# Causality and Long-run Analyses between Financial Globalization and Investment in Turkey

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**Abstract:** This study addresses the issue of long-run association between financial globalization and investment growth rate in Turkey. The annual dataset covers the years from 1988 to 2019 and analyses are conducted by using ARDL method for two distinct indicators of investment growth rate. The findings of ARDL boundary test for co-integration demonstrate that financial globalization and investment growth rate have a co-integrating relationship and they act together in the long run in Turkey for two different models in which gross capital formation as annual percentage growth rate and gross fixed capital formation as annual percentage growth rate are separately used as two different indicators of investment growth rate. Long-run coefficient estimations are statistically significant and get negative signs in both models. This result exposes that financial globalization worsens investment growth rate in Turkey in the long run. Moreover, the findings of diagnostic tests unveil that our models do not involve any sort of undesired econometric problems like autocorrelation, heteroscedasticity, non-normality, and model misspecification. Last analysis we performed is causality analysis and the results of causality analyses exhibit that there is no causality relationship between financial globalization and investment growth rate in Turkey for the period of 1988-2019.

**Key Words:** Globalization, Financial Globalization, Investment, Turkey, ARDL Method

## 1. INTRODUCTION

The positive income shock raises country's income level more than consumption level as well as with an increase in domestic saving and an outflow of net capital abroad, especially for advanced economies. Primarily, there are a decrease in both the capital inflows and outflows through investors that bring the money and sell assets abroad. On the other hand, in next periods, investors choose to send funds to the foreign country. Therefore, economy will have a negative capital inflows and positive capital outflows (Tille and Van Wincoop, 2010: 166). In this regard, fund surplus in advanced countries that provide essential source on economic growth, investment and consumption for developing countries is more likely to shift their moneys abroad, especially developing countries' financial markets. This process may provide contribution both of advanced and developing countries. In advanced economies, financial investors need higher actual interest yields because their economies present negative interest yields in financial markets. Hence, investors prefer foreign countries with high interest rate to protect themselves from the negative effects of inflation. On the other hand, in developing countries, they try to enhance the amount of capital inflows to achieve their macro- and microeconomic purposes.

First, this section looks at the effects of globalization on the economic growth. There are many papers for different countries and regions (Chang and Lee, 2011; Gurgul and Lach, 2014; Samimi and Jenatabadi, 2014). Kilic (2015) investigated three sub globalization indexes and economic growth relationship in 74 developing countries between 1981-2011 period. The findings indicated that economic growth is positively linked with the economic and political globalization, and they are statistically significant. In the remaining models, the impact of social globalization on economic growth is negative. Moreover, the findings show two-way causality relationship between political and social globalization and the economic growth while one-way causality is found running from social globalization to economic growth. More specifically, if we look at the empirical relationship between financial globalization and economic growth examined in the literature, there are also detailed papers (Egbetunde and Akinlo, 2015; Ehigiamusoe and Lean, 2019). For example, in one of the latest studies, Bhanumurthy and Kumawat (2020) tested for the relation between financial globalization and economic growth for the South Asian region, including Bhutan, Bangladesh, India, Maldives, Nepal, Pakistan, and Sri Lanka, in the period 1990-2015. The study findings provided evidence supporting a bidirectional causality between the variables.

Second, in this section, we will focus on the studies which fills the gap in the literature by providing some evidence on the relationship between

globalization and productivity. Productivity as one of the factors triggering economic growth is related to globalization. In addition, globalization process can lead to a higher productivity level because it can help to attract transfer of advanced technologies and production methods to host country. Hence, it is worth to note that there are some empirical studies to focus on the effect of globalization on the productivity in the existing literature (Okşak, 2018; Koyuncu and Unver, 2021; Özen, 2021). One of such studies is by Koyuncu and Unver (2018), which analyses the role of globalization on labor productivity using a balanced panel data of 34 OECD economies in the period 2002-2012. The results suggest that globalization seems to be positively related with labor productivity while there is also no causality relationship between the variables using panel causality test method.

