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Chapter 1

MACROECONOMIC DETERMINANTS OF HOUSEHOLD CARD PAYMENT INDEX IN TÜRKİYE

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INTRODUCTION

Credit and debit cards have become fundamental payment instruments in the modern economic system. Influenced by digitalization and technological advancements, the use of these payment methods has rapidly increased. The acceleration of technological developments, widespread use of mobile devices, and increased internet access have facilitated the use of these payment methods (Kosse, 2010; Önder, 2018). Additionally, the tendency to pay with credit and with debit cards has been significantly influenced by incentives offered by banks and financial institutions (Schuh & Stavins, 2010). During this process, where consumers' spending tendencies have increased and financial planning habits have changed, the tendency to pay with credit and with debit cards has also created various effects on the economic system. These payment methods reduce the use of cash and can shrink the size of the informal economy (Humphrey, Pulley & Vesala, 1996).

The digital economy encourages financial transactions and trade to be carried out through digital platforms. The widespread use of the Internet and mobile technologies has led to an increase in online shopping and, accordingly, the widespread use of credit and debit cards. This has placed card payment systems at the centre of economic activity (Gomber, Koch & Siering, 2017). Card payment systems have enabled consumers to prefer these methods by offering advanced security features and ease of use. In particular, it is argued that the security and convenience offered by card payment systems reduce the use of cash and facilitate consumers' adoption of card usage (Fung, Molico & Stuber, 2014). Card payment systems reach a wider user base by increasing financial inclusion. Individuals who do not have a bank account or have limited access to banking services can be included in the financial system through prepaid cards and digital wallets. This contributes to increasing financial inclusion, especially in developing countries. As a result, card payment systems can support economic growth by increasing financial inclusion (Demirgüç-Kunt & Klapper, 2012). Card payment systems can also enable commercial activities to be carried out more effectively and efficiently. The acceleration and increased security of payment transactions reduce the transaction costs of businesses and improve cash flow. In addition, card payments allow businesses to better manage and analyse customer data, helping them to optimise their marketing strategies (Bruno, Denecker & Niederkorn, 2019).

The use of card payment systems is increasing day by day due to factors such as the expansion of the digital economy, security and convenience, financial inclusion and commercial efficiency. This trend is supported by economic and technological developments and is expected to become more widespread in the future. The increasing importance of card payment systems makes them an indispensable part of the modern economic structure. In this framework, it

is also necessary to reveal the factors affecting the tendency to pay with credit and with debit cards. As it is known, the general economic environment, including factors such as inflation, interest rates and economic stability, can determine card usage by affecting consumer confidence and spending patterns (Humphrey et al., 1996; Zinman, 2009). Changes in payment amounts made with credit cards, debit cards and prepaid cards, which are indicative of the Turkish economy, have been published for public information as the General Card Payment Index and the Household Card Payment Index since April 2015. While the index includes the payment amounts made with cards issued by credit card, debit card or prepaid card issuers operating in Türkiye, cash advance and cash withdrawal transactions made with credit and debit cards are not included in these indices. Both indices have two versions, nominal and real, and the real index is adjusted for inflation (CPI). The General Card Payment Index (Nominal) is a monthly index of all payments made in Türkiye or abroad with all cards issued in Türkiye, indexed to April 2015, and is not adjusted for inflation (CPI). The Household Card Payment Index (Nominal), on the other hand, is published monthly by indexing all payments made with individual cards issued in Türkiye, excluding Private Pension and Public/Tax Payments sectors, to April 2015, and no inflation (CPI) adjustment is made (ICC, 2020).

In this framework, this study aims to determine the determinants of households' propensity to make card payments in Türkiye. In the model established in the research, the Household Card Payment Index (nominal), which has been published since April 2015, is used as the dependent variable. Exchange rate, employment rate, interest rate, consumer confidence index and inflation indicators, which are thought to affect this index, are used as independent variables. The research covers the period of 2015/April-2024/April and the frequency of the data is monthly. The stationarity properties of the variables in the research are determined by Augmented Dickey-Fuller (1979, 1981) and Philips-Perron (1988) unit root tests. The short and long run relationships of the research model are determined by the Autoregressive Distributed Lag Bound Test (ARDL).

The following stages of this research are designed as follows. In the second stage, a review of national and international literature on the subject is included. In the third stage, the data set, model and methodology of the research are explained. In the fourth section, the empirical findings of the research are detailed, and the research is completed by presenting conclusions and evaluations.

LITERATURE REVIEW

In this literature review, an investigation of the macroeconomic and financial determinants of card spending volume is presented.

Studies linking card spending to economic and financial factors are widely dispersed across various contexts. Gross and Souleles (2001) using U.S. data from 1995 to 1997, found that increases in credit card limits led to higher credit card debt and consequently increased card spending. Uzgören et al. (2007) indicated that the use of credit cards as payment and consumer credit instruments is continuously rising globally and in Türkiye. Their analysis of factors influencing credit card spending in Türkiye employed multiple regression analysis. They found significant roles played by crises in November 2000 and February 2001 in decreasing credit card usage volume. Moreover, they concluded that per capita gross national income, number of POS terminals, number of credit cards, and inflation rate positively influenced credit card usage volume.

Lamdin's (2008) study in the U.S. from 1978 to 2007 examined the relationship between consumer confidence and credit card spending, finding that consumer confidence affects credit card usage at different time lags. Telyukova (2013), using data from the U.S. Consumer Expenditure Survey 2000-2002, identified that transaction and precautionary demand for money played a key role in explaining credit card spending. Kabarlarlı (2015) analysed the relationship between domestically used credit cards in Türkiye and the consumer price index, weighted average interest rates applied by banks on loans, and industrial production index using the VAR method for the period 2005-2014. According to the results of their impulse response analysis, credit card usage showed a weak response to changes in money supply. They also found that variables such as consumer price index, interest rate, M1 money supply, and industrial production index followed credit card usage in explaining its variance to a small extent.

Yüksel et al. (2016) investigated the impact of macroeconomic factors on credit card usage in Türkiye using the MARS method with data from January 2005 to February 2016. They identified a negative relationship between credit card usage and unemployment rate. Additionally, they observed an increase in credit card usage when interest rates rose. Prabheesh and Rahman (2019) analysed the relationship between credit card usage and monetary policy in Indonesia using a structural VAR model with data spanning from 2006 to 2018. According to their findings, the increase in credit card usage primarily stemmed from Indonesia's economic growth. They observed that the transmission of monetary policy through the lending channel was weak, with exchange rates and global oil prices playing a more widespread role in the monetary transmission process.

Sönmezler et al. (2019) aimed to investigate the relationship between credit card expenditures, consumer confidence, and inflation in Türkiye using data from 2012 to 2018. They employed the ARDL boundary test to analyse the relationship between credit card expenditures, consumer confidence index,

and the cost-of-living index for wage earners. Based on their estimated long-term coefficients, they found that the impact of consumer confidence index on credit card expenditures was statistically insignificant. However, the cost-of-living index had a positive effect on card expenditures. Göv and Salihoğlu (2020) explored the relationship between individual credit card usage, money supply, and economic indicators using a Turkish sample. They analysed monthly data spanning from January 2005 to August 2019, focusing on the real volume of individual credit card usage in relation to real money supply, industrial production index, consumer price index, interbank overnight interest rate, and USD exchange rate. Their Granger causality analysis revealed a one-way causality relationship from industrial production index, consumer price index, interest rate, money supply, and exchange rate to credit card usage. Tunay (2023) investigated the determinants of credit card expenditures using quarterly and monthly data from 2005 to 2022 in Türkiye. They explored changes in explanatory variables that influenced card expenditures, accounting for unobservable factors such as inflation expectations and expectation errors using state-space models, which served as inputs for other analyses. Overall, they concluded that credit card expenditures were sensitive to changes in inflation, wage expectations, and disposable income levels.

When reviewed in general, the relevant literature indicates that macroeconomic factors influence card spending volumes in various ways across country samples. It has been observed that research focusing on the macroeconomic determinants of household/individual card spending volume is quite limited. This observation has motivated the development of the present study.

DATA SET, MODEL, AND METHODOLOGY OF THE RESEARCH

In the research, there are 109 observations for each variable with a monthly frequency data set covering the period between 2015/April and 2024/April. As presented in the research model, some macroeconomic indicators are used as determinants of households. The research period is based on the date when the Household Card Payment Index (Nominal), which is used as the dependent variable in the model, was first published. In order to minimise the scale differences between the research variables, natural logarithms of the variables are used over their level values. Detailed information on the variables is presented in Table 1.

Table 1. Variable Data

| Variable | Short Code | Variable Definition | Source |
|---------------------------|------------|--|---|
| Card Payment Index | INDEX | Household Card Payment Index (Nominal) | |
| Foreign Exchange Rate | EXC | US Dollar/Turkish Lira (Effective Selling) | Central Bank of the Republic of Türkiye |
| Employment | EMP | Employment Rate (%) | Electronic Data Distribution Platform |
| Interest Rate | INT | Personal Loan Interest Rate (Opened in TL) (Current Data, %) | |
| Consumer Confidence Index | CCI | Consumer Confidence Index | |
| Inflation Rate | INF | Price Index (Consumer) (2003=100) | |

The model in equation (1) was used in the research.

$$INDEX_t = a_0 + a_1 EXC_t + a_2 EMP_t + a_3 INT_t + a_4 CCI_t + a_5 INF_t + \varepsilon_t \quad (1)$$

The descriptive statistics of the research are presented in Table 2. When the relevant statistics are analysed, it is seen that the variable with the highest average is the inflation indicator. Among the variables, the variable with the highest deviation from the mean is the card payment index and the lowest is the employment rate. According to the Jarqua-Bera normality test, except for the consumer confidence index, other variables are not normally distributed at 5% significance level.

