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# Inflation and foreign direct investment in Turkey

*This study investigates the short-term and long-term relationship and causality between inflation and foreign direct investments during the 1974–2018 periods for Turkey. The Johansen and Juselius Cointegration Method and the Error Correction Method (VECM) have been applied to examine this issue. After finding the cointegration between the variables, the VECM has been estimated and long-term and short-term causality tests have been carried out based on the VECM. The results have shown that there is no short-term causality between inflation and foreign direct investments in both models. However, the fact that the coefficient of the error correction term (ECT) is negative and significant in both models indicates that there is a long-term causality between inflation and foreign direct investment. An increase in foreign direct investment may lead to a moderate increase in inflation over a long time period.*

**Keywords:** inflation; foreign direct investment; cointegration; causality.
**JEL classification:** B22; B23; E31; D25.

## Introduction

There is a widespread belief that inflation hampers investment and economic growth. Since inflation lowers the purchasing power of money, interest rates also increase, and as a result, real output declines. As the Fisher Effect argues, when inflation rises, nominal interest rates should also increase. The rise in interest rates adversely affects investments and, in turn, causing a decrease in real GDP in the short-run. Total investments go down because the increase in interest rate negatively affects both domestic investment demand and foreign direct investments.

Neoclassical economics claims the existence of an inverse relationship between inflation and economic growth. Uygur (2012) examined the factors that affect foreign direct investment in Turkey, using time series data from 1992:4 to 2004:4. Domestic fixed capital investment, exports, inflation, real interest rates, consolidated budget balance, and growth as core variables that may affect foreign direct investment (FDI). The causality tests showed that the real treasury interest rates and consolidated budget balance are the two most important variables affecting the level of FDI. This conclusion also implicitly supports the neoclassical view that there is an inverse relationship between inflation and real GDP.

Mundell (1965) and Tobin (1965), however, stated that since inflation increases the cost of money, individuals who want to avoid risk and maintain real income levels change their portfolio decisions in favor of capital. Thus, the real interest rates will decrease, and growth will accelerate

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as capital accumulation increases. In the 1960s, when the Phillips curve was famous, the idea that the inflation-growth relationship was positive in the short term was generally accepted. Tobin (1965) and Sidrauski (1967) stated that even in the long-term, there was a positive relationship between inflation and reel GDP growth. At the heart of this view is the idea that there is a positive correlation between inflation and capital accumulation and that inflation will accelerate capital accumulation.

Contrary to Mundell and Tobin, Terzi and Oltulular (2018) found that there was a negative and significant relationship between Inflation-growth and inflation-fixed capital stock expenditures. This conclusion supports the neoclassical theory. Ateşoğlu (2005) found that the decline in inflation, in the long term, may lead to a slight decrease in real investment in the United States. Ericsson, Irons, and Tryon (2001) have shown a positive correlation between inflation and real production level in Canada, France, Germany, Italy, Japan, the United Kingdom, and the United States (G7 countries). Ericsson et al. have found the results that have compromised the accuracy of the low inflation targeting strategy.

Korkmaz, Haghparast, and Korkmaz (2008) showed that there was no relationship between inflation and foreign direct investment for the period from January 2001 to March 2007. The results raise doubts on arguments for low-inflation is desired by international companies. Foreign companies usually are willing to invest in countries with stable macroeconomic conditions, such as low and stable inflation. Omankhanlen (2011) analyzed the effect of the exchange rate and inflation on FDI and economic growth in Nigeria for thirty years. His results suggest that FDI is encouraged by economic growth with liberal trade policies in some industries. Inflation, however, does not have a statistically significant effect on FDI. Exchange rate changes affect the flow of FDI.