Increasing capital inflows implies the real appreciation of national currency that leads to decrease private sector's investment motivation through the disadvantages of investment in tradable. Therefore, the effects of capital inflows on investments and economic growth may be negative while their effect on consumption is positive (Rodrik and Subramanian, 2009: 114-115). In this sense, there are some studies investigating the relationship between financial liberalization and investment with empirical evidence that financial integration significantly influences capital formation. Bonfiglioli (2008) argue the role of financial globalization in economic performance for evaluating the advantages and disadvantages of financial openness by using data of 70 countries for the years from 1975 to 1999. The findings suggest that financial integration influenced positively and directly productivity, while the overall effect of financial liberalization is insignificant for investment. Using dataset in the case of European integration for the years 1990-2007, Gehringer (2013) investigates the effect of international financial integration on economic growth, total factor productivity growth rate and investment. The results indicate that a rise in financial liberalization leads to a significantly positive and robust effect on the economic growth and its crucial sources, namely productivity growth and investment.

Generally, this study's motivation to investigate the long run relationship between financial globalization and investment is twofold. First, we aim to explore this relation by using ARDL estimation method for two different indicators for investment growth rate in our analyses in Turkey. Second, it appears that financial globalization reduces investment for Turkey in our findings while financial globalization has generally been considered an important channel to support investment level in the literature.

The rest of the study is divided as follows. In Section 2 a presentation of data and methodology is showed. Section 3 presents study's empirical results and their debate. Finally, Section 4 summarize fundament conclusions.

## 2.Data and Methodology

Financial globalization may reduce or augment investment level in a country. Firms in a country may have chance to find low-rate credits from abroad for funding their investments as a result of financial globalization. From this perspective financial globalization can increase investment level in the relevant country. On the other hand, firms may prefer to make investment in abroad by transferring money to abroad in order to benefit from advantages and incentives of the host country as a result of financial globalization. Also, firms may incline to invest on domestic or foreign financial instruments (e.g., hedge funds, crypto money etc.) possessing relatively higher potential returns rather than making physical investment (i.e., purchasing capital goods). From this perspective financial globalization can decrease investment level in the relevant country. The ultimate effect of financial globalization on investment will rely on which one of those two effects (i.e., increasing and decreasing effects) of financial globalization dominates to another. Therefore, the eventual impact of financial globalization on investment is ambiguous. In consideration of previous discussion, this study addresses the long-run nexus between financial globalization and investment growth rate in Turkey. Besides the direction of causality between financial globalization and investment growth rate are examined as well. The sample comprises of an annual dataset covering years from 1988 to 2019 and analyses are conducted by utilizing ARDL estimation method. We use two different indicators for investment growth rate (INVESTGRO) in our analyses. These are gross capital formation as annual percentage growth rate (INVESTGRO1) and gross fixed capital formation as annual percentage growth rate (INVESTGRO2) and they were collected from WDI of the World Bank. The data on financial globalization (FINGLOBAL) were gathered from KOF globalization index of Zurich Technology Institute. Due to the ambiguous impact of financial globalization on investment, we hypothesize that financial globalization improves/deteriorates investment growth rate in Turkey in the long run. Hence, we performed long-run analyses via ARDL estimation method in order to figure out the validity of this hypothesis.

ARDL boundary test for co-integration was conducted to check if two series (i.e., INVESTGRO and FINGLOBAL) act together in the long run. For that purpose, the ARDL model below is constituted and estimated:

$$\Delta INVESTGRO_t = \gamma_0 + \sum_{i=1}^{p} \alpha_i \Delta INVESTGRO_{t-i} + \sum_{i=0}^{q} \theta_i \Delta FINGLOBAL_{t-i} + \phi_0 INVESTGRO_{t-1} + \phi_1 FINGLOBAL_{t-1} + \varepsilon_t \quad (1)$$

In Equation 1 above, $\phi_0$ and $\phi_1$ represent the long-run coefficients; $\alpha_i$ and $\theta_i$ show short-run coefficients; $\Delta$ stands for first degree difference operator; $\gamma_0$ is constant of the model, and $\varepsilon_t$ is white noise error term of the model.