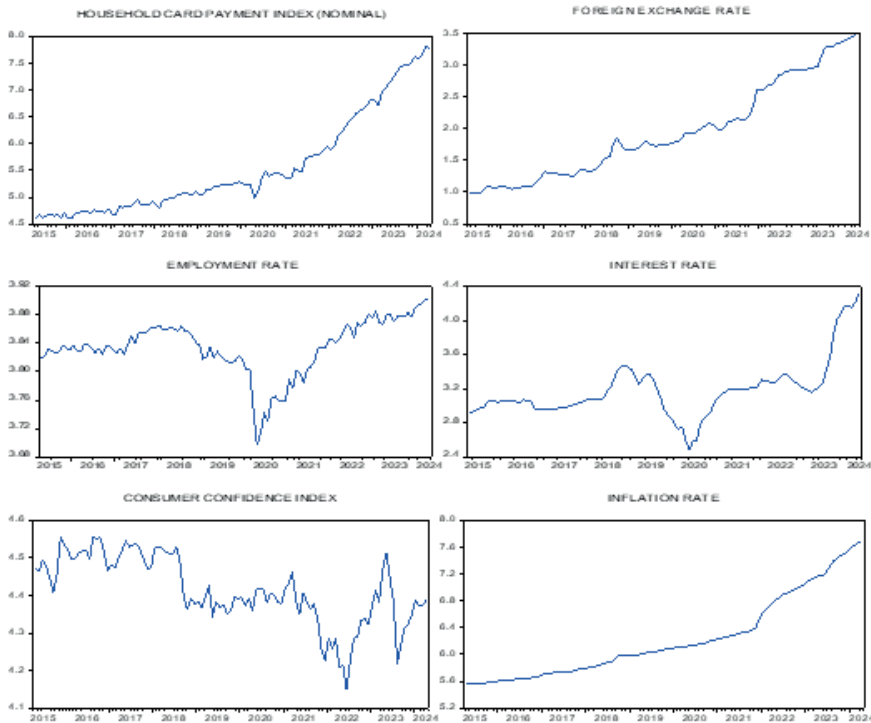
Table 2. Descriptive Statistics

| | INDEX | EXC | EMP | INT | CCI | INF |
|-----------------------------------|----------|----------|-----------|----------|-----------|----------|
| Mean | 5.550514 | 1.947831 | 3.834448 | 3.179911 | 4.413894 | 6.239804 |
| Median | 5.235644 | 1.771342 | 3.835142 | 3.102612 | 4.401135 | 6.076701 |
| Maximum | 7.822525 | 3.477477 | 3.901973 | 4.317421 | 4.555625 | 7.699616 |
| Minimum | 4.601363 | 0.976403 | 3.696351 | 2.480396 | 4.149622 | 5.558333 |
| Standard Deviation | 0.922438 | 0.748954 | 0.039263 | 0.334907 | 0.091314 | 0.609418 |
| Skewness | 1.077248 | 0.561520 | -1.055376 | 1.421373 | -0.440275 | 0.906603 |
| Kurtosis | 2.923942 | 2.119890 | 4.490025 | 5.912134 | 2.717759 | 2.660250 |
| Jarque-Bera (JB) Statistic | 21.10804 | 9.245985 | 30.31767 | 75.21783 | 3.883249 | 15.45596 |
| JB Probability Value | 0.000026 | 0.009823 | 0.000000 | 0.000000 | 0.143471 | 0.000440 |

Figure 1 shows the graphs of the research variables. When the graphs of the variables are analysed, it is observed that household card payment index, exchange rate and inflation indicators are in an upward trend in the relevant

period. The employment rate, interest rate and consumer confidence index variables, on the other hand, follow a more turbulent process. The exchange rate and consumer price-based inflation graphs follow very similar processes, which may be attributed to the pass-through effect of exchange rate increases on consumer inflation. It is observed that especially the employment rate and interest rate variables bottomed out at the beginning of the Covid-19 pandemic and recovered in the following period.

Figure 1. *Graphs of Variables*



In this study, traditional Augmented Dickey-Fuller (1979, 1981) and Philips-Perron (1988) unit root tests were used to determine the stationarity properties of the variables. In the research model, short and long run relationships are analysed using the Autoregressive Distributed Lag Distributed Autoregressive Model (ARDL) bounds approach.

FINDINGS

The stationarity properties of the variables were determined by conventional Augmented Dickey-Fuller (ADF) and Philips-Perron (PP) unit root tests and the findings are presented in Table 3.

Table 3. ADF and PP Unit Root Test Results

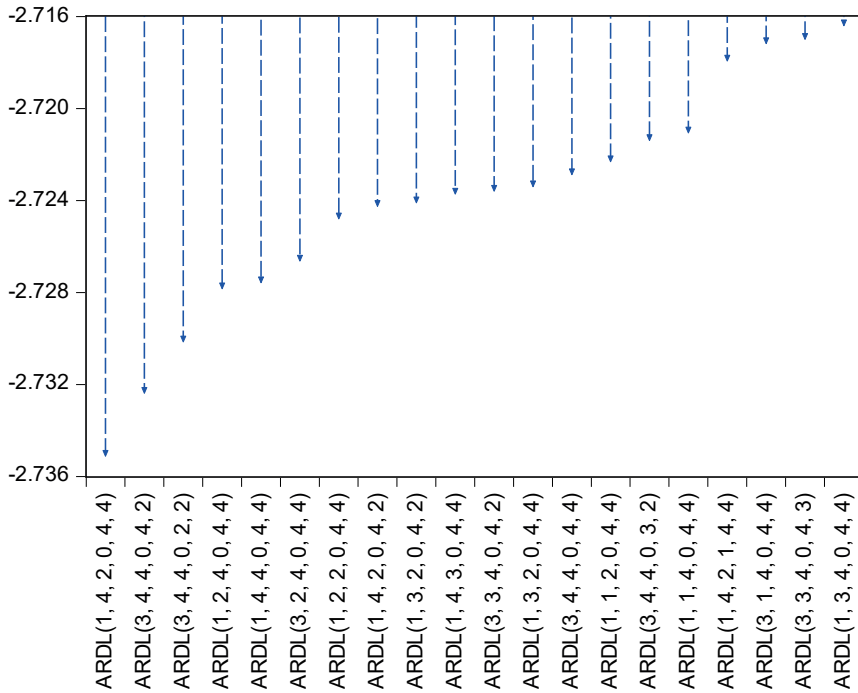
| Variable | ADF | PP |
|----------------|-------------------|-------------------|
| INDEX | -0.3579 (0.9879) | 0.0651 (0.9966) |
| EXC | -1.4960 (0.8251) | -1.4376 (0.8443) |
| EMP | -1.3811 (0.8612) | -1.3350 (0.8738) |
| INT | -1.0021 (0.9387) | -0.8033 (0.9615) |
| CCI | -3.3304 (0.0669) | -3.3302 (0.0669) |
| INF | 0.0902 (0.9968) | 0.6564 (0.9996) |
| Δ INDEX | -9.9639 (0.0000) | -12.3994 (0.0000) |
| Δ EXC | -7.8905 (0.0000) | -6.3695 (0.0000) |
| Δ EMP | -10.5386 (0.0000) | -10.5446 (0.0000) |
| Δ INT | -5.4765 (0.0001) | -5.4226 (0.0001) |
| Δ CCI | -10.1299 (0.0000) | -12.0275 (0.0000) |
| Δ INF | -5.9107 (0.0000) | -5.8152 (0.0000) |

Note: Probability values are in parentheses and the notation “ Δ ” indicates the first difference values of the variables. In the ADF and PP unit root test, the critical values for the model with constant term and trend are -4.045236 (1%), -3.451959 (5%) and -3.151440 (10%). In all tests, the optimal lag is decided by Schwarz Information Criterion (SIC). In addition, in the PP test, Bartlett Kernel was used for the Spectral estimation method, while Bandwith options were used for the Newey-West method.

In ADF and PP unit root tests, the null hypothesis “ H_0 : The series is not stationary and the series contains unit root” is tested. According to Table 3, at 1%, 5% and 10% levels of significance, the variables INDEX, EXC, EMP, INT and INF are found to be unit rooted at level values and become stationary when first order differences are taken. The CCI variable was also found to be unit rooted at 1% and 5% significance levels and stationary at 10% significance level.

According to the ADF and PP unit root test findings, the fact that the independent variables of the model are not I(1) at all significance levels (TGE variable is stationary at 10% significance level) paved the way for the use of ARDL frontier approach due to some advantages in long and short term relationships. Pesaran et al. (2001) argue that in the classical ARDL frontier approach, dependent variables can be I(1) and other variables can be I(1) or I(0). According to this situation, it is necessary to determine the model that minimises the relevant criterion in the ARDL method decided to be used. In the graph in Figure 2, ARDL (1, 4, 2, 0, 4, 4) is determined as the model according to Akaike Information Criterion.

Figure 2. Model Selection
Akaike Information Criteria (top 20 models)



The Unrestricted Error Correction Model Equation (2) is employed to test the cointegration relationship in the ARDL (1, 4, 2, 0, 4, 4) model.

$$\begin{aligned}
 \Delta INDEX_t = & \beta_0 + \sum_{i=1}^p \beta_{1i} \Delta INDEX_{t-i} + \sum_{i=0}^r \beta_{2i} \Delta EXC_{t-i} + \sum_{i=0}^s \beta_{3i} \Delta EMP_{t-i} + \sum_{i=0}^k \beta_{4i} \Delta INT_{t-i} \\
 & + \sum_{i=0}^m \beta_{5i} \Delta CCI_{t-i} + \sum_{i=0}^m \beta_{6i} \Delta INF_{t-i} + a_1 INDEX_{t-1} + a_2 EXC_{t-1} + a_3 EMP_{t-1} \\
 & + a_4 INT_{t-1} + a_5 CCI_{t-1} + a_6 INF_{t-1} + \varepsilon_t
 \end{aligned} \tag{2}$$

The notation Δ in equation (2) denotes the difference operator, ε_t denotes the error term, β_0 denotes the constant term, $\beta_{1,2,3,4,5,6}$ denotes the short-run coefficients, $a_{1,2,3,4,5,6}$ denotes the long-run coefficients, and p, r, s, k, l and m denote the lag lengths determined by the information criterion. In the ARDL approach, the F bounds test is used to test the cointegration relationship. In the related test, the alternative hypothesis $H_1: a_1 \neq a_2 \neq a_3 \neq a_4 \neq a_5 \neq a_6 \neq 0$ is tested against the null hypothesis $H_0: a_1 = a_2 = a_3 = a_4 = a_5 = a_6 = 0$. The F bound test statistic value is compared with the lower and upper bound critical values calculated in Narayan (2005). If the F bound test statistic is greater than the upper bound critical value, the null hypothesis H_0 , which states

that there is no cointegration, is rejected and the existence of cointegration relationship is confirmed. After the long-run coefficients of the ARDL model are determined, the Error Correction Model is constructed to determine the short-term relationships. For the error correction mechanism to work, the error correction coefficient must be negative and statistically significant. The Error Correction Model is presented in Equation (3) and the notation λ in this equation refers to the error correction coefficient that shows how long after the short-run deviations are eliminated in the long run.

$$\Delta INDEX_t = \beta_0 + \sum_{i=1}^{p-1} \beta_{1i} \Delta INDEX_{t-i} + \sum_{i=0}^{r-4} \beta_{2i} \Delta EXC_{t-i} + \sum_{i=0}^{s-2} \beta_{3i} \Delta EMP_{t-i} + \sum_{i=0}^{k-0} \beta_{4i} \Delta INT_{t-i} + \sum_{i=0}^m \beta_{5i} \Delta CCI_{t-i} + \sum_{i=0}^m \beta_{6i} \Delta INF_{t-i} + \lambda ECT_{t-1} + \varepsilon_t \quad (3)$$

The robustness of the ARDL (1, 4, 2, 0, 4, 4) model is checked by diagnostic tests. In the diagnostic test results presented in Table 4, it is seen that the probability values (p) of the tests are greater than the test statistics at 5% significance level. According to these results, the model exhibits a normal distribution and does not contain serial correlation and changing variance problems. Finally, the Ramsey RESET was used to test whether there is a specification error in the model. The null hypothesis of no model specification error was not rejected at the 5% significance level and as a result, no model specification error was detected.

