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The impacts of international capital flows on household credits

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ABSTRACT

This paper investigates the association between international capital flows (foreign direct investment and portfolio investments) and household credits using quarterly data for Turkey from 2005 to 2020. The Turkish financial market is a suitable sample due to Turkey's highly open economic structure to global markets and because of the country's strong demand dynamics. This study also employs a set of control variables in line with the existing literature and country-specific dynamics that might be related with household credit growth. Empirical findings show that (1) there is a unidirectional causal linkage from FDI and interest rates to household credits, (2) FDI and portfolio investments positively affect household credits in the long-run, (3) short-term results suggest a negative relationship between FDI and credit growth and (4), based on the results from the error correction model, a deviation in the household credit market is stabilized by 23.6% each quarter in order to achieve long-run equilibrium. The overall results of this study suggest that encouraging FDI inflows and thus accelerating the technological transformation of domestic markets may contribute to the development of the household credit market and indirectly to the welfare of households in Turkey.
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1. Introduction

As rarely seen before, global financial markets have been tested by tremendous challenges due to the Covid-19 pandemic. Besides the many adverse economic effects, severe imbalances have emerged in terms of international capital flows. In March of 2020, international portfolio inflows fell not only in emerging markets but also in advanced economies (OECD, 2020). However, foreign direct investment (FDI) flows have been gradually decreasing since 2016. More specifically, due to the effects of the pandemic, the 2020 projection for FDI flows was estimated to be a decline of more than 40% compared to 2019 if the recovering process would have started in the second half of 2020, which was verbalized as the most optimistic prediction (OECD, UNCTAD, 2020).

Regardless of the economic crises, neoclassical economic theory generally argues that capital tends to flow from high-income countries to less developed countries due to differences in capital's marginal return. In this way, it creates an alternative financial resource for emerging markets to promote their economic growth and sustain current account deficits (BIS, 2009). As an emerging market economy, Turkey welcomes long-term capital flows by global investors. The level of FDI and non-FDI capital flows (portfolio investment) to Turkey over the 2005-Q4 and 2020-Q4 period can be seen in Fig. 1. The liberalization process of the 1980s to the present period has increased the international capital inflows stock, but it is hard to say whether the country has drawn from the advantages that it had expected to draw from.

Such international capital flows provide an alternative and additional fund to home countries' domestic markets. In other words, these capital inflows show potential to serve as desirable external funds to meet the lack of financial resource in credit markets. For that reason, there is a wide array of literature that deals with the capital flows and credit cycles relationship. Moreover, not only short-term portfolio investment but also FDI inflows are examined as a possible determinant of domestic credits. On the one hand, it is essential to note that portfolio investments and FDI inflows may generate heterogeneous impacts on domestic credits. On the other, such capital flows lead to different effects in terms of types of credits such as household credits and corporate credits (Igan and Tan, 2017). As depicted in Fig. 1, the ongoing Turkish household credit boom process extended to the last period of 2013; then, the bust process was observed until the third quarter of 2019. It can be said that before the Covid-19 outbreak, the expansionary process in the household credit market had already proceeded.

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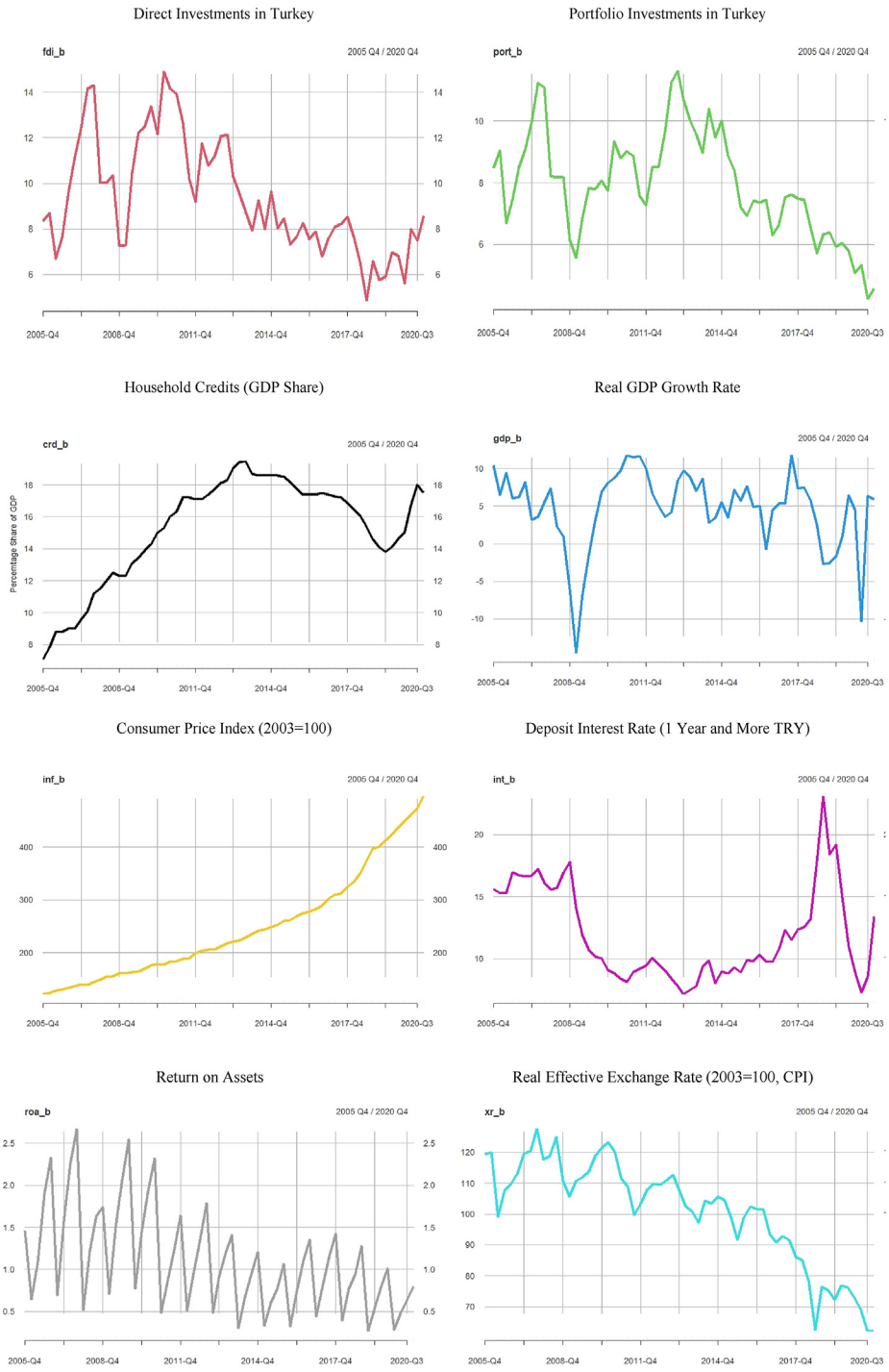