In co-integration test based on ARDL boundary test, the null hypothesis claims that INVESTGRO and FINGLOBAL series are not co-integrated (i.e., $H_0 : \phi_0 = \phi_1 = 0$). Unlike the null hypothesis, the alternative hypothesis alleges that INVESTGRO and FINGLOBAL series are co-integrated (i.e., $H_1 : \phi_0 \neq \phi_1 \neq 0$). F-statistic value gathered from ARDL boundary test beyond the upper limit at a particular significance level implies existence of a co-integrating association between INVESTGRO and FINGLOBAL series whereas F-statistic value gathered from ARDL boundary test falling short of the lower limit at a particular significance level indicates absence of a co-integrating association between INVESTGRO and FINGLOBAL series. Meanwhile F-statistic value gathered from ARDL boundary test falling in between those two limits leaves us indecisive on co-integrating relationship.

After performing co-integration analysis based on ARDL boundary test, the following error correction model is constructed and estimated to be able to get short and long-run coefficients:

$$INVESTGRO_t = \beta_0 + \sum_{i=1}^{p} \lambda_i \Delta INVESTGRO_{t-i} + \sum_{i=0}^{q} \varphi_i \Delta FINGLOBAL_{t-i} + \varsigma ECM_{t-1} + \varepsilon_t \quad (2)$$

In Equation 2 above, $\lambda_i$ and $\varphi_i$ show the dynamic coefficients returning back the model to the balance in the long-run; $ECM$ represents error correction term; $\varsigma$ notation stands for the speed of adjustment at which the series go back to long-run path in response to a shock occurred in short-run. The coefficient of speed of adjustment should be statistically significant and take a negative sign.

**3.Empirical Results**

As it is known, ARDL boundary test for co-integration is applicable to only those series with integration order no more than two (i.e., no higher than I (2)). Hence firstly the stationarity of series used in the analyses must be checked. In that sense we conducted Augmented Dickey-Fuller (ADF) unit root test by utilizing three different models, namely none, constant, and constant and trend. The null hypothesis of the ADF unit root test states that relevant variable is non-stationary while the alternative hypothesis of the ADF unit root test expresses that relevant variable is stationary. ADF unit root test results are displayed in Table 1.

Table 1: ADF Unit Root Test Results

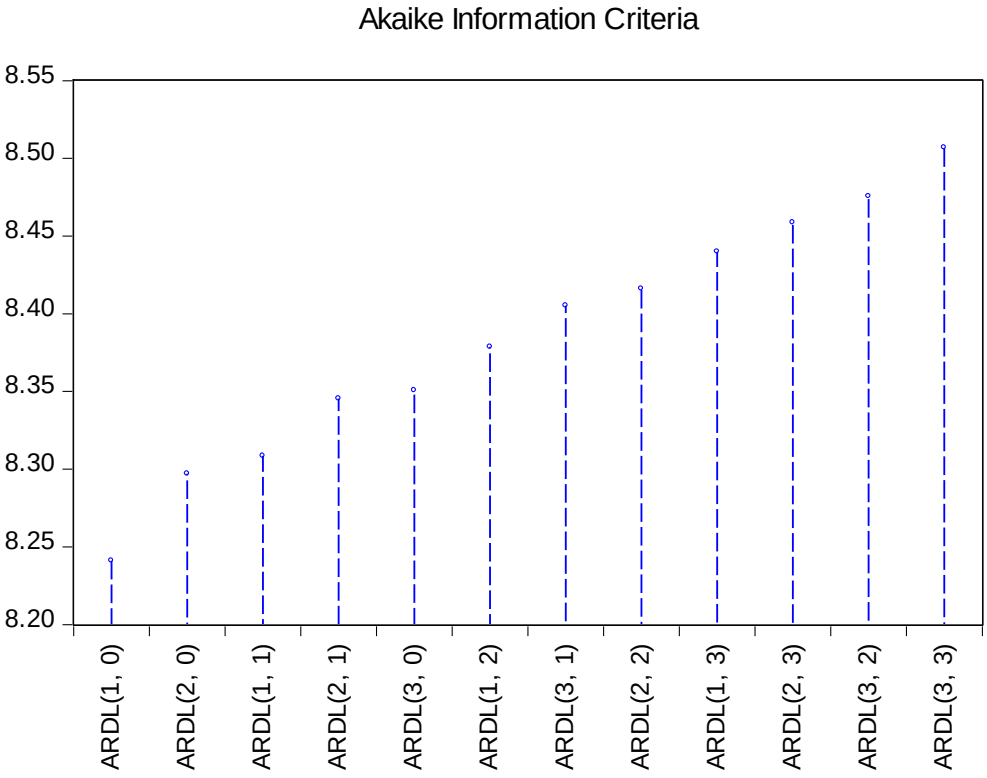
| Variable | Model | Test Statistic (P-value) |
|---|---|---|
| INVESTGRO1 | None | -6.463560 *(0.0000)* |
| | Constant | -7.740603 *(0.0000)* |
| | Constant&Trend | -7.688621 *(0.0000)* |
| INVESTGRO2 | None | -4.787278 *(0.0000)* |
| | Constant | -5.787069 *(0.0000)* |
| | Constant&Trend | -5.670710 *(0.0003)* |
| FINGLOBAL | None | 0.440729 *(0.8055)* |
| | Constant | -1.652386 *(0.4485)* |
| | Constant&Trend | -1.724536 *(0.7249)* |
| $\Delta$ FINGLOBAL | None | -6.444244 *(0.0000)* |
| | Constant | -6.466786 *(0.0000)* |