Table 4. ARDL (1, 4, 2, 0, 4, 4) Model and Diagnostic Test Results

| Variable | Coefficient | Standard Error | T Statistic | Probability Value |
|------------|-------------|----------------|-------------|-------------------|
| INDEX (-1) | 0.470519 | 0.083072 | 5.663963 | 0.0000 |
| EXC | 0.119676 | 0.168415 | 0.710599 | 0.4793 |
| EXC (-1) | -0.081023 | 0.300162 | -0.269930 | 0.7879 |
| EXC (-2) | -0.065611 | 0.334108 | -0.196378 | 0.8448 |
| EXC (-3) | 0.089895 | 0.304993 | 0.294744 | 0.7689 |
| EXC (-4) | -0.324877 | 0.200534 | -1.620056 | 0.1090 |
| EMP | 3.082204 | 0.504544 | 6.108886 | 0.0000 |
| EMP (-1) | -0.892417 | 0.675937 | -1.320266 | 0.1903 |
| EMP (-2) | -1.551865 | 0.500477 | -3.100775 | 0.0026 |
| INT | -0.052311 | 0.030245 | -1.729588 | 0.0874 |
| CCI | -0.318248 | 0.190402 | -1.671453 | 0.0984 |
| CCI (-1) | 0.042486 | 0.210572 | 0.201764 | 0.8406 |
| CCI (-2) | 0.399216 | 0.205394 | 1.943662 | 0.0553 |
| CCI (-3) | -0.473977 | 0.211048 | -2.245823 | 0.0273 |

| | | | | |
|----------|-----------|----------|-----------|--------|
| CCI (-4) | 0.368472 | 0.171510 | 2.148405 | 0.0346 |
| INF | 0.228645 | 0.515326 | 0.443691 | 0.6584 |
| INF (-1) | -0.895447 | 0.852928 | -1.049851 | 0.2968 |
| INF (-2) | 2.245608 | 0.929653 | 2.415532 | 0.0179 |
| INF (-3) | -1.313990 | 0.885378 | -1.484101 | 0.1415 |
| INF (-4) | 0.923119 | 0.449935 | 2.051674 | 0.0433 |
| C | -6.276506 | 1.204452 | -5.211090 | 0.0000 |

$R^2 = 0.996977$ Adjusted $R^2 = 0.996257$ Probability (F-Statistic) = 0.000000

| Diagnostic Tests | Test Statistic | Probability Value |
|----------------------------|----------------|-------------------|
| Breusch-Pagan-Godfrey Test | 1.015808 | 0.4535 |
| Breusch-Godfrey LM Test | 1.014499 | 0.3671 |
| Jarque-Bera Test | 0.343650 | 0.8421 |
| Ramsey Reset Test | 0.580351 | 0.5633 |

Table 5 presents the F bounds test results for the ARDL model. The F statistic is calculated as 7.972032 and since this value is above the upper bound I(1) critical values at all significance levels, the null hypothesis of no cointegration in the model is rejected. Therefore, the ARDL (1, 4, 2, 0, 4, 4) model is cointegrated, in other words, there is a long-run equilibrium relationship in the model.

Table 5. ARDL Boundary Test Results

| Test Statistic | Value | Signif. | I(0) | I(1) |
|----------------|----------|---------|-------|-------|
| F Statistic | 7.972032 | %10 | 2.355 | 3.5 |
| k | 5 | %5 | 2.787 | 4.015 |
| | | %1 | 3.725 | 5.163 |

Table 6 presents the long and short run parameters of the model. In the long-run parameter estimates, it is observed that a 1% increase in exchange rate, employment, interest rate, consumer confidence index and inflation variables create approximately -0.49%, 1.2%, -0.09%, 0.03% and 2.24% change in the household card payment index, respectively. In the long run, only the consumer confidence index variable is statistically insignificant. As a result, in the long run, increases in exchange rate and interest rate variables have a negative effect on the household card payment index, while increases in employment, consumer confidence index and inflation variables have a positive effect.

Table 6. Long and Short Run Coefficient Estimates

| Variable | Coefficient | Standard Error | T Statistic | Probability Value |
|-----------------------------|-------------|----------------|-------------|-------------------|
| Long Term Estimates | | | | |
| EXC | -0.494712 | 0.201216 | -2.458613 | 0.0160** |
| EMP | 1.204808 | 0.457875 | 2.631301 | 0.0101** |
| INT | -0.098797 | 0.059199 | -1.668896 | 0.0989* |
| CCI | 0.033898 | 0.289464 | 0.117108 | 0.9071 |
| INF | 2.243584 | 0.235706 | 9.518559 | 0.0000*** |
| Short Term Estimates | | | | |
| C | -6.276506 | 0.882796 | -7.109802 | 0.0000*** |
| D (EXC) | 0.119676 | 0.160339 | 0.746390 | 0.4575 |
| D (EXC (-1)) | 0.300593 | 0.199330 | 1.508020 | 0.1353 |
| D (EXC (-2)) | 0.234982 | 0.200345 | 1.172886 | 0.2442 |
| D (EXC (-3)) | 0.324877 | 0.176652 | 1.839083 | 0.0694** |
| D (EMP) | 3.082204 | 0.467737 | 6.589613 | 0.0000*** |
| D (EMP (-1)) | 1.551865 | 0.468847 | 3.309962 | 0.0014*** |
| D (CCI) | -0.318248 | 0.164572 | -1.933791 | 0.0565** |
| D (CCI (-1)) | -0.293711 | 0.158976 | -1.847519 | 0.0682* |
| D (CCI (-2)) | 0.105505 | 0.155655 | 0.677815 | 0.4998 |
| D (CCI (-3)) | -0.368472 | 0.157080 | -2.345758 | 0.0213** |
| D (INF) | 0.228645 | 0.464788 | 0.491934 | 0.6240 |
| D (INF (-1)) | -1.854737 | 0.531627 | -3.488796 | 0.0008*** |
| D (INF (-2)) | 0.390871 | 0.581619 | 0.672039 | 0.5034 |
| D (INF (-3)) | -0.923119 | 0.413114 | -2.234541 | 0.0281** |
| CointEq (-1) | -0.529481 | 0.074376 | -7.118943 | 0.0000*** |

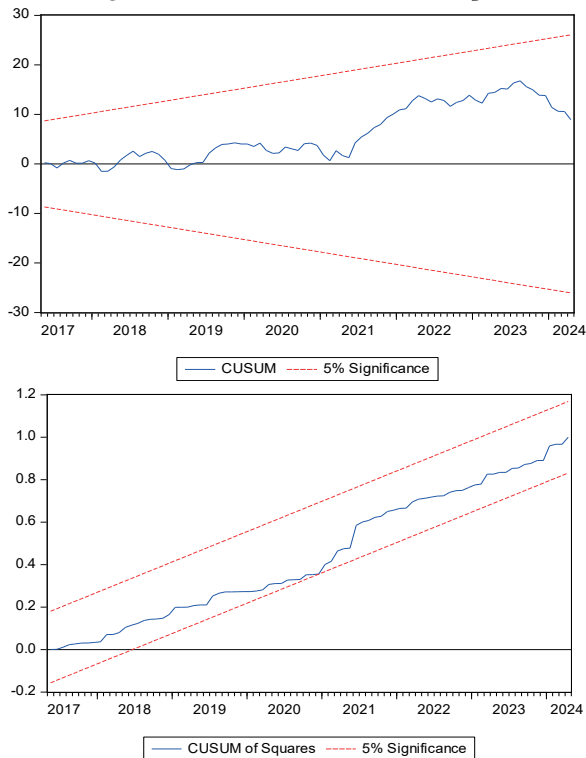
Note: *, ** and *** indicate 10%, 5% and 1% significance level, respectively.

Short-run parameter estimates of the model are also presented in Table 6. In the short run, exchange rate values up to two lags have a positive effect on the household card payment index, but these effects are statistically insignificant. However, although the effect of the third lag is also positive, this effect is statistically significant. The employment variable, on the other hand, has a positive and statistically significant effect on the household card payment index in its own and one lagged value. The consumer confidence index, on the other hand, contains a more complex process up to three lags. Except for the second lag of the consumer confidence index, all other lags affect the household card payment index negatively and statistically significantly. Finally, the inflation variable also followed a mixed process in the short run and affected the household card payment index differently at different lags. The fact that the error correction coefficient of the model (CointEq(-1)

= -0.529481) is negative and statistically significant indicates that the error correction mechanism works. This result indicates that shocks or imbalances occurring in the short term will improve by approximately 53% in the next period. Short-term imbalances ($1/0.529481$) are found to recover after 1.88 months and reach the long-run equilibrium.

The CUSUM and CUSUM² specification tests reported in Figure 3 test the structural break problem and the stability of the long-run coefficients in the model. At the 95% confidence interval, the parameter estimates are within the desired limits and the model is stable.