Fig. 1. Plots of the analysis variables (2005–2020).

As it will be presented, a growing body of literature examines the capital flows and credit booms-bust relationship by analyzing it with time series and panel data analyses. However, there is still little evidence on Turkey and about whether Turkish household credits react to international capital inflows. Turkey is an exciting and important research area in terms of the capital flows and household credits relationship for many reasons. First, there is a sufficiently liberalized or open economic structure to global markets. Second, household credits are considered to be a respectable share in economic growth dynamics due to the country's tendency for high consumption. As Demirezen (2015) stressed, private consumption expenditures are largely financed by credits in Turkey; it is known that consumer credits are much more prominent than commercial loans in terms of economic growth. Therefore, this study aims to investigate the effects of capital inflows on household credits in Turkey over the quarterly period between 2005-Q4 to 2020-Q4. Household credits and, more specifically, mortgages in Turkey, unfortunately, do not provide a large data range. Therefore,

the opportunity to observe credit cycles that may have occurred in a much more extended period is very limited in emerging markets such as Turkey. However, available data still appear to be enough to carry out a time-series analysis on Turkey.

To this end, several time series methods have been employed such as the unit root test, cointegration test, short-long term coefficient estimation, and causality test. This study uses quarterly time series data from 2005-Q4 to 2020-Q4. As previously stated, the types of capital flows may lead to different impacts on household credits. This study classifies capital flows as FDI and portfolio investments in order to consider hetero short-long term effects and the causal relationship between capital inflows and household credits. In addition, a set of control variables consisting of macroeconomic, monetary, and bank-specific indicators that might affect the household credit consuming behavior have been integrated into the econometric model in line with previous investigations in the literature. For instance, a number of studies highlight the negative effect of growing inflation on household credits (Igan and Tan, 2017; Nguyen et al., 2018). However, it is expected that a strong national currency might motivate households to consume more credit. A return on assets as a proxy for bank profitability is also controlled when investigating the relationship between capital inflows and the household credit factor.

The remaining sections of the paper deal with the following: Section 2 aims to construct a theoretical background for the capital inflows and credit growth relationship; Section 3 discusses the existing literature; the model and the data are introduced in Section 4; and empirical findings are reported on and discussed in Section 5. Finally, the main findings are evaluated in the conclusion.

2. Background

Dependency on external funding makes long-term capital flows more desirable in terms of emerging economies and a surge of these kinds of capital inflows creates a positive atmosphere on economic prospects. In this way, capital flows are used to meet additional financial resource requirements. At this point, the domestic banking sector plays a crucial role as an intermediary, leading capital inflows to be used directly or indirectly as a lending tool (Hernandez and Landerretche, 1999).

Multiple approaches explain the mechanism between capital flows and credit cycles. First, the impacts of capital flows on current account may indirectly affect credit growth by causing changes in macroeconomic indicators such as output growth, exchange rates, inflation, and asset prices. However, local market actors may initiate credit expansion in local markets by directly borrowing from foreign depositors and institutions in international markets. On the household side, a surge in capital inflows in host countries may lead to asset valuations, which may affect the welfare level of the household and, ultimately, lead to the creation of higher credit demand. In addition, more capital inflows will come to the fore as a factor that will trigger the supply of more credit by domestic banks. (Lane and McQuade, 2014; Igan and Tan, 2017).

One of the most important determinants of the transformation of capital flows into output in local markets is the level of development of the host country's financial system. For instance, it is possible to encounter some approaches suggesting that FDI which is a special type of capital flow will support final consumption through technology transfer and adaptation in domestic markets. Hermes and Lensink (2003) state that a host country's financial system is a prerequisite for the growth effect of FDI. The increase in direct investments will contribute to the level of technology in host countries, support output growth, and also contribute to the development of the financial system; ultimately, the country will end up with an increase in savings and consumption patterns. Hermes and Lensink (2003) explain this relationship using a simple model:

$$r = (1/\eta)LA^{\frac{1}{1-a}}\left(\frac{1-\alpha}{\alpha}\right)\alpha^{2/(1-a)} \quad (1)$$

where r is the rate of return (interest rate), a is the capital's share of income, and L shows labor input. The model assumes that there are fixed maintenance costs equal to 1, and FDI is involved with the model in this way; fixed R&D costs equal η. There is an inverse relationship between an increase in FDI and the cost of innovation by assuming that F represents FDI; then, $\eta = f(F)$. It is also assumed that A represents the level of technology via the financial sector. As Hermes and Lensink (2003) pointed out, the financial sector encourages the improvement of the average level of technology; thus, it is assumed that A is the function of financial sector development, represented by H ($A = h(H)$) At this point, households get involved in the model, and they maximize their utility function under the budget constraint. The growth rate of consumption g_c is equal to $(1/\theta)$(r-ρ). Furthermore, θ is the elasticity of marginal utility and ρ represents the discount rate. It is assumed that the growth rate of consumption is equal to the growth rate of output, according to the steady-state condition (Hermes and Lensink, 2003). By substituting r in equation (2), the growth rate of output g is as follows:

$$g = (1/\theta)\left[\left(\frac{L}{f(F)}\right)hH^{\frac{1}{1-a}}\left(\frac{1-a}{a}\right)a^{\frac{2}{1-a}} - \rho\right] \quad (2)$$