Oke (2012) examined the relationship between FDI and financial sector growth, providing empirical evidence from Nigeria using annual time series data from 1981 to 2010. The finding suggested that the inflow of the FDI had a positive effect on the financial sector in the short-run. Still, it had failed to turn into real long financial sector growth that could stimulate rapid economic growth. On the other hand, the author concluded that FDI to the financial sector improved to the output of the Nigerian capital market. The improvement in the capital market means that production will increase as factor efficiency increases. Another conclusion is that inflation and foreign debt negatively affect FDI inflow to the Nigerian finance sector in the short-term.

Mangir, Ay, and Saraç (2012) investigated the determinants of FDI in Poland and Turkey using monthly data for the period of 2000–2009. They used the Granger causality test and the Vector Autoregression Model in the study. They concluded that FDI inflows have a positive correlation with market size and openness of the economies. The study could not find any relationship between FDI and inflation in both countries. However, Li, Woodard, and Leatham (2013) found the opposite conclusions. They examined the causal structure between FDI and economic growth and found that economic growth causes FDI inflows for developing countries. In contrast, FDI induces economic growth for developed countries.

Bibi, Ahmad, and Rashid (2014) looked into the role of trade openness, inflation, imports, exports, real exchange rate, and foreign direct investment for economic growth in Pakistan for the period 1980 to 2011. Their results suggest the existence of a long-run relationship among the variables. FDI and trade contribute to economic growth. Trade openness and inflation, however, have an inverse relationship with real GDP. Amoah, Nyarko, and Asare (2015) analyzed the relationship between GDP growth, FDI, inflation, and the real exchange rate in Ghana from 1980 to 2013. Their study results show unidirectional causality between GDP growth rate and exchange rate, and bidirectional causality between the inflation rate and exchange rate, and between inflation

rate and GDP. FDI, however, does not granger cause for inflation rates, exchange rates, or GDP to change.

Yüce and Zelaya (2014) investigated the foreign direct investment decisions of the multinational companies in China and India between 2003 and 2008. Their results indicate that large market size, high GDP growth, and low wages are the major determinants of foreign direct investment decisions. Although the result of this study appears to be indirectly related to our research, it makes sense because real wages go down during inflation periods. In all economic approaches, there is a negative relationship between labor demand and real wages. For example, when real wages decrease both in the classical approach and in the Keynesian approach, the demand for labor increases.

Bayar (2014) examined the relationship among saving, foreign direct investment, and GDP in emerging Asian countries during the period of 1982–2012 using Pedroni, Kao, and Johansen-Fisher panel cointegration tests and vector error correction model. He found that gross domestic savings, gross domestic investment, and foreign direct investment inflows had a positive effect on economic growth in the long-term. This result is not surprising because savings increase will reduce the interest rates and which increase total investments by lowering costs. Angelopoulou (2014) empirically examined the relationship between FDI and economic growth, implementing a panel data analysis for a period of 1989–2008, and found some results which are a contrast to the previous studies. The author did not find a robust causality relationship between FDI and economic growth.

Alshamsi, Hussin, and Azam (2015) examined the impact of the inflation rate and GDP per capita on FDI in the United Arab Emirates (UAE) for the period of 1980 to 2013. Their results show that inflation has no significant effect on FDI inflows, and GDP per capita has a positive impact on FDI inflows. Mwakanemela (2014) investigated the impact of FDI, trade openness, inflation rate on the performance of the manufacturing export for Tanzania for 1980–2012. The model results show that FDI inflows and trade openness have a positive impact on manufacturing exports while the inflation rate is inversely related to manufacturing exports. The study concludes that Tanzania should encourage FDI and trade openness-led polices and reduce the inflation rate to enhance its manufacturing export performance. Musyoka and Ocharo (2018) analyzed the effect of real interest rates, exchange rate, inflation, and competitiveness on FDI in Kenya by using data from 1970 to 2016. They found that real interest rates and exchange rates have a negative and statistically significant impact on FDI. Their results also showed that competitiveness has a positive and statistically significant effect on FDI. Inflation, however, does not have a statistically significant impact on FDI in Kenya.