Figure 3. CUSUM and CUSUM² Graphs



CONCLUSION AND EVALUATION

The security and ease of use offered by card payment systems play an important role in consumers' preference for these methods. Credit and debit cards eliminate the risk of carrying cash and enable faster and safer payment transactions. Especially the development of digital technologies has increased the security features of card payment systems and enabled these systems to be adopted by a wider user base. The acceleration and increased security of payment transactions enable commercial activities to be carried out more

effectively and efficiently. It is stated that digital payment systems have gained the trust of users thanks to their advanced security features and the use of cash has decreased.

In this study, it is aimed to determine the macroeconomic determinants of households' tendency to make card payments in Türkiye. In the model established in the research, the Household Card Payment Index (Nominal), which has been published since April 2015, is used as the dependent variable. Exchange rate, employment rate, interest rate, consumer confidence index and inflation indicators, which are thought to affect this index, are used as independent variables. The research covers the period of 2015/April-2024/April and the frequency of the data is monthly. The stationarity properties of the variables in the research are determined by Augmented Dickey-Fuller (1979, 1981) and Philips-Perron (1988) unit root tests. The short and long run relationships of the research model are determined by ARDL Bounds Test. According to the long-run parameter findings of the research, increases in exchange rate and interest rate variables negatively affected the household card payment index, while increases in employment, consumer confidence index and inflation variables positively affected it. The short-run parameter results are more mixed. Finally, the error correction coefficient of the model (CointEq(-1) = -0.529481) is negative and statistically significant, indicating that the error correction mechanism works. This result shows that the shocks or imbalances that occur in the short term will improve by about 53% in the next period. Short-term imbalances ($1/0.529481$) are found to recover after 1.88 months and reach the long-run equilibrium.

The fact that increases in USD/TL exchange rate, which is used to represent the exchange rate in the research results, lead to a decrease in the household card expenditure index can be interpreted as that exchange rate increases increase economic uncertainties and cause consumers to cut their spending and act more cautiously. On the other hand, increases in exchange rates may lead to higher prices of imported goods and increase the cost of living. In this case, consumers' real incomes may decrease, and this may reduce their spending capacity. Consumers who experience a decline in their incomes may also have to cut down their credit card expenditures.

There are several main reasons underlying the decrease in card expenditures due to the increase in interest rates. The most important of these is that the increase in interest rates increases borrowing costs. Rising interest rates increase the cost of repayment of card debts and reduce consumers' appetite for using cards. Consumers may tend to cut down their card expenditures, fearing that their debt burden will increase due to high interest rates. An increase in interest rates may also lead consumers to save more by increasing savings rates.

An increase in employment rates leads to an increase in the income levels of individuals. Increased income increases the spending capacity of consumers, which may lead to an increase in card expenditures. With the increase in income, consumers may tend to purchase more goods and services and finance these expenditures with credit cards. An increase in employment rates may increase consumer confidence. An increase in consumer confidence causes individuals to have more positive expectations about the economic future and to be more inclined to spend. Increased confidence may lead consumers to use credit cards more. In this way, consumers' tendency to raise their living standards and consume more can be supported. In this process, individuals' access to credit cards and the increase in credit card limits may also become easier. In periods of rising employment rates, banks may offer higher credit limits to consumers with higher income levels. In this case, consumers may tend to use their credit cards more.

Finally, an increase in inflation in a country requires consumers to spend more money to purchase the same amount of goods and services. In this case, consumers may increase their card spending to meet their mandatory expenditures. The increase in consumer inflation may cause individuals to prefer to purchase goods and services that will become more expensive in the future by raising the expectation that prices will rise further in the future. These brought-forward expenditures can be financed by credit card usage. On the other hand, inflation leads to a decline in real income. As prices increase, consumers' real purchasing power decreases even though their nominal income remains the same. In this case, consumers may turn to borrowing to maintain their living standards and meet their basic needs. In this process, credit cards are one of the most common means of borrowing.

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Chapter 2

THE EFFECT OF FOREIGN DIRECT INVESTMENT AND FOREIGN PORTFOLIO INVESTMENT ON ECONOMIC GROWTH AND INFLATION¹

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1. Introduction

Foreign direct investment (FDI) entails the extensive movement of capital, wherein a corporation or entity from one nation extends its operations or establishes a branch in another nation. This involves gaining control and transferring assets (Har et al., 2008). FDI has proven to be a vital source of economic growth for numerous countries, fostering employment, investment, production, general welfare, and technology for the host country. Among the most significant benefits of increased FDI for developing economies is the introduction of new technologies, training, skills, and other essential resources that contribute to bolstering the host country's economy (Hossain & Hossain, 2012). Furthermore, FDI generates employment opportunities, which is a considerable advantage for the host country. As foreign companies expand their operations into new territories, they bring along improved management efficiency and advanced technological capabilities. This enables developing nations to enhance their competitiveness against international rivals and promote the production of superior quality goods and services in the times ahead.

However, the primary motivation behind the pursuit of FDI lies in the necessity for financial resources to support investment in developing nations. Consequently, FDI has the potential to elevate living standards and foster national development by generating additional employment opportunities and facilitating the execution of large-scale projects that demand substantial funding.

Based on Nair-Reichert & Weinhold (2001), in the past two decades, foreign direct investment (FDI) in developing nations has surged by 17 percent. Over the same period, globalization has significantly bolstered the movement of production factors across borders, aided by advancements in communication and information technology. Multinational corporations utilize diverse indicators and indices to identify suitable developing countries for investment. Consequently, despite their utilization of advanced technology in operations and production, these corporations still necessitate access to higher levels of technology and a skilled workforce. In the domain of skilled employment, developing nations possess abundant labour resources and a sizable population. Nevertheless, to sustain a proficient workforce, they must enhance educational opportunities across all levels. Additionally, they need to allocate greater capital reserves, as emphasized by Ilgun et al. (2010).

Since 2003 FDI and FPI have been an essential focus for Turkish regulators due to the benefits that FDI and FPI brings to a country's economy. By creating laws that incentives foreign investors to invest in the country, and since the introduction of such laws FDI and FPI have been increasing in Turkey. This paper examines the effects that FDI and FPI have on the Turkish economy,

by examining GDP and PPI which are indicators for economic growth and inflation.

2. Literature Review

Foreign direct investment has intrigued many scholars since the initial study examining its impact in the United Kingdom (Dunning, 1958). Subsequent research has been conducted in multiple countries, concentrating on the factors influencing FDI and the effects that FDI and FPI have on the host country.

Various research have analysed the effect that FDI and FPI have on economic growth and whether FDI and FPI are significant factors in the economic growth or not. FDI and FPI theories have been evolving over time, and each theory presents a different point of view on both variables. As in our study, we will examine the effect of foreign direct investment (FDI) and foreign portfolio investment (FPI) on economic growth (GDP) and inflation (PPI) in Turkey by gathering quarterly data from 2003 till 2023 by running a regression model, we will be able to capture the effects that FDI and FPI have on GDP and PPI. Additionally, we have divided the data into two sections which are 2003-2013 and 2014-2023 to be able to make a comparison between both periods.

2.1 FDI and Economic Growth

Numerous studies have documented the positive impact of FDI on economic growth. Borensztein, De Gregorio, and Lee (1998) found that FDI contributes to economic growth by transferring advanced technologies to developing countries, improving productivity and GDP growth. Alfaro et al. (2004) highlighted that FDI significantly affects economic growth, especially in countries with well-developed financial markets. In Turkey, Ilgun et al. (2010) showed that FDI inflows from 1980 to 2004 significantly boosted economic growth by increasing capital and improving production. Akinlo (2004) demonstrated that FDI in Sub-Saharan Africa, particularly in the manufacturing sector, positively impacts economic growth. However, Carkovic and Levine (2005) argue that the benefits of FDI depend on the host country's absorptive capacity, including human capital and infrastructure, and without it, the positive effects may be limited.

2.2 FDI and Inflation

The relationship between FDI and inflation is less straightforward compared to its impact on economic growth. Some studies suggest that FDI can lead to a decrease in inflation in the host country. For example, Mustafa (2019) study shows that FDI inflows decreases the long-term inflation in Sri Lanka. Additionally, other studies propose that FDI can help stabilize inflation by increasing the supply of goods and services and enhancing productivity. According to a study by Sayek (2009), FDI can contribute to price stability and

reduce the real negative effects of inflation. In the Turkish context, empirical evidence on the effect of FDI on inflation is mixed. Some researchers, such as Sekmen et al. (2009) argue that FDI inflows increase inflation in Turkey in the long-term, but has no significant effect in the short-term

2.3 FPI and Economic Growth

The relationship between FPI and economic growth has been widely studied, with many researchers finding positive correlations. Levine and Zervos (1998) argue that FPI enhances economic growth by improving market liquidity and resource allocation. Bekaert and Harvey (2000) found that FPI boosts economic growth in emerging markets by increasing capital availability and financial market development. Conversely, Sawalha (2016) demonstrated a significant negative impact of FPI on GDP growth. For Turkey, Telatar (2016) showed that FPI positively influences economic growth by increasing capital for productive investments, stimulating economic activities, and financing infrastructure projects, technological advancements, and human capital development.

2.4 FPI and Inflation

Theoretically an increase in FPI should lower inflation in the country by strengthening the domestic financial institutions and subsequently this enhances stability of the financial markets and lowers inflation. But some of the empirical evidence shows the opposite. For example, Agarwal's (1997) study examined the impact of FPI on inflation, the results of the study showed that FPI increases overall inflation rates. For Turkey, there is only one study that examines the effects of FPI on inflation, the study done by Gumus et al. (2015), suggest that FPI has no significant effect on CPI which is a measure of inflation, and there is not relation between FPI and inflation in the short-term.

The impact of FPI on inflation is a subject that has not been examined sufficiently, very few studies have been done on this subject and none of the relevant studies have been done in recent times, most recent studies show that FPI has no significant effect on inflation.

3. Data and Methodology

In this section the data collection and the design of the regression model will be explained. Furthermore, the results of the regression models and the descriptive statistics of the variables that are used in the regression models is included in this section. Lastly the interpretation of the results and the tables can be seen below.

3.1 Data

This study examines the impact of Inward FDI and FPI on economic growth (GDP) and inflation (PPI) in Turkey using quarterly data from 2003

to 2023, divided into three periods: 2003-2023, 2003-2013, and 2014-2023. This segmentation allows analysis of how these impacts evolve over different economic and policy environments, capturing effects of significant economic events, policy shifts, and external shocks. The data for the study is gathered from EVDS (2024).