Accordingly, surges in FDI inflows will facilitate technology adoption and increase the return on assets. As a result, the growth rate of consumption will increase, as well as the savings rate. Within this framework, there is a wide and valuable literature examining these theoretical approaches in terms of empirical investigations. In the following section, the empirical literature on the relationship between capital flows and credit growth will be discussed in terms of both the overall credit markets and, more specifically, household credits.

3. Related literature

When the literature review is primarily focused on the financial system and international capital flows from a wider perspective, one can infer that the domestic financial system has a decisive role in terms of the effects of capital flows. In addition, there is an adequate empirical literature linking the local financial system and direct investments. Numerous studies suggest that the structure of the host country's financial system and the level of development significantly determine the effects of FDI inflows on economic growth. (Hermes and Lensink, 2003; Alfaro et al., 2004; Choong, 2012; Muruko-Jaezuruka and Gupta, 2020). In those types of studies, credits are one of the most focused indicators. However, new evidences suggest that if the share of private sector credits in gross domestic product becomes larger enough, the impact of FDI on growth remains limited. (See Osei and Kim, 2020).

As stated before, larger capital inflows may generate a booming or growth effect in terms of domestic credits. Hernandez and Landerretche (1999) point out the credit booms financed by large capital inflows lead to over-borrowing and thus higher asset prices and macroeconomic vulnerability. Therefore, some of the papers argue whether capital controls may repress financial imbalances. Kim and Yang (2011) suggest with a panel VAR model that the capital inflows lead to asset price inflation in the Asian emerging markets. In some cases, there might be an over-borrowing in the domestic markets when the liberalization process surges in terms of short-term capital flows. McKinnon and Pill (1996) argue that

most economies, where the financial markets' liberalization process continues at full steam, have experienced the booming effect and then financial crises. For that reason, a number of policy implications proposed: (1) limiting the short-term capital flows, (2) liberalizing in the foreign direct investments due to the positive contributions in terms of new technology transmission and preventing market failures, (3) restricting some of the consumer credits such as mortgages (4) Creating a provident fund by using the compulsory social security returns (McKinnon and Pill, 1996). As is known, restrictive policies on the international capital flows seems inappropriate, especially since the 1980's where the liberal economic policies have started to spread over to the developing countries. Instead of thinking about limiting capital flows, it is important to consider whether domestic markets will benefit from these inflows. According to the panel data evidence for the fifty-eight developing countries suggested by Bosworth et al. (1999), the lion's share of the capital inflows was used to finance current account deficits in these countries. Moreover, it can be stated that macro prudential policy tools offer an effective policy set in countries with sensitive financial dynamics especially in the periods where such rapid credit growth is experienced together with higher capital inflows. In particular, financial market fluctuations on a global scale after the 2008 crisis have made the macro prudential policy approach more outstanding. Erdem Kuçukbicakci et al., (2020) suggest that macro prudential policy tools are effective in terms of limiting the credit growth in domestic markets especially during the credit booms and argue that the number of these tools matter.

However, there is an ongoing controversial argument related to the capital flows and credit cycles that capital flows lead to the credit boom-bust process in the domestic markets. Mainly, it is hard to control the adverse effects of the credit booms in the presence of large capital inflow cases. Some studies argue whether these adverse impacts can be moderated or tolerated by some institutional factors and deep financial market structure. In this sense, Nguyen et al. (2018) argue that the inward FDI leads to a booming effect on the domestic credits in 33 emerging economies. However, institutional quality seems to moderates this effect. More explicitly, better institutions reduce the booming effect of inward FDI.

It is important to consider that long-term and short-term capital inflows create various impacts, and also, these effects may subject to change in terms of whether the household or corporate sector demands the credits. Accordingly, the studies dissociate the capital flows as FDI and non-FDI inflows suggest different results. For instance, the VAR analysis of Estonia, Latvia, Lithuania, and Bulgaria by Hegerty (2009) suggests that FDI and non-FDI inflows lead to a growth effect on the domestic credits only in Bulgaria. Besides, in the number of studies, the findings differ in terms of the credit types. For instance, Sopanha (2006) investigates the causal relationship between capital inflows and bank credit to the private sector in the 27 emerging markets. The results suggest that capital inflows lead to credit booms in just nine countries. D. Furceri et al. (2012) argue that when the capital inflow to begin surge, the credit to GDP ratio increases by 2% in the following two years. Sa et al. (2014) find that capital inflows positively affect real house prices, real credit to the private sector, and real residential investment in OECD countries. However, this relationship is much more powerful, especially in the countries where have more developed mortgage markets. Calderon and Kubota (2012) and Arslan and Taskin (2014) also suggest that capital flows and credit growth have positive linkage according to the panel data analysis using large cross-country datasets. In one of the studies dealing with different country groups, Lane and McQuade (2014) suggest that domestic credit growth is largely associated with net debt inflows in the pre-crisis period in European countries and 54 developed and emerging economies represented in the extended sample.