| | |
|---|---|
| Constant&Trend | -6.488153 *(0.0000)* |

ADF unit root test findings in Table 1 shows that both INVESTGRO1 and INVESTGRO2 variables do not have a unit root and thus they are stationary at levels (i.e., they are integrated order zero) for three different models. However, as seen from Table 1, FINGLOBAL variable contains a unit root at level thus FINGLOBAL variable is not stationary at level, but FINGLOBAL variable does not contain a unit root at first difference (i.e., it is stationary at first difference and integrated order one). In overall ADF unit root test results indicate that INVESTGRO1 and INVESTGRO2 variables are integrated order zero and FINGLOBAL variable is integrated order one, which do not violate the integration order requirement of being integrated order no more than two of ARDL boundary test. Therefore, we are eligible to perform ARDL boundary test to check the co-integration relationship between financial globalization and investment growth rate.

We used Akaike information criterion to identify the optimal lag lengths for the model given in Equation 1. Graphs 1 and 2 below display the results for optimal lag selection for the model. Out of twelve models, ARDL (1,0) model was identified as the optimal model for both models utilizing INVESTGRO1 and INVESTGRO2 as proxies for investment growth rate. Hence our analyses will be conducted by relying on ARDL (1,0) model.

Graph 1: Lag Selection for the Model in which INVESTGRO1 is Indicator



Graph 2: Lag Selection for the Model in which INVESTGRO2 is Indicator

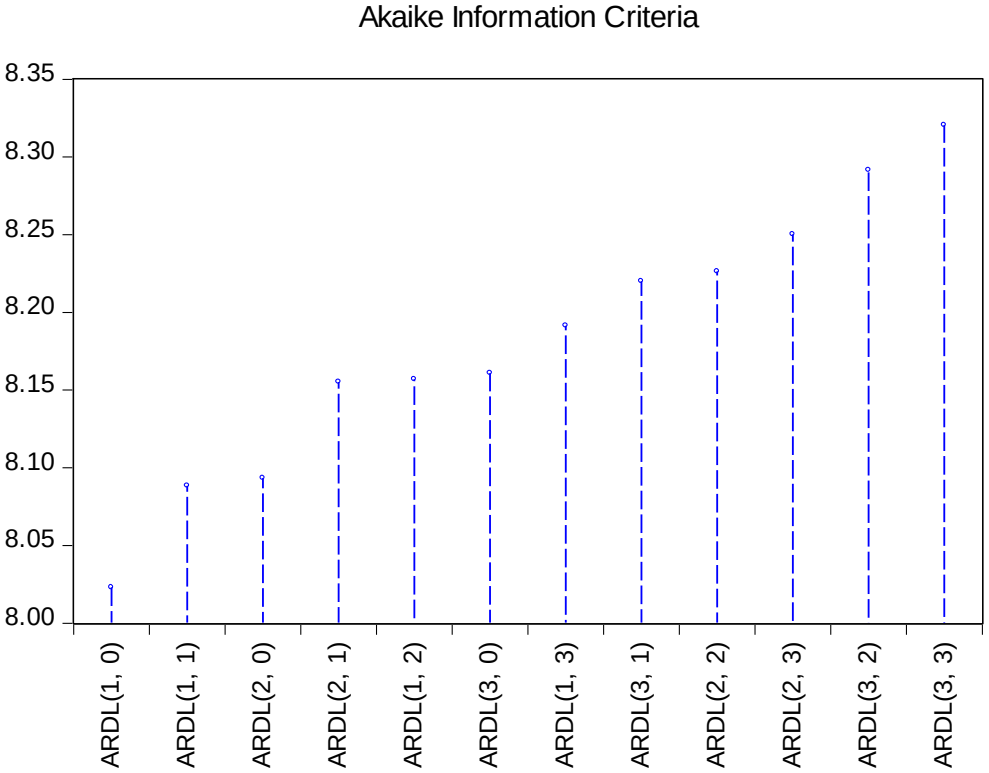