Tsaurai (2018) investigated the impact of inflation on FDI and also explored whether a financial development is a channel through which the effects of inflation on FDI in Southern Africa could be moderated, using panel data analysis from 1995 to 2014. The findings of the study reveal that under fixed effects, inflation has a positive impact on FDI, but this is not statistically significant. However, when a random effect is considered, inflation has a negative impact on FDI, but this is not statistically significant. On the other hand, under the pooled OLS, inflation has a significant negative influence on FDI in Southern Africa.

Çoban and Yussif (2019) analyzed the relationship among economic growth, foreign direct investment, and inflation applying the Autoregressive Distributed Lags (ARDL) model and the Toda and Yamamota (1995) causality test for Ghana from 1980 to 2017. They suggest that inflation hampers foreign direct investment and economic growth, meaning that inflation relates negatively to both

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FDI and economic growth. They also found bidirectional causality between FDI and inflation. The reason for the bidirectional causality is that foreign investments are moving towards the country where real wages fall as inflation reduces real wages. At the same time, FDI increases average income in the host country, increasing demand that causes inflation.

This present study attempts to investigate the empirical relationship between inflation and foreign direct investment in Turkey for the 1974–2018 period by using the Johansen and Juselius Cointegration Method and Vector Error Correction Model. This study is important since the Turkish economy has been experiencing a challenging time in recent years, with low economic growth rates accompanied by high inflation. FDI has also been on a declining trend. Inflation has severe economic consequences impacting many of the economic indicators, including FDI. Therefore, it is crucial to examine the relationship between inflation and FDI.

The next section of the study summarizes a brief history of economic developments in Turkey. Section 2 discusses the data and methodology. Section 3 provides empirical results of the research. The final section presents the conclusion.

## 1. Economic policies in Turkey

The Turkish economy, having experienced a challenging decade in the 1970s, faced many challenges a needed a significant rethinking of economic affairs. Two oil price shocks and economic embargo highlighted the decade with a substantial decline in the economy. On January 24, 1980, an economic reform and stabilization program adopted to liberalize the Turkish economy and restore the economic conditions. The program aimed to stimulate economic growth, improve efficiency, increase domestic savings, and attract foreign direct investment. The economy has stabilized and began to recover soon after the implementation of these measures. The government liberalized trade policy and ended interest rate controls between 1980 and 1984. The government also took steps to transform an import-substitution-oriented-closed economy into an export-oriented, private-sector-driven, free-market economy by reducing the state's involvement in the marketplace. The measures included a reduction in agricultural product support purchases, elimination of subsidies other than fertilizers, energy, and transportation. The government also initiated foreign trade liberalization (Rodrik, 1990).

One of the most critical features of the January 24 decisions is the move toward the determination of the prices of goods, labor, capital, and foreign exchange in competitive market conditions. In 1984, Turkey took the first step to switch from the fixed exchange rate to the market-determined exchange rate system. Turkey signed a three-year stand-by agreement with the IMF for the years between 1980 and 1983. This agreement provided Turkey with urgently needed foreign currency to import inputs to increase domestic production.

The government opened the domestic economy to foreign capital flows and facilitated the entry of new banks in the banking system in the second phase, between the years 1985 and 1989 (Boratav, Yeldan, 2006). The government took measures to encourage foreign capital investments and make it easier to repatriate profits for international companies. The government gradually reduced import restrictions on inputs necessary for the production of exported goods. Tax rebates and low-interest credits provided by the government increase the import exemptions for raw materials of the exported products. In 1989, the government adopted the floating exchange regime.

Turkish economy experienced two major economic crises one in 1994 and one in 2001. Populist economic policies with ill-advised monetary and fiscal policies, however, compromised the stabilization program. The government took some measures to reduce inflation rates by lowering interest rates and canceled internal debt bond offerings. These measures worsen the economic conditions, and a financial crisis emerged.