As it is known, the concentration of capital flows and the rapid increase in local credits were among the determinants of the 2008 financial crisis. In the post-crisis period, cautious movements in financial markets and efforts to heal the damage caused by the crisis had an impact on the credit demand of both households and the private sector. In this context, the findings for Central and Eastern European (CEE) countries by Hegerty (2018) show that credit growth increased rapidly until the 2008 crisis, then rapidly in the Baltics and Hungary, and slowly in all places except Poland and Slovakia decreased.

Igan and Tan (2017) suggest that while the net portfolio investment and net other inflows boost the household credit growth, no significant effect of FDI in 33 countries. Tobe (2017)'s findings for developed countries show that cross-border bank inflows and risk perception are the main drivers of credit growth in local markets. Samarina and Bezemer (2016) investigate whether international capital flows create a re-allocation process in terms of the domestic credits for the 36 economies over the 1990–2011 periods. Accordingly, larger capital flows lead to a higher shift in the domestic bank credits from non-financial business to households. In this case, domestic banks compensate for the decrease in the non-financial sector credits with the households. According to the findings on India and Indonesia by Prabheesh et al. (2020), while the local credit cycle in India is extremely related to international capital flows, local real economic effects, which occur mostly with the indirect effect of capital flows, lead to credit boom in Indonesia.

One can infer from the given literature that the relevant studies mostly focus on large country groups as well as suggest a strong relationship between international capital flows and local credit growth. Indeed, limited number of researches in which time series analyses are employed deals with Turkey or a different specific country. For example, Baskaya et al. (2017) suggest that when capital flows are separated into bank and non-bank inflows, local banks lead to credit growth in Turkey in the case of foreign borrowing. In this study, as a more specific research area, whether international capital flows are the driver of household credits in Turkey will be analyzed through a model where a number of country-specific indicators are controlled.

4. Empirical analysis

4.1. Data

As it is stated, the main aim of the study is to investigate the effects of capital inflows on household credits using quarterly data 2005-Q4 to 2020-Q4 in Turkey. Igan and Tan (2017) present a baseline panel data model where credit growth is associated with capital flows. This study employs a time series econometric model where the capital flows and household credits are linked from a similar perspective. In addition to the capital flow indicators, a number of control variables might be associated with household credits are employed. The time series econometric model is as follows:

$$lnCRD_t = \beta_0 + \beta_1 FDI_t + \beta_2 PORT_t + \beta_3 X_t + \varepsilon_t \quad (3)$$

where '*t*' is the time dimension which is the quarterly data from 2005 to 2020, 'ε' is the error term, the dependent variable *CRD* is the total credit to households and considered as percentage of GDP. *CRD* is broadly considered as total credit to households and non-profit institutions serving households (NPISHs) based on Bank for International Settlements (BIS). The dependent variable is a sub-component of the total credit to the non-financial private sector

and not only consists of credits by domestic banks, but also credits from the other sources. More explicitly, total credit to households and NPISHs embodies not only the credits supplied by commercial banks but also saving banks, credit unions and non-bank financial sector (Dembiermont et al., 2013). The explanatory variables are *FDI* and portfolio investments (*PORT*) and both variables are also expressed as percentage of GDP. In general terms, FDI refers to cross-border investments that involve foreign investors having a control in the management of a company. Portfolio investments consist of equity and debt securities. As Igan and Tan (2017) suggested, capital inflows are categorized into FDI and portfolio investment to estimate possible heterogeneous effects on household credits.

X represents the set of control variables. While determining the control set, it is aimed to select indicators that could be country-specific variables specific to Turkey and whose effects on household credits are supported by the literature. Similar to Magud et al. (2012), Aslan and Taskin (2014), Igan and Tan (2017), Tobe (2017) and Nguyen et al. (2018), inflation, deposit interest rate, real GDP growth, real effective exchange rate are controlled in the analysis. In addition, based on the expectation that bank profitability may also be related to credit cycles, it is included in the empirical model as a bank-specific factor. The expectation that the profitability of banks operating in Turkey would be important in terms of credit cycle motivates the bank profits to be included in the control set. Kohlscheen et al. (2018) observed that credit growth has a much stronger relationship with bank profits than with output growth, and also they suggest that credit cycles may be more relevant than business cycles in explaining bank profitability.

In set of control variable *X*, *GDP* is used as real GDP growth rate, inflation (*INF*) is considered as consumer prices index (2003 = 100), deposit interest rate (*INT*) considered as 1 year and more TRY deposits, return on assets (*ROA*) is used as a proxy for profitability which is estimated as percentage of banks' profits on total assets, the real effective exchange rate (*REER*) calculated with CPI. Table 1 displays the definition of the variables and where the data are extracted from.

Turkey has experienced considerable short-term fluctuations with or without economic and financial factors in the period the study focused on. One can see the progress of employed indicators in Turkey over 2005 to 2020 from the given figure below.

One can observe from Fig. 1 that international capital movements namely FDI and portfolio investments exhibit a volatile structure almost during the whole period and appear to be in a decreasing trend roughly in 2013s. The GDP share of the household credits increases to the last period of 2013 and then gradually decreases until the second quarter of 2019. One can see the gradual decrease in the real exchange rate for the given period in Fig. 1. It can be said that this indicator, which means the depreciation of the Turkish lira, becomes more meaningful with the upward trend in the inflation rate. Last but not least as pre-analysis information, Table 2 displays the descriptive statistics of the variables. The quarterly data over the 2005–2020 periods consist of 61 observations.

4.2. Methodology

First, unit root analysis has to be employed to specify the stability characteristics of the series and the direction of the estimation process. It is important to note that whether the time series data are stationary at level or first difference determines the estimation technique decisions. This study uses two different unit root tests suggested by Dickey and Fuller (1979) and Phillips and Perron (1988), namely Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests respectively. While the null hypothesis in the ADF and PP unit root tests states the existence of unit roots, the alternative hypothesis indicates no unit root.