Table 2 reports ARDL boundary test results for the model given in Equation 1 in which INVESTGRO1 and INVESTGRO2 are indicators of investment growth rate. In Panel A, F-statistic value of 22.26538 is far beyond the upper bound critical value at all significance level and In Panel B, F-statistic value of 13.10481 is also larger than the upper bound critical value at all significance level. Therefore, we can conclude that financial globalization and investment growth rate act together in the long-run and they are co-integrated.

Table 2: ARDL Boundary Test Results

| *Panel A: ARDL Boundary Test Results for Model in which INVESTGRO1 is Indicator* | | |
|---|---|---|
| **F-statistic:** *22.26538* | **Critical Values** | |
| ***Significance*** | $I(0)$ ***Bound*** | $I(1)$ ***Bound*** |
| 10% | 4.05 | 4.49 |
| 5% | 4.68 | 5.15 |
| 2.50% | 5.3 | 5.83 |
| 1% | 6.1 | 6.73 |
| *Panel B: ARDL Boundary Test Results for Model in which INVESTGRO2 is Indicator* | | |
| **F-statistic:** *13.10481* | **Critical Values** | |
| ***Significance*** | $I(0)$ ***Bound*** | $I(1)$ ***Bound*** |
| 10% | 4.05 | 4.49 |
| 5% | 4.68 | 5.15 |
| 2.50% | 5.3 | 5.83 |
| 1% | 6.1 | 6.73 |

Long-run coefficient estimation results are shown in Table 3 for both models. As indicated by the Table 3, financial globalization and investment growth rate are negatively related in the long run in Turkey for both models and this result supports the co-integration test results given in Table 2. In other words, financial globalization decreases investment growth rate in Turkey in the long run.

Table 3: Long-run Coefficients of ARDL (1,0) Models

| *Panel A: Model in which INVESTGRO1 is Indicator* | | | |
|---|---|---|---|
| *Variable* | *Coefficient* | *t-statistic* | *Prob.* |
| *FINGLOBAL* | -1.345094 | -3.363461 | 0.0024 |
| *TREND* | 0.170884 | 0.827955 | 0.4152 |
| *Panel B: Model in which INVESTGRO2 is Indicator* | | | |
| *Variable* | *Coefficient* | *t-statistic* | *Prob.* |
| *FINGLOBAL* | -1.510997 | -3.349004 | 0.0025 |
| *TREND* | 0.320280 | 1.422370 | 0.1668 |