Economic conditions were dire at the start of 1994. IMF helped the Turkish government to launch a new economic stabilization program on April 5, 1994. The new stabilization program stimulated the economy, and macroeconomic indicators improved. The government, however, did not take the necessary measures to keep the economy going and did not make new structural changes. Turkish economy deteriorated and experienced another major crisis in 2001 (Eğilmez, 2018).

Turkey launched another stabilization program with the IMF help of IMF in preparation, implementation, and financing. The stabilization program again had shown some signs of improvement. The economic downturn in the previous few years, however, cost the governing coalition parties a significant loss in the elections in 2002. The Justice and Development (AKP) won the elections and continued to implement the IMF policies. The stabilization program dictated a tight fiscal policy and low budget deficit, a strict monetary policy, and inflation-targeting. The Central Bank moved the managed flexible exchange rate regime to the floating exchange rate regime.

The dominance of the state in tobacco, alcohol, textile, energy, and transportation industries was eased with the privatization of these industries starting in the 1980s. Monetary policy was used effectively between 2002 and 2017. Incomes from privatization revenues generated revenue for the government. Foreign direct investment increased many folds. In 2017, the government switched to expansionist fiscal policy. Monetary policy has lost its discipline, and policy coordination between monetary and fiscal policy vanished. Fiscal policy focused on expanding the economy, while monetary policy tended to control inflation. As a result of these contradictions, the economy experienced high growth levels while inflation increased. These complex and contradictory practices caused unemployment to remain at the two-digit level.

## 2. Methodology and data

This study investigates the direction of causality between inflation and FDI by using the Vector Error Correction Model (VECM). The VECM model equations for FDI and inflation are:

$$\Delta lfdi_t = \alpha_e + \sum_{i=1}^{r} \rho_{ei} ECT_{i,t-1} + \sum_{i=1}^{n} \delta_{ei} \Delta lfdi_{t-i} + \sum_{i=1}^{n} \varphi_{ei} \Delta linf_{t-i} + \varepsilon_{et}, \qquad (1)$$

$$\Delta linf_t = \alpha_y + \sum_{i=1}^{r} \rho_{yi} ECT_{i,t-1} + \sum_{i=1}^{n} \delta_{yi} \Delta linf_{t-i} + \sum_{i=1}^{n} \varphi_{yi} \Delta lfdi_{t-i} + \varepsilon_{yt}, \qquad (2)$$

where *lfdi* and *linf* represent the natural logarithm of foreign direct investment and inflation, respectively.

The *ECT* term describes the error-correction term and $\varepsilon$ is the error term. The advantage of this formulation and estimation process is that it allows us to test the source and direction of causality directly. Using the VECM, it can be tested if there is a long-term or a short-term relationship between inflation and foreign direct investment. The existence of a short-term relationship can only

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be determined by the dependent variable responding to short shocks, which is represented by the null hypothesis of $\delta_{ei} = 0$ in equation (1), and $\varphi_{yi} = 0$ in equation (2). To determine if inflation reduces or increases FDI in the long term, the coefficients of ECT in equations (1) and (2) must be taken into account. The significance of the ECT coefficients implies a long-term causality between inflation and FDI.

All data are annual and obtained from the World Development Indicators (2019). The series studied in this study are inflation and foreign direct investment, and the sample period is from 1974 to 2018 for Turkey. Table 1 provides descriptive statistics of the data used in the study.

**Table 1.** Descriptive statistics of the data

| Variables | Mean | Standard deviation | Median | Maximum | Minimum |
|---|---|---|---|---|---|
| FDI | 4.98E+09 | 6.98E+09 | 8.10E+08 | 2.20E+10 | 10000000 |
| Inf | 39.75 | 29.36 | 34.61 | 105.22 | 6.25 |
| Observations | 45 | 45 | 45 | 45 | 45 |

*Note*. FDI stands for foreign direct investment, net inflows (current US $); Inf is inflation rate (consumer prices, annual %).

## 3. Empirical results

We tested the stationarity of the data sets to ensure the reliability of the analysis by the Augmented Dickey–Fuller (ADF) and Phillips–Perron (PP) tests. The ADF test deals with lagged values of error terms for autocorrelation and heteroscedasticity, while the PP test deals only with the autocorrelation.

