Form (χ^2)	0.029	0.865
Normality (χ^2)	1.904	0.386
Heteroscedasticity (χ^2)	0.794	0.373

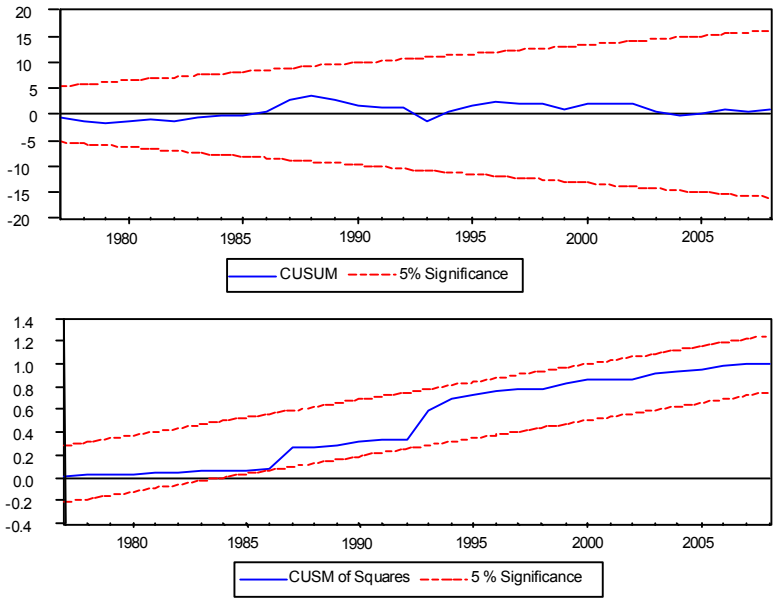

Fig. 1: CUSUM and CUSUMsq Test

The results in Table (5) show that the coefficient of $FDIG_t$ is positive and significant at 5% level of significance. So, FDI has a positive and significant impact on domestic investment. Result is proving the complementarily of FDI and domestic investment. So, FDI has a crowding-in effect on domestic investment in Pakistan. The coefficient of $FMDG_t$ is positive and significant at 1% level of significant. So, the financial market development has a positive impact on the domestic investment. The coefficient of GR_t is positive and significant at 1% level of significant. So, the economic growth has a positive and significant impact on the domestic investment. Intercept (C) is positive and significant at 1% level of significance. The coefficient of

D_{DIG} is positive and significant at 5% level of significance. It is also showing that intercept has changed after 1986. The short run estimates are given in Table (6).

Table (6) shows that all coefficients are statistically significant except dGR_t. Results show that FDI and financial market development have positive and significant impact on domestic investment in short run at 10% and 1% respectively. Coefficient of ECT_{t-1} is negative and significant at 1% level of significance. So, the short run relationship exists amongst variables in the model and speed of adjustment from short run disequilibrium to long run equilibrium is 12.4% in a year.

Results of Table (7) show that all p-values are greater than 0.1, so there is no problem of serial correlation, functional form, normality and heteroscedasticity in the model.

Figure (1) shows CUSUM and CUSUMsq tests. Figures show that CUSUM and CUSUMsq do not exceed the critical boundaries at 5% level of significance. This means that the model of domestic investment is correctly specified and the long run coefficients of regressors are reliable.

CONCLUSIONS

To check the impact of foreign direct investment on domestic investment, the study uses FDI, financial market development and GDP growth rate as independent variables. The study uses ARDL cointegration technique and its error correction model to check the long run and short run relationships in the domestic investment model. The dummy variable is also included in ARDL model after finding the optimum lag length to complete the information of model. The results show that the long run and short run relationships exist in the model. FDI, financial market development and economic growth have the positive and significant impact on the domestic investment. So, results prove that FDI has complementary effect on the domestic investment in Pakistan. Financial market development and economic growth play a positive role in enhancing the domestic investment.

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