GDP is used as a measure of economic growth, and PPI is selected as the measure of inflation to focus on production-level price changes. Diagnostic tests, including the Augmented Dickey-Fuller test for stationarity, variance inflation factor test for multicollinearity, and Breusch-Pagan test for heteroskedasticity, ensured the reliability of the regression models. Non-stationary variables were transformed using differencing techniques.

In the GDP model, FDI, FPI, imports, interest rates, exchange rates, and government expenditure are the independent variables. In the PPI model, the same variables plus the export-to-GDP ratio are included. These variables were chosen based on their theoretical relevance to economic growth and inflation.

Missing data points for FDI and FPI were imputed using information from corresponding years to maintain data integrity. This comprehensive approach enhances the robustness of the findings, providing policymakers with detailed insights for informed economic strategies.

3.2 Methodology

The aim of this study is to explore the impact of Inward FDI and FPI on Turkey's economic growth and inflation. To achieve this, we have selected Gross Domestic Product (GDP) as the measure of economic growth and the Producer Price Index (PPI) as the measure of inflation. Additionally, several control variables are included in the analysis, namely interest rate, exchange rate, export to GDP ratio, government expenditure, import, and savings. These variables are chosen for their relevance to the Turkish economy and their potential influence on both economic growth and inflation dynamics. By incorporating these key variables into the analysis and employing the simple linear regression, the study aims to provide valuable insights into the relationships between foreign investment inflows, economic performance, and price stability in Turkey.

3.2.1 GDP Model

When evaluating the impact of FDI on economic growth in Turkey, Gross Domestic Product (GDP) stands as the central metric. Accompanying this assessment, the GDP model incorporates a range of control variables to enrich the analysis. These include interest rates, exchange rates, government expenditure (GOV), and imports. Each of these variables plays a critical role in shaping economic dynamics. Interest rates, for instance, influence borrowing costs and investment levels, while exchange rates affect trade competitiveness

and export-import dynamics. Government expenditure reflects the level of public investment and infrastructure development, while imports and savings contribute to overall consumption and investment patterns. By integrating these control variables, the GDP model aims to provide a better understanding of how FDI interacts with various economic factors to influence GDP growth in Turkey.

$$Y_t = \beta_0 + \beta_1 X_{1,t} + \beta_2 X_{2,t} + \beta_3 X_{3,t} + \beta_4 X_{4,t} + \beta_5 X_{5,t} + \beta_6 X_{6,t} + \epsilon_t$$

Dependent Variable:

Yi: Gross Domestic Product (GDP)

Control variables:

X1: Import

X2: Interest rate

X3: Exchange Rate

X4: Government Expenditure

Independent variable:

X5: Foreign Direct Investment (FDI)

X6: Foreign Portfolio Investment (FPI)

3.2.2 PPI Model

In examining the impact of FDI and FPI on inflation in Turkey, the Producer Price Index (PPI) is utilized as the designated measure of inflation. The choice of PPI is motivated by its ability to capture the average changes in prices received by domestic producers for their output, reflecting inflationary pressures at the production level before they reach consumers. This makes PPI a leading indicator of consumer price inflation, providing early signals of inflationary trends in the economy.

The PPI is a good measure of inflation because it encompasses the prices of goods at various stages of production, from raw materials to finished products, allowing for a comprehensive analysis of inflationary pressures across the supply chain. Additionally, PPI is less volatile than the Consumer Price Index (CPI), as it excludes volatile items like food and energy prices, offering a clearer view of underlying inflation trends.

Complementing this analysis, the PPI model incorporates a comprehensive set of control variables to enhance the precision of the regression analysis.

These control variables include interest rates, savings, exchange rates, exports to GDP ratio, imports, and government expenditures. Each of these variables plays a crucial role in shaping inflationary pressures within the economy. By considering these control variables alongside FDI and FPI, the PPI model aims to provide a comprehensive understanding of how foreign investment influences inflation dynamics in Turkey.

$$Y_t = \beta_0 + \beta_1 X_{1,t} + \beta_2 X_{2,t} + \beta_3 X_{3,t} + \beta_4 X_{4,t} + \beta_5 X_{5,t} + \beta_6 X_{6,t} + \beta_7 X_{7,t} + \beta_8 X_{8,t} + \epsilon_t$$

Dependent Variable:

Yi: Producers Price Index (PPI)

Control variables:

X1: Import

X2: Interest rate

X3: Exchange Rate

X4: Government Expenditure

X5: Exports to GDP Ratio

X6: Savings

Independent variable:

X7: Foreign Direct Investment (FDI)

X8: Foreign Portfolio Investment (FPI)

4. Findings

In this section, we present the regression results of the analysis, focusing on the impact of Inward FDI and FPI on economic growth and inflation in Turkey. The regression models are applied to three distinct time periods: the entire timeframe from 2003 to 2023, as well as two sub-periods, 2003-2013 and 2014-2023.

Here, we provide an interpretation of the results, shedding light on the relationships between foreign investment, economic performance, and price stability over the specified time periods. Through the analysis, the study aims to offer valuable insights into the drivers of economic growth and inflation dynamics in Turkey, contributing to the existing literature on this subject.

4.1 GDP Regression Results

Based on the regression analysis in Table 1, GDP is examined as the dependent variable in relation to several independent variables. The analysis

reveals that FDI (Foreign Direct Investment) has a negative coefficient, suggesting an association with a decrease in GDP, but this effect is not statistically significant, indicating it does not meaningfully impact economic growth. The interest rate has a positive coefficient, implying that higher interest rates are linked to increased GDP, though this relationship is also not statistically significant. Imports show a substantial positive coefficient with high statistical significance, indicating that higher imports are strongly associated with increased GDP, highlighting their crucial role in driving economic growth. Similarly, government expenditure has a positive and statistically significant coefficient, underscoring the beneficial impact of increased government spending on GDP. Conversely, the exchange rate has a negative and statistically significant coefficient, suggesting that a higher exchange rate (potentially a weaker domestic currency) is associated with a decrease in GDP, pointing to the adverse effects of unfavourable exchange rate movements on economic growth. Lastly, FPI (Foreign Portfolio Investment) has a negative coefficient, indicating that an increase in FPI is associated with a decrease in GDP, with this effect being marginally significant. Overall, the results emphasize the significant positive roles of imports and government expenditure in promoting economic growth, while the impacts of FDI and FPI are less clear and potentially negative.

Table 1 2003-2023 GDP Regression

| | Estimate | Std. Error | t value | Pr(> t) |
|---------------|----------|------------|---------|-----------|
| Intercept | 0.0115 | 0.0113 | 1.015 | 0.3132 |
| FDI_diff | -0.0034 | 0.0414 | -0.082 | 0.9350 |
| Interest Rate | 0.0643 | 0.0637 | 1.010 | 0.3158 |
| Import | 0.6876 | 0.0983 | 6.993 | 0.0000*** |
| GOV | 0.2540 | 0.0805 | 3.153 | 0.0023*** |
| ExchangeRate | -0.2985 | 0.1331 | -2.242 | 0.0279** |
| FPI | -0.0016 | 0.0009 | -1.825 | 0.0719* |

Signif. codes: <0.1 ‘*’, <0.05 ‘**’, <0.01 ‘***’

R-squared: 0.562

The regression analysis in Table 2 examines the relationship between GDP and various economic variables. The results indicate that FDI has a negative but not statistically significant coefficient, suggesting that FDI variations do not significantly influence GDP. Similarly, the interest rate has a negative, statistically insignificant coefficient, implying negligible effects on GDP. In contrast, imports have a strong positive and statistically significant coefficient, indicating that higher import levels are closely linked to increased GDP, underscoring their importance in driving economic growth. Government expenditure also shows a positive and statistically significant coefficient, highlighting its critical role in supporting economic growth. The exchange rate has a negative coefficient that is not statistically significant, suggesting it

does not significantly affect GDP in this context. Finally, FPI has a negative coefficient and is marginally significant, indicating that higher levels of FPI might slightly reduce GDP, though this effect is not robust. Overall, the results emphasize the significant roles of imports and government expenditure in boosting economic growth, while the impacts of FDI, interest rates, exchange rates, and FPI are less pronounced, with FPI potentially having a minor negative impact on GDP.

Table 2 2003-2013 GDP Regression

| | Estimate | Std. Error | t value | Pr(> t) |
|--------------------|----------|------------|---------|-----------|
| Intercept | -0.0000 | 0.0130 | -0.003 | 0.9973 |
| FDI_diff | -0.0591 | 0.04616 | -1.280 | 0.2092 |
| Interest Rate_diff | -0.0187 | 0.1173 | -0.159 | 0.8744 |
| Import | 0.7059 | 0.1253 | 5.632 | 0.0000*** |
| GOV | 0.4080 | 0.1028 | 3.971 | 0.0004*** |
| Exchange Rate | -0.0367 | 0.2454 | -0.149 | 0.8821 |
| FPI_diff | -0.0011 | 0.0006 | -1.765 | 0.0866* |

Signif. codes: <0.1 ‘*’, <0.05 ‘**’, <0.01 ‘***’

R-squared: 0.7124

The regression analysis in Table 3 explores the relationship between GDP and various economic variables. The coefficient for FDI is positive but not statistically significant, indicating that FDI variations do not significantly impact GDP. Similarly, the interest rate is positive but not statistically significant, suggesting minimal influence on GDP. Imports have a positive coefficient that is marginally significant, implying that an increase in imports is associated with an increase in GDP, though the effect is not highly robust. Government expenditure has a positive coefficient, but it is not statistically significant, indicating that increased government spending does not strongly impact GDP in this model. The exchange rate has a negative and not statistically significant coefficient, suggesting that changes in the exchange rate do not significantly affect GDP. Lastly, FPI has a negative and not statistically significant coefficient, indicating that variations in FPI do not significantly influence GDP. Overall, the results suggest that while imports may have a marginally positive effect on GDP, other factors such as FDI, interest rates, government expenditure, exchange rates, and FPI do not show strong or significant impacts on economic growth within this analysis.