Table 2 shows that both variables are nonstationary at the level, but after taking the first differences, they become stationary. Thus, the level of integration of the series is 1, $I(1)$. The existence of the long-run cointegration relationship between inflation and foreign direct investment will be tested using the Maximum Likelihood Estimation (MLE) of Johansen and Juselius Method (1990). If there is a correlation relationship between the series, the VECM can be estimated, and the corresponding causality test can be performed.

**Table 2.** Unit root test results

| Variables | Level | | | First difference | | | Conclusion |
|---|---|---|---|---|---|---|---|
| | Test format* | Test statistics | 5% critical value** | Test format* | Test statistics | 5% critical value** | |
| *ADF test* | | | | | | | |
| FDI | $(c, t)$ | –3.315 | –3.518 | $(c, t)$ | –5.654 | –3.520 | $I(1)$ |
| Inf | $(c, t)$ | –2.285 | –3.515 | $(c, t)$ | –7.00 | –3.518 | $I(1)$ |
| *PP test* | | | | | | | |
| FDI | $(c, t)$ | –2.403 | –3.515 | $(c, t)$ | –8.798 | –3.518 | $I(1)$ |
| Inf | $(c, t)$ | –2.21 | –3.515 | $(c, t)$ | –7.131 | –3.518 | $I(1)$ |

*Notes*. * Expressions used in the parentheses represent constant terms and trends, respectively; ** denotes the critical value of MacKinnon (1996).

The Johansen cointegration test estimates the long-run relationship between foreign direct investment and inflation. Before the cointegration test, it is crucial to determine the appropriate lag of the Vector Autoregression (VAR) model. Hannan–Quinn (HQ) information criterion, Schwarz Bayesian criterion (SBC), and Akaike information criterion (AIC) were used to determine the appropriate lag length used in the VAR model. Table 3 presents the optimal lag selection of the model. According to Table 3, the optimal lag length is one year, since it has the lowest values for each criterion.

**Table 3.** Optimum lag selection

| Lags (number of years) | HQ criterion | AIC criterion | SIC criterion |
|---|---|---|---|
| 1 | 53.03* | 54.94* | 55.19* |
| 2 | 55.16 | 55.01 | 55.43 |
| 3 | 55.36 | 55.15 | 55.74 |
| 4 | 55.58 | 55.31 | 55.06 |

*Note.* * indicates optimum lag.

Table 4 presents the results of the cointegration tests obtained, according to Johansen and Juselius method. In this method, the two tests show the number of cointegrating vectors ($r$): These are the trace test and the maximum eigenvalue test. In the Trace test, the null-hypothesis indicates that the number of cointegrating vectors is zero, and the alternative hypothesis is at most 1. The same hypotheses use the maximum eigenvalue statistics. In other words, the number of cointegrating vectors is zero for the null hypothesis, whereas it is at most 1 for the alternative hypothesis.

The results show that the null-hypothesis is rejected by both according to the trace statistics and the maximum eigenvalue statistics since both in the trace statistics and the maximum eigenvalue statistics since statistical values are higher than critical values. This result shows that there is at least one cointegrating equation at the 0.05 level, indicating foreign direct investment and inflation rate moves together in the long-run.

**Table 4.** Johansen–Juselius maximum likelihood cointegration test results

| Null | Trace test | | | Maximum eigenvalue test | | |
|---|---|---|---|---|---|---|
| | Test statistics | 5% critical value | Probability | Test statistics | 5% critical value | Probability |
| $r = 0$ | 29.94 | 25.87 | 0.0147* | 5.924 | 12.52 | 0.47 |
| $r \leq 1$ | 24.02 | 19.38 | 0.0098* | 5.92 | 12.52 | 0.47 |

*Notes.* Asterisks (*) denotes statistical significance at 5%; $r$ stands for the number of cointegrating vectors.