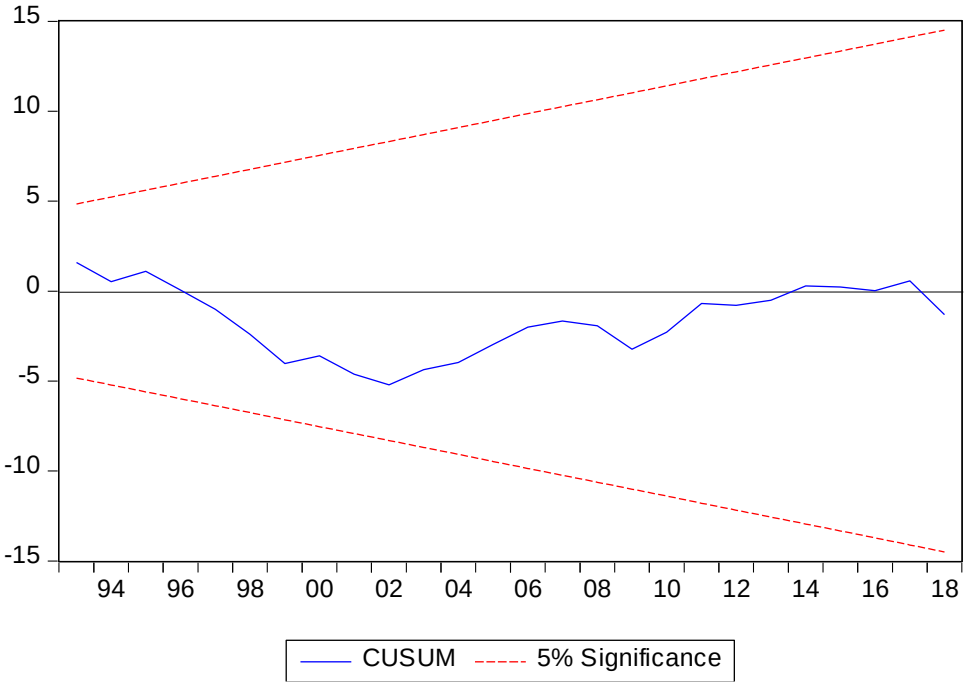
Table 4 reports short-run coefficient estimations and findings of diagnostic test for both models. As implied by Table 4, short-run coefficients of FINGLOBAL variable in both ARDL (1,0) models are statistically significant and possesses negative sign. The coefficients of error correction terms in both models take the anticipated negative sign and are also statistically significant at 1% significance level. Meantime we checked if the models suffer from any sort of problems as part of autocorrelation, heteroscedasticity, non-normality, and model specification by conducting diagnostic tests given in Table 4 underneath short-run estimations in each panel. Diagnostic test results of ARDL (1,0) models hint that the models do not comprise any problem in context of serial correlation, heteroscedasticity, non-normal distribution, and model misspecification at least at 5% significance level.