Table 3 2014-2023 GDP Regression

| | Estimate | Std. Error | t value | Pr(> t) |
|--------------------|----------|------------|---------|----------|
| Intercept | -0.0198 | 0.0575 | -0.346 | 0.7329 |
| FDI | 0.1629 | 0.2654 | 0.614 | 0.5459 |
| Interest Rate_diff | 0.0304 | 0.1018 | 0.298 | 0.7683 |
| Import_diff | 0.2715 | 0.1322 | 2.053 | 0.0527* |
| GOV | 0.2035 | 0.1981 | 1.027 | 0.3160 |
| Exchange Rate_diff | -0.2141 | 0.1835 | -1.167 | 0.2564 |
| FPI_diff | -0.0077 | 0.0050 | -1.553 | 0.1354 |

Signif. codes: <0.1‘*’, <0.05‘**’, <0.01 ‘***’

R-squared: 0.4117

The regression results across different time periods from 2003 to 2023 reveal that FDI's influence on GDP is insignificant, while FPI shows a marginally significant potential negative impact. Imports consistently have a robust positive effect on GDP, underscoring their critical role in economic growth. Government expenditure generally shows a positive impact on GDP, though not always statistically significant. Exchange rates and interest rates exhibit weak or insignificant effects on GDP. Overall, the results highlight the pivotal role of imports in driving economic growth, with some positive influence from government expenditure, while the impacts of FDI and FPI on GDP remain uncertain.

4.2 PPI Regression Results

Table 4 examines the relationship between the Producer Price Index (PPI), a measure of inflation, and various economic variables. The coefficient for FDI is negative and not statistically significant, indicating it does not impact inflation. The interest rate has a positive but insignificant coefficient, suggesting a weak relationship with inflation. Similarly, savings have a negative and insignificant coefficient, showing no significant effect on inflation. The exchange rate has a positive and highly significant coefficient, indicating that higher exchange rates, possibly reflecting a weaker domestic currency, are strongly associated with increased inflation. The exports-to-GDP ratio also shows a positive and significant effect on inflation, implying higher exports relative to GDP contribute to rising producer prices. Imports have a positive and highly significant coefficient, linking higher import levels to increased inflation.

Government expenditure, in contrast, has a negative and highly significant coefficient, suggesting that increased government spending is associated with reduced inflation, possibly by stabilizing producer prices. FPI has a positive and significant coefficient, indicating that higher levels of FPI contribute to rising inflation.

Overall, the results highlight the significant roles of the exchange rate, exports-to-GDP ratio, imports, and government expenditure in influencing inflation, with FDI and savings showing no significant impact, while FPI contributes positively to inflation.

Table 4 2003-2023 PPI Regression

| | Estimate | Std. Error | t value | Pr(> t) |
|--------------------|----------|------------|---------|-----------|
| Intercept | -0.0113 | 0.0051 | -2.193 | 0.0315** |
| FDI_diff | -0.0023 | 0.0165 | -0.139 | 0.8898 |
| Interest Rate | 0.0229 | 0.0274 | 0.837 | 0.4055 |
| Savings | -0.0225 | 0.0376 | -0.600 | 0.5505 |
| Exchange Rate | 0.2063 | 0.0584 | 3.531 | 0.0007*** |
| Export to GDP_diff | 0.8442 | 0.3881 | 2.175 | 0.0329** |
| Import | 0.1904 | 0.0379 | 5.031 | 0.0000*** |
| GOV_diff | -0.1142 | 0.0219 | -5.217 | 0.0000*** |
| FPI_diff | 0.0005 | 0.0002 | 2.133 | 0.0363** |

Signif. codes: <0.1 ‘*’, <0.05 ‘**’, <0.01 ‘***’

R-squared: 0.5737

In Table 5, the regression model examines the effects of the independent variables on the Producer Price Index (PPI) which is the measure for inflation. Import demonstrates a significant positive coefficient, suggesting a notable association with higher PPI values. This implies that increases in imports contribute to inflationary pressures, as higher costs for imported goods and materials translate into elevated producer prices. Such dynamics can lead producers to pass these higher costs onto consumers, resulting in increased prices for finished goods and services.

Similarly, FPI exhibits a significant positive coefficient, indicating that rises in Foreign Portfolio Investment coincide with higher PPI values. This suggests that increased foreign investment stimulates economic activity, leading to heightened demand and potentially driving up producer prices. On the other hand, the coefficients for the remaining variables—FDI, interest rate, savings, exchange rate, and exports to GDP ratio are statistically insignificant, signifying minimal influence on the PPI. While these variables are included in the analysis for context, they do not demonstrate significant effects on producer prices within the examined regression model.

Table 5 2003-2013 PPI Regression

| | Estimate | Std. Error | t value | Pr(> t) |
|--|----------|------------|-------------------|-----------|
| Intercept | -0.0125 | 0.0325 | -0.384 | 0.7031 |
| FDI | 0.0045 | 0.0128 | 0.353 | 0.7267 |
| Interest Rate | 0.0373 | 0.0290 | 1.288 | 0.2070 |
| Savings | -0.0264 | 0.0251 | -1.054 | 0.2996 |
| Exchange Rate | 0.1179 | 0.0654 | 1.801 | 0.0811* |
| Export to GDP | 0.5402 | 0.5828 | 0.927 | 0.3609 |
| Import | 0.0998 | 0.0312 | 3.202 | 0.0031*** |
| GOV | -0.0544 | 0.0278 | -1.955 | 0.0594 |
| FPI | 0.0007 | 0.0003 | 2.230 | 0.0329** |
| Signif. codes: <0.1 ‘*’, <0.05 ‘**’, <0.01 ‘***’ | | | R-squared: 0.5438 | |

Table 6 analyzes the Producer Price Index (PPI) and various economic factors affecting it. The interest rate shows a significant positive effect, indicating that changes in interest rates impact inflationary pressures by influencing producer prices. Government expenditure has a significant negative effect, suggesting that increased government spending can dampen the rate of change in PPI. The exports-to-GDP ratio exhibits a significant positive coefficient, implying that changes in this ratio contribute to inflationary pressures by affecting producer prices.

However, the coefficients for FDI, savings, exchange rate, import, and FPI are statistically insignificant, indicating they have minimal influence on changes in PPI. While these variables are included for context, they do not significantly affect the rate of change in producer prices in this regression model.

Table 6 2014-2023 PPI Regression

| | Estimate | Std. Error | t value | Pr(> t) |
|--|----------|------------|-------------------|----------|
| Intercept | 0.0026 | 0.0085 | 0.301 | 0.7667 |
| FDI_diff | -0.0118 | 0.0711 | -0.166 | 0.8701 |
| Interest Rate_diff | 0.0986 | 0.0449 | 2.195 | 0.0415** |
| Savings_diff | -0.0154 | 0.0794 | -0.194 | 0.8480 |
| Exchange Rate_diff | 0.1676 | 0.1081 | 1.551 | 0.1383 |
| Export to GDP_diff | 1.8012 | 0.6904 | 2.609 | 0.0178** |
| Import_diff | 0.0608 | 0.0688 | 0.884 | 0.3883 |
| GOV | -0.1967 | 0.0774 | -2.542 | 0.0205** |
| FPI | -0.0023 | 0.0030 | -0.767 | 0.4531 |
| Signif. codes: <0.1 ‘*’, <0.05 ‘**’, <0.01 ‘***’ | | | R-squared: 0.7193 | |

The regression analysis across different periods highlights significant variations in the impact of various variables on the Producer Price Index (PPI) in Turkey. Overall, the findings indicate that FDI does not have a significant impact on PPI across all periods studied, while FPI has a significant effect during the entire period and the 2003–2013 sub-period but not in the 2014–2023 period. Control variables such as the exchange rate, import, export to GDP ratio, and government expenditure show varying levels of significance, reflecting changes in their influence over time. This nuanced understanding of the different variables' impacts can help policymakers and researchers tailor their strategies and analyses to better address economic challenges related to inflation.

5. Discussions and Conclusions

This study examines the relationship between foreign direct investment (FDI), foreign portfolio investment (FPI), economic growth (GDP), and inflation (PPI) in Turkey. Using simple linear regression models on quarterly data from 2003 to 2023, sourced from the Turkish Central Bank, the study analyzes the effects of FDI and FPI over two distinct periods: 2003–2013 and 2014–2023.

The results indicate that while FDI shows inconsistent effects on economic growth and inflation, FPI significantly impacts both. Specifically, FPI negatively affects GDP and positively influences PPI, suggesting that increased FPI leads to higher inflation. This outcome is attributed to capital flow volatility, which causes exchange rate fluctuations and import cost increases (Yeyati, Schmukler, & van Horen, 2009).

Other variables like exchange rates and government expenditure also play crucial roles, with exchange rates positively impacting inflation and government expenditure boosting GDP. These effects vary across different periods, highlighting the dynamic nature of economic relationships.

Policymakers can manage FPI's negative impacts through measures like capital controls, promoting long-term investments, and adjusting monetary and fiscal policies. Enhancing domestic capital markets and managing exchange rate volatility are also vital.

This study is significant as it comprehensively analyzes the impacts of FDI, FPI, and other variables on Turkey's economic indicators over an extended period, contributing to the literature on economic development and investment dynamics in Turkey. The study's findings align with Sawalha (2016) regarding FPI's negative impact on economic growth but differ from Gumus et al. (2015) regarding FPI's effect on inflation.

While valuable, the study's findings are limited to Turkey and constrained by data availability and chosen models. Future research could expand by

incorporating data from multiple countries and exploring additional variables, using structural break tests to identify trends related to significant events like the 2008 financial crisis.

In conclusion, this study provides insights into the complex interplay between FDI, FPI, GDP, and inflation in Turkey, informing policymakers, businesses, and investors for better decision-making and sustainable economic growth.

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Chapter 3

THE DYNAMICS OF THE MORTGAGE MARKET IN THE FINANCIAL SECTOR: DIGITAL INNOVATION AND GLOBAL TRENDS

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1- Introduction

Lending businesses help the economic system by handing out loans to individuals to obtain property. They benefit people, who would otherwise have limited resources to buy a house. Data shows that loan lending promotes fiscal stability by managing dangers. One of their risk management methods is credit analysis. They decide the creditworthiness of borrowers before they release a financial item. If they pay on time, they lower the chances of losing their interest. Consequently, they remain in a position to prosper from real estate difficulties. Investment in real estate throws them into the sector with their capital and develops the housing market. The same information shows that other than their investment, they support homeownership attempts. Note further that loan lending businesses support homeownership by issuing house loans.