The causality between variables, if there is cointegration between foreign direct investments and inflation series, can be looked at in the short- and long-term effects using the VECM. Table 5 presents the short-term and long-term relationship between foreign direct investment and inflation based on the VECM.

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**Table 5.** Causality based on the VECM

| Dependent variable | Sources of causation (independent variable) | | | | |
| --- | --- | --- | --- | --- | --- |
| | Short-run | | Long-run | | |
| | Wald test | | ECT | | Probability |
| | t-Statistics | Probability | Coefficient | t-Statistics | |
| Model 1: D (FDI) | 0.6998 | (0.4882) | −0.254 | (−2.863)* | 0.0067 |
| Model 2: D (Inf) | 0.436 | (0.6650) | −9.48E−10 | (−2.0863)* | 0.00457 |

*Note.* Asterisk (*) denotes statistical significance at 1% level. ECT shows the error correction term.

In the first model, with the foreign direct investment (FDI) as the dependent variable, the co-efficient of the cointegrated model (ECT) is negative and statistically significant at 0.01, indicating a long-run causality running from inflation to FDI. The ECT may also express the speed of adjustment towards long-run equilibrium. In the model, where FDI is a dependent variable, the fact that the coefficient of the ECT is negative and significant might indicate that the deviations from the long-run equilibrium dissolve quickly and that the system again converges to the long-run equilibrium. However, for the first model, where FDI is a dependent variable, the Wald test results show that there is no causality from inflation to FDI in the short-run. In this case, the null-hypothesis cannot be rejected.

In the second model, where inflation is a dependent variable, the negative and significant coefficient of ECT indicates that there is a causality running from FDI to inflation. This might be the case that short-run imbalances dissolve in the long-run, and the system is converging to the long-run equilibrium. According to the Wald test for the short-term causality relationship between foreign direct investment and inflation in model 2, the null-hypothesis cannot be rejected because the coefficient of foreign direct investments is zero. Thus, it can be concluded that there is no causality running from foreign direct investments to inflation in the short-run.

Finally, given the evidence presented in Table 5, it can be stated that there is only a long-term causality between inflation and foreign direct investment, but not a short-term causality.

## Conclusions

FDI has increased as a consequence of economic liberalization in the 1980s in Turkey. Thanks to economic liberalization policies, substantial changes have taken place in the Turkish economy. Economic liberalization increased foreign direct investments, increasing employment and production, which in turn, increased inflation. Resulting inflation caused severe financial problems in Turkey. Inflation and unemployment are some of the most critical macroeconomic concerns today. It might be possible to reduce inflation only by increasing production only if the total demand stays the same. On the other hand, it is essential to increase domestic and foreign direct investments to increase production; hence, an opportunity to reduce unemployment. The policymakers implement stable economic policies, including tax incentives, respect for private ownership, enforcing safety regulations, and protect the rights of the employees to encourage foreign direct investment inflows.

This study examined the causality relationship between foreign direct investments and inflation using the VECM for Turkey, considering the period of 1974–2018. Apart from the previous studies on this matter, this study contributes to the existing literature by examining the short-term

and long-term relationship between inflation and foreign direct investment. In this study, the cointegration has been found between the variables, then the long-term and short-term causality tests have been carried out based on a VECM.

The results showed that there is no short-term causality between inflation and foreign direct investments in both models. However, the fact that the coefficient of the ECT is negative and significant in both models indicates that there is a long-term causality between inflation and foreign direct investment. Foreign direct investment can lead to employment creation and an increase in income. The reason for a positive relationship between inflation and foreign direct investments is that a significant increase in the level of prices reduces real wages, in turn, increases the demand for labor demand. According to the monetarist approach, real wages fall, and demand for labor increases due to monetary expansion, since commodity prices increase before factor prices. As a result, revenue and production can soar in the short-term. The lack of short-term causality between FDI and inflation may indicate that investments take time to impact the economy.

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