Table 4: Short-run&Diagnostic Results of ARDL (1,0) Model

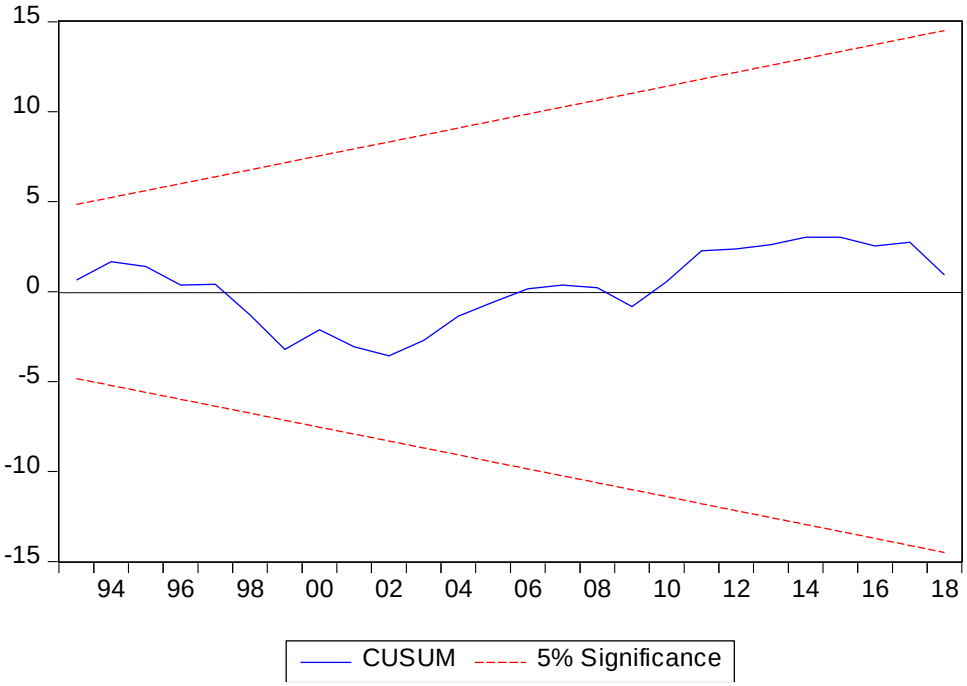
| *Panel A: Model in which INVESTGRO1 is Indicator* | | | |
|---|---|---|---|
| | *Coefficient* | *t-Statistic* | *Prob.* |
| $\Delta FINGLOBAL$ | -2.010277 | -3.512903 | 0.0016 |
| C | 104.149463 | 9.152397 | 0.0000 |
| $ECM_{t-1}$ | -1.487294 | -9.325750 | 0.0000 |
| ECM = $INVESTGRO1$ - (-1.3451*FINGLOBAL+ 0.1709*$TREND$) | | | |
| **Diagnostic Tests** | | | |
| Tests | | Test Value (Prob.) | |
| Breusch-Godfrey Serial Correlation LM Test | | 0.968390 *(*0.3940*)* | |
| ARCH Heteroskedasticity Test | | 0.590512 *(*0.4489*)* | |
| Ramsey RESET Test | | 2.143331 *(*0.1557*)* | |
| Jarque-Bera Test | | *0.632918 (0.728725)* | |
| *Panel B: Model in which INVESTGRO2 is Indicator* | | | |
| | *Coefficient* | *t-Statistic* | *Prob.* |
| $\Delta FINGLOBAL$ | -1.807405 | -3.513065 | 0.0016 |
| C | 90.162306 | 6.504576 | 0.0000 |
| $ECM_{t-1}$ | -1.221818 | -6.547255 | 0.0000 |
| ECM = $INVESTGRO2$ - (-1.5110*FINGLOBAL+ 0.3203*$TREND$) | | | |
| **Diagnostic Tests** | | | |
| Tests | | Test Value (Prob.) | |
| Breusch-Godfrey Serial Correlation LM Test | | 0.255735 *(*0.7764*)* | |
| ARCH Heteroskedasticity Test | | 0.388763 *(*0.5382*)* | |
| Ramsey RESET Test | | 3.590145 *(*0.0697*)* | |
| Jarque-Bera Test | | *1.126830 (0.569262)* | |

Cusum test of model stability was performed, and the findings are shown in Graph 3 and 4 for ARDL (1,0) models. As can be deducted from Graph 3 and 4, neither of ARDL (1,0) models puts up with model instability.

Graph 3: Cusum Test for Model in which INVESTGRO1 is Indicator




Graph 4: Cusum Test for Model in which INVESTGRO2 is Indicator




The last analysis we conducted in this study is causality test between financial globalization and investment growth rate by utilizing VAR Granger Causality/Block Exogeneity Wald Tests. Optimal lag length for unrestricted VAR model was chosen based on AIC criterion and VAR (1,1) was determined as the optimal model for both cases. We identified no causality between financial globalization and investment growth rate for both cases.

**Table 5: Causality Test**

| | | | |
|---|---|---|---|
| *Panel A: Model in which INVESTGRO1 is Indicator* | | | |
| Dependent variable: INVESTGRO1 | | | |
| | Chi-sq | df | Prob. |
| FINGLOBAL | 1.860465 | 1 | 0.1726 |
| Dependent variable: FINGLOBAL | | | |
| | Chi-sq | df | Prob. |
| INVESTGRO1 | 0.053079 | 1 | 0.8178 |
| *Panel B: Model in which INVESTGRO2 is Indicator* | | | |
| Dependent variable: INVESTGRO2 | | | |
| | Chi-sq | df | Prob. |
| FINGLOBAL | 1.424208 | 1 | 0.2327 |
| Dependent variable: FINGLOBAL | | | |
| | Chi-sq | df | Prob. |
| INVESTGRO2 | 0.929506 | 1 | 0.3350 |