Mortgage places are the radical drivers of economic growth in the real estate division. They offer individuals a chance to get financial help and put money into real estate. In the process, they make job chances in the building area. For each person that qualifies, are offered funding to put money into many homes that the mortgage group their knowledge can sell. This forms a set of clients where the group earnings come from. They come up with a plan each year that shows what they get after paying all the loans to lenders. The groups link the investor to all these possible buyers. The number of structures that are sold is decided by the customers that want to buy. One way of making sure that individuals buy a product that they are comfortable to put money into is to lower the prices of this product. But an individual is not able to put money into it due to lack of help. Definitely one of the most clear mortgage group services out there is the fact that helped many individuals get real estate.

In conclusion, it is evident to assume that cash places are an integral part of the financial system. Foremost, they contribute to the overall stability of this edition and ease risks associated with the financial market. As such, they provide backing to the entire system. Secondly, they contribute to an increase in economic action. It is observable that the volume of secondary market operations performed by these companies is high enough to activate the real estate market. As a result, this increase in real estate transactions fosters further economic growth of the country. So, these companies have this powerful function in stimulating economic action. Thirdly, mortgage companies do far more than just selling a standardized good. They assist numerous clients that lie outside of the general marketing trend. Acting as a channel of mediation between a credit market and those customers-borrowers who have credit problems and whose earning produces channels of always handling payments, they fulfill important forceful and market breaker roles. Therefore, they are the feeders of the secondary credit market.

In contemporary times, the mortgage sector has entered a period of rapid and dynamic change compared to previous eras. Global factors are pushing the sector to its extremes, reshaping the operations of mortgage lending and having significant impacts. Technological advancements and low interest rates have emerged as the strong driving forces behind this transformation. Customer profiles are also evolving as a result of these changes. To thrive in the digital age, optimization and delivering superior customer experiences are of critical importance. Innovations in financial technology (FinTech) have led to profound changes in the lending industry in recent years. The use of blockchain technology, artificial intelligence, and machine learning has fundamentally transformed traditional lending methods. Additionally, the rise of online lending platforms has contributed to the reduction of steps required for loan approval, consequently providing customers with greater power and access to credit. The purpose of this study is to examine the innovations brought by technology in the sector on a global scale and to discuss the impacts of these developments on the industry. In the context of the significant transformation driven by technology, global financial systems have also necessitated mortgage providers to accelerate their digitization processes, utilize blockchain technology, leverage artificial intelligence and machine learning, develop mobile applications, and offer personalized services through data analytics. In this context, the first section of the study provides information on mortgage companies' access to financing sources and the risks they face. The second section addresses technological developments and digitization for mortgage companies, while the third section discusses the future of mortgage companies in the context of technological transformation, offering conclusions and recommendations both globally and for Turkey.

2- Financing Sources of Mortgage Companies: Challenges and Risks Facing Mortgage Companies

The act of getting money poses a quandary to mortgage firms. Mortgage firms provide economic aid to folks willing to own abodes. Numerous are the economic puzzles experienced by firms in the mortgage industry on issues of financing. One issue is the rise of quandaries in the procurement of funding to help in establishing, operating a mortgage firm.

In terms of home loan firms, interest charges drastically impact the entity's cash flow. If the interest rates surge excessively, the number of fresh clients requesting a loan may diminish potentially because the cost of borrowing is overly elevated. When the interest rates are fluctuating swiftly, companies may introduce new loan options or promotional rates to entice clients. The revenue of the home loan companies can drop due to a comparatively meager quantity of fresh loans, but the strategy can be altered in agreement with the interest rate.

A meager loan rate boosts call for it as more potential house-buyers aim to gain from meager borrowing costs. The call for home loans bursts as meager loan rates provide an encouragement for potential house-owners to act. A lower rate increases the number of potential house-buyers interested in taking out a loan, (Mortgage Industry Insights to Navigate a Changing Market, 2020).

When it comes to the choice of funding sources, diversity is crucial for mortgage firms to ensure maximum flexibility and stability. Therefore, mortgage firms can mitigate their risks and adapt to different market conditions. This diversity can be achieved through various institutions in financial markets, primarily banks. On the other hand, reliance on a single source of funding can increase risks for both the financial system and the economy.

Firms that provide home loans are among the vast number of members in the home loan area. They offer a range of items that are linked to serious risks. One of these is a market danger. Its handling is vital for the victory of such a firm. It also encounters such risks as an interest and default ones. The market risks implicate home loan firms. So do the interest rate risks.

Due to global developments, the 2023 home loan trade has been forced to deal with many market risks. Inflation, increased interest rates, and an impending economic crisis are challenging features for a given home loan company. That is because historical accounts have shown that rate hikes have led to recessions. The outcomes are great for home loan companies, now that job losses and financial distresses have already been spotted in the trade. The trade has experienced a drop in whole employment and many large layoffs at the prominent home loan companies like Freedom Mortgage and Better.com. Top-notch aids must be adopted to lower the unsteadiness effect. They include the diversification of portfolios, re-evaluation of the management of risks, and changes in point of clients to be offered, amongst other changes (2023 Mortgage Industry Outlook: Opportunities, Challenges, and an Uncertain Future, 2023).

2.1 Managing Interest Rate Risks in Mortgages

When it comes to getting a home, loan is one of the most odd and very long-term choices in personal money management. In order to not allow the loan payment become unmanageable, borrowers need to handle rate of interest risks associated with it. Changes in interest rates directly affect changes in mortgage payments and make mortgages less accessible. That is, as costs increase, mortgage payments also increase, making it difficult for users to afford their loans. When interest rates are low, payments also decrease, potentially increasing the purchasing power of the user. It is crucial for banks to manage financial risks wisely to ensure their financial stability and security. Therefore, banks determine the interest rate risk they are exposed to collectively and develop strategies to manage individual portfolios. Being

aware of financial risks during the homebuying process and preventing these risks are of great importance (<https://www.federalreserve.gov/boarddocs/supmanual/trading/3000p2.pdf>).

The danger in mortgages arises from the risk inherent in or exposure to bad shifts in rates. They are the bank's troubles first and foremost and may badly affect the bank's state together with its gains and shareholders' worth. Thus, changes in rates directly impact mortgage payments and constitute the risk for the bank's net gains and running costs at the same time. Additionally, changes in rates may misrepresent the base worth of the mortgage things and things, harming the PV of future money flows. Effective risk handling process is so key for ensuring that bank correctly manages its risk because the bank's troubles arising from rate changes can turn unsafe. Rate troubles should be maintained carefully. The control of the rate troubles leads or causes the bank to use the proper watch, risk handling rules and methods, count tools, as well as inner checks needed to handle or else safeguard the bank's exposure to the above troubles (Basle Committee on Banking Supervision 1997). It looks like alterations in interest levels may have a serious effect on home loan payments. New and existing house owners must be cautious regarding these hazards and ensure they can effectively handle them. This topic raised such vital mitigation strategies as fixed-rate home loans, adjustable-rate mortgage (ARM) things, and suitable budgeting. Thus, knowledge of these risks and the potential to lessen them are essential for mortgage holders.

2.2 Creditworthiness in Mortgage Default Risk

One of the means how the success of banks in mortgage lending can be measured is in the viewing of how well banks are assessing the creditworthiness of people. Hence, one of the most vital managed dangers in balance sheets is default risk that helps to explain the capacity of the borrower in finding a loan repayment. Many projects related to real estate suffer from any construction issue that can negatively affect the capacity of a bank to get full repayment of CRE loans. Banks that subject to build construction exposure face such credit probabilities which imply a risk associated with a borrower's capacity to finalize a proposed project, and within proposed scope and budget completion date. Because of the extra costs in construction loans, the cost overruns can diminish a loan to borrower's equity, banks loan-to-value ratio, reducing bank's collateral margin, and creating a situation where owning an empty property makes more sense than finishing the project and give the renter a chance to get a discount as well (Comptroller's Handbook, 2022).

Firms akin to mortgage providers within the mortgage field possess numerous disparate struggles to ponder over, such as client dependability and default hazard, market risks, and the risk of interest rate escalation. They must navigate through these risks with remarkable caution to guarantee they will

not exit the industry. That is why it is indispensable to utilize efficacious risk management methods to conduct timely fund regulations and to evade risks in a timely fashion.

3. Technological Developments and Digitalization for Mortgage Companies

Digitization is crucial in the mortgage sector. The rapid transformation in technology, as seen in many fields and industries, illustrates that the transformation of mortgage companies without the use of digital mortgage forms and FinTech is not possible. Additionally, information and analytics are perceived as an anticipated trend for mortgage companies. These developments provide the opportunity for collecting and utilizing large amounts of data in the mortgage sector.

The effect of tech upon the mortgage market has led to important shifts. The online path is becoming more used to investigate, aid, and apply for a mortgage hence enhancement of client experience with online tools and platforms. 90% of the common clients are willing to explore online a fact that underscores that the mortgage market is changing. This progress aids in the client experience through accessing mortgage at the suitable time required. The new money things were crafted with thought to the impact of the people shift on preferred housing over the past years. The rise in the number of phone calls received by customer contact centers also changed during the pandemic in 2020. The development has affected money banking too because lenders had to handle the larger work and looked to the IVR and chatbots for self-service help. Today's tech is a method to control and manage the work of customer contact centers. The number of made innovations is already great and it is hard and time-taking to control them all. It would be profitable for the most of the customers to contact the IVR or a chatbot for a suggestion on a money format. Varied people changes are linked with the nature of money banking due to the impact of COVID-19, people call often enough (Mortgage Industry Trends in the Post-Pandemic World, 2020). In this section, information about technological alternatives will be provided.

3.1. Streamlining Mortgage Processes Through Digital Applications

A survey by the Stratmor Group reveals that electronic app create a win-win state for both firm and their customers. The apps also offer more effective and smooth options to people. Those surveyed acknowledged that digitization may disrupt how people get houses using funding. As a result, business leaders are using electronic mortgages as a core job focus because that is the only way they will be able to compete. Digitalization is another pattern in the mortgage field that aligns with the omnichannel customer experience approach. Digital tools including customer-facing dashboards and signals are giving PFS clients with real-time updates during the loan approval process.