The second step of the analysis is based on the autoregressive distributed lag (ARDL) model suggested by Peseran et al. (2001). ARDL model has a large implication area in the literature in terms of some advantages compared to the other cointegration techniques. First, the ARDL method does not require a purely integrated order of variables. Second, the model provides more reliable estimation results, especially in the small sample properties. Third, the ARDL model is also an efficient technique as it considers the endogenous independent variable results. From the baseline model in Equation (3), the ARDL model can be written as follows:

$$\Delta CRD_t = \sigma_0 + \sum_{i=0}^{p} \sigma_{1i}\Delta CRD_{t-i} + \sum_{i=0}^{p} \sigma_{2i}\Delta FDI_{t-i} + \sum_{i=0}^{p} \sigma_{3i}\Delta PORT_{t-i} + \sum_{i=0}^{p} \sigma_{4i}\Delta X_{t-i} + \delta_1 CRD_{t-1} + \delta_2 FDI_{t-1} + \delta_3 PORT_{t-1} + \delta_4 X_{t-1} + \varepsilon_t \quad (4)$$

where Δ is the difference operator and ε refers to the residual term. The null hypothesis that states the no long-run relationship can be written as follows:

$$H_0 : \delta_1 = \delta_2 = \delta_3 = \delta_4 = 0$$

In this case, the alternative hypothesis would be as follows:

Table 2
Descriptive statistics.

Variables	Obs	Mean	Median	Minimum	Maximum	Std. Dev
CRD	61	15.24	16.50	7.10	19.50	3.29
FDI	61	9.34	8.56	4.86	14.93	2.48
PORT	61	7.93	7.78	4.24	11.62	1.70
INF	61	246.70	220.52	121.74	496.92	101.38
REER	61	100.91	104.43	62.18	127.71	17.02
INT	61	11.92	10.16	7.17	23.11	3.74
GDP	61	4.68	5.70	−14.50	11.80	5.15
ROA	61	1.10	0.95	0.26	2.67	0.60

Table 1
Data definitions and sources.

Variables	Definition	Data Source
CRD	Total Credit to Households (As percentage of GDP)	CBRT (from BIS)
FDI	Foreign Direct Investment (As percentage of GDP)	CBRT
PORT	Portfolio Investment (As percentage of GDP)	CBRT
INF	Inflation (Consumer Price Index (2003 = 100)	TURKSTAT
REER	Real Effective Exchange Rate (2003 = 100, CPI)	CBRT
INT	Deposit Interest Rate, % (1 Year and More TRY Deposits)	CBRT
GDP	Real GDP Growth Rate	TURKSTAT
ROA	Profitability (Return on Assets)	CBRT

Note: CBRT based data are obtained from EVDS Data Central of CBRT.

$$H_0 : \delta_1 \neq \delta_2 \neq \delta_3 \neq \delta_4 \neq 0$$

Peseran et al. (2001, Section 3) use the F statistic (or the Wald statistic) to test the null hypothesis of no long-run relationship among the variables. Once the model is specified based on Equation's (4), long-run and short-run dynamics will be estimated with ARDL model. Long-run relationship among the variables can be estimated with the following equation:

$$\Delta CRD_t = \sigma_0 + \sum_{i=0}^{p} \sigma_{1i} \Delta CRD_{t-i} + \sum_{i=0}^{p} \sigma_{2i} \Delta FDI_{t-i} + \sum_{i=0}^{p} \sigma_{3i} \Delta PORT_{t-i} + \sum_{i=0}^{p} \sigma_{4i} \Delta X_{t-i} + \varepsilon_t \quad (5)$$

while the short-run dynamics can be expressed as follows:

$$\Delta CRD_t = \sigma_0 + \sum_{i=0}^{p} \sigma_{1i} \Delta CRD_{t-i} + \sum_{i=0}^{p} \sigma_{2i} \Delta FDI_{t-i} + \sum_{i=0}^{p} \sigma_{3i} \Delta PORT_{t-i} + \sum_{i=0}^{p} \sigma_{4i} \Delta X_{t-i} + \varphi ECT_{t-1} + \mu_t \quad (6)$$

In Equation (6), error correction term is denoted by ΦECT and it refers the speed of stabilization towards equilibrium in the case of a deviation from a long-run equilibrium.

Finally several residual diagnostic and stability tests should be checked. This study presents the results of the serial correlation, heteroscedasticity and Ramsey Reset tests. In addition, the stability property of the selected model is tested with the cumulative sum (CUSUM) and cumulative sum of squares (CUSUMSQ) techniques developed by Brown et al. (1975).

Finally, this study employs the Hacker and Hatemi-J causality technique to determine the direction of the possible relationship between household credit and its determinants. The prominent feature of the bootstrap test developed by Hacker and Hatemi-J (2012) unlike the standard Granger causality technique is the internal determination of the lag length choice. In former tests such as Granger (1969, 1988), Toda and Yamamoto (1995), and Hacker and Hatemi-J (2006), it is assumed that the lag order is known within the vector autoregressive model (VAR) model framework. However, Hacker and Hatemi-J (2012) emphasize that the lag order must be determined endogenously before causality testing, in other words, the lag length must be pre-selected in a data-driven process. For this reason, the bootstrap technique used in the Hacker and Hatemi-J (2006) test is modified with a method in which the lag length is selected endogenously in the Hacker and Hatemi-J (2012) test. One of the biggest advantages of the bootstrap test with endogenous lag length choice is that it is much more suitable for use in small sample sizes than other existing Granger and bootstrap techniques (Hacker and Hatemi-J, 2012). The following equation used by Hacker and Hatemi-J (2012) shows the vector autoregressive model of order k,

$$y_t = B_0 + B_1 y_{t-1} + \ldots + B_k y_{t-k} + u_t \quad (7)$$

where the vectors B_0, y_t and u_t have n x 1 dimensions and B_i is a n x n dimensional matrix parameter with $i \geq 1$. In this technique, an alternative information criterion is used developed by Hatemi-J (2003, 2008) instead of Schwarz Bayesian criterion (SBC) and Akaike information criterion (AIC). In the Hacker and Hatemi-J (2012) test, the null hypothesis is constructed as there is no causal relationship between the variables. If the Wald statistics are greater than the critical values obtained from the Monte Carlo simulation, the null hypothesis is rejected and it is stated that there is a causal relationship between the variables.