## 4.Conclusion

In the literature, there exist numerous studies that economic aspect of globalization and interaction of globalization with macroeconomic indicators were addressed. In contrast to them, this study more specifically deals with the long-run nexus between financial globalization and investment growth rate in Turkey for years of 1988-2019 by using ARDL approach for two distinct indicators of investment growth rate. Firstly, we implemented co-integration analyses by means of ARDL boundary test to see whether or not financial globalization and investment growth rate have a co-movement in the long run in Turkey. ARDL boundary test findings reveal that financial globalization and investment growth rate in Turkey are co-integrated and thus they move together in the long run. This identified co-integrating association between financial globalization and investment growth rate remain valid for both models in which gross capital formation as annual percentage growth rate and gross fixed capital formation as annual percentage growth rate are separately used as two different indicators of investment growth rate. Following the identification of co-integration, we obtained long-run and short-run coefficient estimation in the framework ARDL technique. Long-run coefficient estimations are significant and have negative signs in the models. This hints that negative impact side of financial globalization overrides positive impact side of financial globalization and hence financial globalization spoils investment growth rate in Turkey in the long run. Moreover, the findings of diagnostic tests unveil that our models do not involve any sort of undesired problems like autocorrelation, heteroscedasticity, non-normality, and model misspecification. Last analysis we performed is causality analysis and the results of causality analyses exhibit that there is no causality relationship between financial globalization and investment growth rate in Turkey for the period of 1988-2019.

## REFERENCES

Bhanumurthy, N. R., & Kumawat, L. (2020). Financial globalization and economic growth in South Asia. South Asia Economic Journal, 21(1), 31-57.

Bonfiglioli, A. (2008). Financial integration, productivity and capital accumulation. Journal of International Economics, 76(2), 337-355.

Chang, C. P., & Lee, C. C. (2011). The effect of globalization and political party on economic growth: Panel data analysis of former communist countries and European OECD members. Eastern European Economics, 49(6), 5-26.

Egbetunde, T., & Akinlo, A. E. (2015). Financial globalization and economic growth in Sub-Saharan Africa: Evidence from panel cointegration tests. African Development Review, 27(3), 187-198.

Ehigiamusoe, K. U., & Lean, H. H. (2019). Do economic and financial integration stimulate economic growth? A critical survey. Economics, 13(1), 1-27.

Gehringer, A. (2013). Growth, productivity and capital accumulation: The effects of financial liberalization in the case of European integration. International Review of Economics & Finance, 25, 291-309.

Gurgul, H., & Lach, Ł. (2014). Globalization and economic growth: Evidence from two decades of transition in CEE. Economic Modelling, 36, 99-107.

Kilic, C. (2015). Effects of Globalization on Economic Growth: Panel Data Analysis for Developing Countries.

Petroleum-Gas University of Ploiesti Bulletin, Technical Series, 67(1).

Koyuncu, C. & Unver, M. (2018). Is There a Long-run Association between Globalization and Labor Productivity?: Panel Evidence from OECD Countries. Sosyal Bilimler Araştırma Dergisi, 7(3), 32-41.

Koyuncu, J. Y. and Unver, M. (2021). Are Openness and Productivity Associatedin Turkey?: Evidence from Long-run Analysis, Rasim Yilmaz and Günther Löschnigg (Eds.), Studies on Balkan and Near Eastern Social Sciences, Volume: 5, (pp.63-73). Berlin: Peterlang.

Okşak, Y. (2018). Is there a long-run association between globalization and productivity: The case of Turkey. Turkish Economic Review, 5(2), 215-222.

Rodrik, D., & Subramanian, A. (2009). Why did financial globalization disappoint?. IMF staff papers, 56(1), 112-138.

Samimi, P., & Jenatabadi, H. S. (2014). Globalization and economic growth: Empirical evidence on the role of complementarities. PloS one, 9(4), e87824.

Tille, C., & Van Wincoop, E. (2010). International capital flows. *Journal of international Economics*, *80*(2), 157-175.

Özen, E. (2021). Productivity, Globalization and Rents in Developing Economies, Rasim Yilmaz and Günther Löschnigg (Eds.), Studies on Balkan and Near Eastern Social Sciences, Volume: 5, (pp.37-47). Berlin: Peterlang