5. Estimation results

Before to proceed to the further parts of the econometric analysis, one must specify the stationarity properties of the variables. It is important to check whether series contain unit root and follow the same order or not, in terms of determining which econometric techniques will be employed in further investigations. Table 3 presents the ADF and P–P unit root test results. Considering the findings of both ADF and P–P unit root tests, it is seen that the *GDP* and *ROA* variables look stationary at level. On the other hand, all other variables, including the dependent variable, become stationary when the first difference operator is run.

As reported in Table 1, the unit root test results indicate mixed types of stationary due to the I(0) and I(1) properties of the variables. Once there is no single integration order of the variables, the ARDL model becomes the suitable method to test the cointegration relationship. The preliminary results of the ARDL test based on the AIC indicate the optimal lag selection as (3, 4, 4, 1, 5, 4, 5, 5).

F bound test results are reported in Table 4. In order to accept the existence of a long-run relationship among the variables, F-statistic has to be larger than the upper I(1) and the lower I(0) bounds.

The findings in Table 4 indicate that the estimated F-statistic (6.537) is beyond the upper and lower bound critical values. Thus, it can be stated that there is a long-run relationship among the variables.

According to the ARDL method, such a relationship allows for coefficient estimation in both long and short-run forms. The long-run estimation results, where the household credit is the dependent variable, are reported in Table 5. Findings of long-term estimation show that FDI and portfolio investments have positive and statistically significant effects on household credits. If one evaluates the coefficients of variables of interest, it can be said that FDI supports the household credit demand more strongly than portfolio investments. According to Furceri et al. (2012), Igan and Tan (2017), and Nguyen et al. (2018), FDI has essentially a positive effect on credits to the private sector. However, the finding of Igan and Tan (2017) that FDI has no significant effect on household credits for a panel group of 33 countries contradicts the long-term findings of this study. In fact, to the best of the author's knowledge, there is no empirical evidence that FDI supports household credit growth in Turkey. As an emerging market economy, it is likely that in the long term, foreign capital investments will contribute to the tendency of households to increase consumption demand by

Table 3
Unit root test results.

Variables	ADF Test Statistic		P–P Test Statistic	
	Level	1st difference	Level	1st difference
CRD	−2.324	−4.187***	−2.659*	−4.187***
FDI	−2.290	−8.026***	−2.331	−8.025***
PORT	−1.683	−7.433***	−1.789	−7.430***
GDP	−3.718***	−9.118***	−3.753***	−9.239***
INT	−2.409	−5.572***	−2.210	−5.572***
INF	7.674	−0.489	7.946	−3.188**
XR	2.464	−4.872***	−0.646	−8.514***
ROA	−1.091	−3.762***	−6.030***	−20.618***

Note: ***,** and * denote the 1%, 5% and 10% significance levels respectively.

Table 4
F bound test results (cointegration results).

Bound Tests	Value	Signif.	I(0)	I(1)
F-Bound Test	6.537	10%	2.155	3.353
		5%	2.513	3.823
		1%	3.346	4.895
Estimated Model		Optimal Lag Structure (AIC)		
(CRD/FDI, PORT, GDP, INT, INF, XR, ROA)		(3, 4, 4, 1, 5, 4, 5, 5)		

Table 5
Long-run elasticities by ARDL approach and diagnostic results.

Variables	Coefficients	T-statistic	P-value
FDI	0.841	2.607**	0.018
PORT	0.378	2.579**	0.019
GDP	−0.126	−2.484**	0.023
INF	0.039	3.011***	0.007
INT	−0.321	−2.408**	0.027
REER	0.127	1.855*	0.080
ROA	−3.49	−2.211**	0.041
LM Test = 0.370 (0.696)	$R^2 = 0.974$		
Het. Test = 0.658 (0.859)	Adj. R^2=0.941		
Reset test = 2.064 (0.170)			

Note: ***,** and * denote the 1%, 5% and 10% significance levels respectively. The values given in parentheses show the p-values of the diagnostic tests.

supporting technological transformation and developments in local markets due to the spillover effect. The findings of this study may gain importance in a scenario such as the households' tendency to consume more credit as a result of technological developments.[1] At this point, in order to clarify the validity of the argument in question, it is beneficial to investigate the subject with different methods in new studies. On the other hand, Igan and Tan (2017) similarly confirm the existence of a positive relationship between portfolio investments and household credits. However, the fact that the positive effect of portfolio investments on credits is lower may indicate that short-term capital inflows in Turkey lead to an appreciation in real asset prices, resulting in lower credit demand.

The long-term findings of the controlled variables reveal interesting results. Contrary to the expectations, GDP growth negatively affects credits with a low magnitude in the long run. While this linkage is similar with Nguyen et al. (2018) for 33 emerging markets, Igan and Tan (2017) and Tobe (2017) suggest that there is a positive relationship between GDP growth rate and household credits. Nguyen et al. (2018) states that a positive relationship between economic growth and firms' balance sheets leads that the firms start to meet their expenditures more with internal funds. With a similar approach, based on the current finding of a negative relationship between household loans and economic growth, the increase in the value of stock price and other assets promoted with economic growth may lead to an increase in the welfare of households resulting with a decreasing in credit demand.

It can be concluded that the inflation rate does not have a considerable effect on the household credits in the long-run. Most of the studies investigating the effect of the inflation rate on credit growth reveal a negative relationship between the variables. In other words, the general increase in prices slows down the credit growth. On the other hand, as partly similar findings, Magud et al. (2012) did not find a significant relationship between the inflation rate in emerging market economies and the share of private sector credits in and Igan and Tan (2017) find an insignificant relationship between inflation and household credits in countries with higher financial development and structure.

In line with the expectations, interest rate has a negative and significant effect on the household credits. This result seems to be compatible with the findings obtained in many different studies in terms of both household credits and credits to the private sector (Magud et al., 2012; Igan and Tan, 2017; Nguyen et al., 2018). This theoretically meaningful result indicate that in the case of an increase in interest rate, Turkish households decrease their credit demand of the by reacting to the increase in borrowing costs. Similar to Tobe (2017), a positive and significant long-term relationship exists between the real effective exchange rate and household credits.

It has been observed that there is an inverse relationship between bank profitability and household credits. In fact, a formal relationship between bank profitability and credit growth does not seem likely from the existing literature, but some findings show that bank profitability does not have a significant effect on credit growth (Awdeh, 2017). It is thought that the long-term estimation result regarding the bank profitability will have an adverse effect on household loans should be the subject of further investigations. In this sense, it may be an important research question whether the increase in bank profitability leads banks to reduce the credit portfolio offered to households. On the other hand, the course of bank profitability is closely related to percentage of credits in total assets, nonperforming loans and credit risks. For example, the findings obtained by Alper and Anbar (2011) on Turkey show that size of credit portfolio and loans have a negative effect on bank profitability. In this context, slowing down the credit supply by banks in order to maintain their profitability levels may lead to a negative impact on credit growth in the long-run.

Furthermore, the short-run coefficient estimation results by the ARDL method are given in Table 6. In order to perform the short-run analysis, the error correction model should be run, and the error correction term has to be in a negative form and statistically significant. Evidence from the error correction model reports a negative and statistically significant error correction term. Accordingly, it can be said that a deviation in the household credits in Turkey is stabilized by 23.6% each quarter in order to achieve long-run equilibrium.

Short-term estimator findings reveal mixed results in terms of variables of interest. While there is a negative effect of FDI on household credits, portfolio investments have a positive and significant effect after three periods later. The argument of Bosworth et al. (1999) on how capital inflows are allocated in developing economies suggests that the larger share of the capital inflows regarded as a resource to finance current account deficits. Also, these resources are used for investment instead of consumption. It is a well-known fact that the Turkish economy is an emerging market that struggles with the current account deficits for many years. According to the short-term findings of the present study, the negative and insignificant capital inflows elasticities can be attributed to this argument.

In terms of control variables, it has been observed that inflation rate, interest rate and real effective exchange rate have negative and statistically significant effects on household credits in the short-run. It can be said that the magnitude of the negative effect is quite low for all three variables. Statistically significant finding that indicates bank profitability is positively affects the household credits during the four lags reveals that this variable is a determining indicator in terms of credit demand. The fact that the long-

[1] Please see Hermes and Lensink (2003) and Lane and McQuade (2014) to get more information about the mechanism between capital inflows and credit growth.

Table 6
Short-run coefficient estimation by ARDL approach.

Variables	Coefficients	T-statistic	P-value
ΔCRD(-1)	0.096	0.880	0.390
ΔCRD(-2)	−0.345	−3.662***	0.001
Δ(FDI)	0.047	1.211	0.242
ΔFDI(-1)	−0.144	−3.310***	0.004
ΔFDI(-2)	−0.173	−4.569***	0.000
ΔFDI(-3)	−0.127	−3.12***	0.007
Δ(PORT)	0.103	1.847*	0.082
ΔPORT(-1)	−0.005	−0.104	0.918
ΔPORT(-2)	−0.045	0.628	0.538
ΔPORT(-3)	0.222	3.362***	0.003
ΔGDP	0.002	0.399	0.694
ΔINF	−0.015	−1.822*	0.086
ΔINF(-1)	−0.024	−2.857**	0.010
ΔINF(-2)	0.001	0.135	0.893
ΔINF(-3)	0.011	1.331	0.200
ΔLINF(-4)	−0.019	−2.708**	0.014
ΔINT	−0.064	−3.169***	0.005
ΔINT(-1)	0.048	2.232**	0.039
ΔINT(-2)	−0.066	−3.577***	0.002
ΔINT(-3)	−0.095	−5.270***	0.000
ΔREER	−0.003	−0.524	0.606
ΔREER(-1)	−0.025	−4.521***	0.000
ΔREER(-2)	−0.009	−1.565	0.135
ΔREER(-4)	−0.014	−2.368**	0.030
ΔREER(-4)	−0.022	−4.092	0.000
ΔROA	−0.162	−1.379	0.185
ΔROA(-1)	0.641	3.907***	0.001
ΔROA(-2)	0.695	4.812***	0.000
ΔROA(-3)	0.292	2.200**	0.041
ΔROA(-4)	0.396	3.481***	0.002
Constant	−1.935	−7.953***	0.000
ECT	−0.236	−8.592***	0.000

Note: ***, **,* denote 1%, 5% and 10% significance levels respectively. Δ is the first difference operator. ECT is the error correction term.

term and short-term effects of bank profitability are in different directions reveals the necessity of new researches.

Finally, in Table 5, residual diagnostic tests such as LM (serial correlation), heteroscedasticity, and R^2 are reported. Accordingly, one can suggest that the empirical model behaves well. Besides, Ramsay reset test result indicates that the overall model looks effective.

Furthermore, one may check the stability properties of the coefficients by employing the CUSUM and CUSUMSQ tests. In order to say that the estimated coefficients are fit, the blue lines in Fig. 2 should be inside the 5% confidence intervals (the red lines). As

Table 7
Hacker-Hatemi J 2012 causality test results.

Null Hypothesis	MW Test Stat.	1% CV	5% CV	10% CV
CRD → FDI	0.297	7.588	3.998	2.787
FDI → CRD	3.736*	6.793	4.295	2.892
CRD → PORT	2.751	10.726	5.974	4.922
PORT → CRD	4.408	10.639	6.345	5.078
CRD → INT	0.144	7.840	4.486	3.106
INT → CRD	14.504***	7.113	3.739	2.793
CRD → INF	9.342**	9.708	6.841	5.042
INF → CRD	4.374	10.506	6.576	4.804
CRD → ROA	23.582***	20.560	14.119	11.829
ROA → CRD	11.127	20.143	13.725	11.710
CRD → XR	5.752*	10.070	6.630	4.488
XR → CRD	2.704	10.295	6.692	4.951

Note: ** and * denote 5% and 10% significance level. P-values are in the parentheses.

Fig. 2 displayed, coefficient estimation seems suitable in terms of household credits.

The final part of the econometric analysis explores causal relationships among the household credits, capital inflows and control variables.

The following Table 7 reports the Hacker-Hatemi J (2012) causality test results. The test findings show that there is a unidirectional causality relationship from FDI to household credits. No causal relationship was found between portfolio investments and household credits. In fact, this result supports the arguments discussed earlier which is the entry of short-term speculative capital flows into the host country may lead to an increasing on asset prices and support households' self-funding instead of their credit demand. On the other hand, the diffusion of technology that emerged with FDI and the fact that new household needs trigger expenditures can be associated with the increase in credit growth.

When the relationship between control variables and credits is examined, there is a unidirectional causal linkage from interest rate to credits and from credits to inflation rate. Finally, there is a one-way causality relationship from household credits to the bank profitability and real effective exchange rate. These findings, which essentially reveal the causality relationship between control variables and credits, seem to be compatible with both the previous analysis findings of the study and related literature.

6. Conclusion

The present study investigates the Turkish economy in terms of the international capital flows and household credits relationship

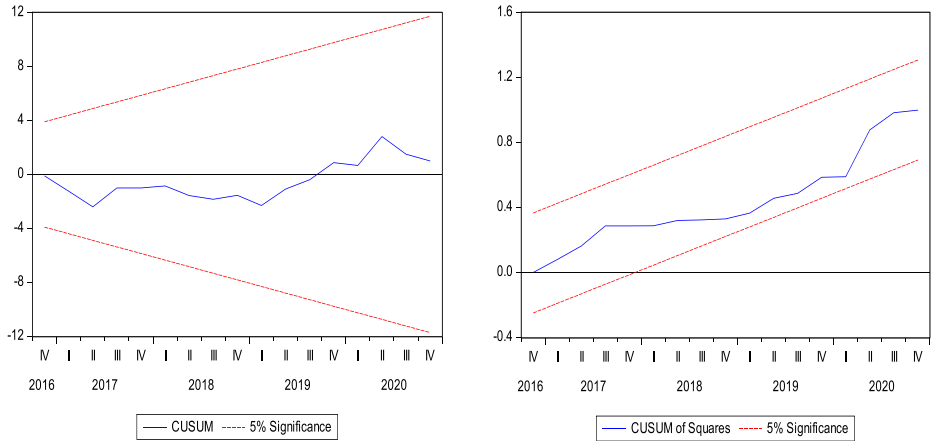


Fig. 2. Plots of CUSUM and CUSUMSQ (Recursive residual).

over the quarterly period between 2005 and 2020. The Turkish financial market is a suitable example to observe because of its highly open economy to foreign markets and strong local demand dynamics. Moreover, in order to increase the explanatory power of the model and avoid problems such as omitted variables bias, this study employs a set of control variables in line with the existing literature and also considers country-specific dynamics. The study also categorizes the inflows as FDI and portfolio investments to consider the possible heterogeneous impacts of short-term and long-term capital inflows on household credits. The long-run results suggest that FDI and portfolio investments lead to a positive and significant effect on household credit. In the short-run, while FDI creates a negative effect on household credits, portfolio investments still remain a positive effect. Macro-economic, monetary, and bank-specific variables controlled in the model present consistent results in general and in line with the expectations observed from the related literature. An interesting and original finding here is the long-term negative and short-term positive relationship that was observed between bank profitability and household credits. As the statistically significant error correction term suggested, a deviation in Turkey's household credit market is stabilized by 23.6% during each quarter to achieve long-run equilibrium. Finally, results obtained from the bootstrap causality test with endogenous lag length choice show that there is a unidirectional causal linkage from FDI and interest rates to household credits and from household credits to inflation, bank profitability, and real effective exchange rates.

The overall inference from the findings on variables of interest and household credits linkage implies that there is a strong relationship between FDI and household credit growth compared to short-term portfolio investments in Turkey. In fact, this outcome supports the argument mentioned earlier that diffusion and adaptation of new technologies encouraged by FDI inflows will lead to output growth and that increased savings and consumption, along with financial development, will support credit growth. However, the findings on the monetary policy side show that interest rates continue to act as a restraint in terms of credit growth. In terms of bank-specific factors, the increase in bank profitability seems to support the growth motivation of household credits in the short-run.

To conclude, encouraging FDI inflows and thus accelerating the technological transformation of domestic markets may contribute to the development of the household credit market and, indirectly, to the welfare of households in Turkey. Nevertheless, in the presence of large-scale and speculative capital inflows, there may be a requirement for the macro-prudential policy sets for the stability of not only households but also overall credit mechanisms. Another result that emerged regarding both the research topic and the selected sample is that further investigations, in which different methods and other country-specific factors could be considered, would be worthwhile in order to propose more comprehensive policy recommendations.

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