That is the case where both sides of the communication procedure benefit from synchronization. Adopting other patterns in the mortgage field, collaboration between lenders and mortgage brokers could also be considered with the growth of customer relationship management (CRM) tools that allow for communication between multi-branch offices situated throughout the United States. Strain resolutely denotes that “Focusing on a finer customer experience through digital innovation changes everything.” Consequently, this procedure leads to decreased expenses along with reduced cycle time (Digital Mortgages: How Leaders Are Harnessing Tech To Streamline Processes, Cut Costs And Improve Customer Experience, 2019).

Likewise, digital realization of client paperwork in the mortgage request process removes a bunch of errors and minimizes handling times. In the modern era we inhabit, streamlining the loan process is more critical than ever. There is also a radical shift in how digital forms in mortgages are welcomed, making the exactness and safety of this info immensely better. This procedure has also aided to radically reduce paperwork, and time, in the loan process. It ensured that the info given by the applicant is safeguarded. Ergo, less paperwork makes the procedure quicker and more practical for those seeking a lender, to go through. Be that as it may, digital requests are altering the way in which individuals request for a loan. Undoubtedly, the arrival of digital tools in the home-loan flow has transformed and more protected and simplified it both for a seeker and a lender. By making the process simpler, these answers have drastically decreased the volume of papers and time needed to handle the application. It has also made the system considerably more precise and secure. In the context of complete digitization of the home-loan application flows, technological benefits will only become more drastic.

3.2. FinTech Revolutionizing Mortgage Industry

The FinTech force on home loan firms is the most obvious, as it has taken away old stuff running flows and replaced it with new AI and Cloud tech. The groups are just using data more powerfully to foresee and then hunt for potential customers. Selling pipes are very bulky, and this tech advance only allowed lenders to plan and do better promotion practices, cutting their costs and growing the market share. As for the claim flow, digital trade is way ahead in terms of the branch’s usefulness and overall truth of certain models of software, as they can reach up to 99.9 %. Acquiring the request paperwork from the FinTech lender, study lenders, had perceived the light and commenced offering the comprehensive digital experience. And the best part—no paperwork from the part of the applicant for the loan request. The conventional lenders typically demand the submission of the financial data by printing it out. The financial FinTech companies do this all online, too, netting 10 (on average) days of time-saving according to statistics. (Top Tech Trends for the Mortgage Industry, 2023).

Lately the lending area has undergone rapid shifts, chiefly due to fintech ideas. Traditional lending practices that have been used so far have been greatly affected by this revolution. Some of the most vital ideas in the lending industry are related to the blockchain tech, AI, and online stages. These techs have been joined into it in order to provide it with better safety, lending accuracy, and facility for the clients. For example, blockchain has transformed the way the deal is made, making it secure and see-through. AI has transformed the way credit scoring is made, as it permits for more precise risk evaluation and better lending choices based on accessible info. With the help of online lending stages, borrowers are now able to manage their loans with no effort.

The blockchain tech offers safe and see-through mortgage deals. It improves safety as all folks that can see the consumer book get the same real-time info, whilst boosting clarity by allowing all users access to the proved info. (Feyen et al., 2021). Its use in the mortgage can aid cut fraud and finish time. Regulatory uncertainties and interworkability of blockchain with current IT systems are some of the key issues faced by this tech. Therefore, folks tend to believe that all mortgage deals done using this tech are safe due to the big chances of fraud.

3.2.1 AI-driven Credit Scoring in Mortgages

In the money trade, unusual brainpower and machine learning considerably impacted number rating and risk study. Specialized code with incorporated formulas allows financial companies to assess enormous sums of info for the reputation of loaning seekers in credit study. Zeidy (2022), notes that “The Part of Financial Knowledge (FINTECH) in Changing Financial Business and Increasing Effectiveness in the Economy” in the article published by the Common Market for Eastern and Southern Africa, the use of Fintech, AI, and Big Data innovations upgrades number rating patterns. These innovations have more upsides, as compared to inconveniences in increased effectiveness and the chance to avoid human mistake. At the same time, proper number rating is an effective method to offer more fitting and profitable credit choices for every loaning seeker based on the information consumed in the lending process. It indicates that only automatic decision-making methods based on the thorough studies represented by AI and machine learning cost less. Nevertheless, the issues with number rating and risk study rely solely on artificial brainpower and machine learning in formula discrimination and privacy protection. Aside from that, machines are not able to process more innovations offered by Fintech and, thus, requiring human participation, followed by other challenges in effective financial business functioning.

3.2.2. Streamlining Mortgage Process Through Online Platforms

The mortgage method has been digitized and is available online. It became truly easy with companies like DocMagic, Spruce and Qualia.

Moreover, the majority of the platform closing papers are digitized. DocMagic creates regulation-compliant loan paper packs, and it has paperless eClosing, eSignature, and eDelivery platforms. Qualia provides a cloud-based title and closing framework and unites such functions as reporting, paper, and task management. These are the companies that have digitized title and closing process. It made it possible to generate, send, and sign most of the closing papers online. These technological advances have made mortgage applications and approvals method electronic. This has transformed the ability to process and approve loans. The enhancements to the method of obtaining mortgage loans have made mortgage processing more open and web welcoming to people. This digital change has greatly improved the complete ecosystem of mortgage from the perspective of the number of days a mortgage loans takes from application to funding (Choi et al., 2019).

3.3. Analyzing Mortgage Data with AI

Examination is a vital piece in decision-making measures of mortgage companies. The technological development, i.e., digital creation, closeness of frameworks, PC power, and access to significant information has expanded essentially that brought about cutting exchange costs and empowered new business models (Feyen et al., 2021). Such advances permit mortgage companies to rapidly pass the credit endorsement process utilizing AI, improve customer insight, and, along these lines, be more productive. The fast investigation of enormous information volume performed by AI adjusts the credit endorsement process, and mortgage activities apply a good impact on client assistance quality. Additionally, these advances have an incredible possibility to utilize misrepresentation identification in the mortgage business successfully. They are probably very much suited to oversee dangers in loaning and guarantee more grounded monetary relations between moneylenders and borrowers.

The mortgage business has completely transformed lately chiefly because technology has merged and brand-new Fintechs have risen. As for now, electronic requests can be seen as the most extraordinary change in the field. Without a doubt, these advancements have fundamentally improved the field. In this context, mortgage companies that integrate new technologies into their business practices have a significant advantage.

4. Future Changes Awaiting the Mortgage Sector

The mortgage field remains a crucial component within the money domain. It provides folks the chance to purchase property or generate passive earnings. Currently, there are many new transformations available. For example, these include: entail the emergence of eco-friendly mortgage goods, worldwide tendencies that may influence distant regions and incorporating technological procedures into the mortgage application process.

4.1 Eco-Friendly Mortgage Options

Given the speed at which the world is altering, the property sector can be seen as an important giver to the reason of environmental steadiness. One of the cutting-edge practices in this respect is eco-friendly loans. These are credits that are made to encourage people to make environmentally aware choices in buying or enhancing their homes. Eco-friendly loans include fewer costs and lower interest rates, which allows us to view this emerging industry in a steady context as having some level of effect. There are many types of eco-friendly loan choices now available in the world. For example, there are energy-efficient loans, green loans, and green building funds. This is to say that energy effectiveness is only one of the considerations for an eco-friendly credit. In summary, Eco-friendly loans are an environmentally friendly development with expansion possible. It is crucial to mention the environmental donation of eco-friendly debts because they assist the customers deal-makers serve purchasing energy-efficient houses, making green revisions, etc. Brokers' Handbook on Green Retrofit and Technologies also claims that deal-makers are "well situated to support consumers on their net-zero journey – particularly with terms of upgrading the energy effectiveness of their properties" (Green Finance Institute, 2023). That is a way of supporting the environment and leads to the emission reduction, for instance. Overall, the environmental influence of eco-friendly debts in the long run can be enormous due to the extended use of the discussed financial items.

Thus, green home loans or energy-efficient mortgages imply the possibility of investing in green features in houses. It is possible for banks to use technology-driven innovation and direct capital to green projects leveraging banks to sustainable production and consumption. Kumar et al., (2021), claim that banks can significantly contribute to the implementation of plans aimed at preventing climate risks and therefore result in a more eco-conscious mortgage ecosystem. Implementing green building loans as an option for new construction or renovation may also encourage the popularity of green choices with benefits from energy-efficiency savings and lower interest rates. Meanwhile, the option of eco-friendly mortgages for home loans provides dwellers with digital convenience and enhances net promoter scores, lower default risks, and create more chances for general business growth.

Eco-friendly loans are a strong way of supporting a sustainable life and a cleaner world. They are effective given that they push homeowners and homebuyers to act by offering various chances, such as energy-efficient loans and green building funds. Their upsides are not limited to a single house – if more people make the choice in the favor of energy-efficient homes or green change, the effect will be enormous. Such loans help to lower energy use and greenhouse gas emissions, as well as other perks, such as the growth of a sustainable housing market. It is key to realize the importance of mortgage

credits in creating a greener society. Based on the notion that these tools encourage responsible and sustainable conduct regarding homeownership, they can be quite effective in driving positive change. Then, as more folks and families gain from the clear advantages of eco-friendly loans, we will ultimately have the majority of homeowners make sustainable picks.

4.2 Sustainable Mortgage Solutions

The usage of eco-friendly money-lending arrangements impacting the place promotes supporting long-lasting undertakings. One research by the Green Finance Institute reveals that the number of house-owners who battle paying for energy has increased threefold from 2021 to 2022. This highlights that there is an urgent requirement for energy-efficient answers. By using green construction materials and energy-efficient qualities in homes that individuals borrow currency to fund with environmentally-friendly money-lending arrangements, they can save a lot of energy and this way decrease carbon dioxide emissions. This assists guard the world and is great for the economy in the prolonged term. Homes that are better insulated are cheaper to heat. They also help households lessen against potential energy shocks and have an extra advantage of backing the move to a net-zero prospect. As home-buyers more and more appreciate the long-lasting benefits from energy-efficient properties, the usage of eco-friendly money-lending arrangements rises which will create a more long-lasting housing stock suitable for individual and collective usage (Green Finance Institute's Built Environment Programme, 2023).

The banks contribute to the growth of an eco-friendly mortgage obtainable to users. They are meant to promote unique bank credit sorts that are intended for the purchase of the eco-friendly property system. A user can choose either a plain eco-friendly mortgage or get an energy-efficient mortgage and a green mortgage at the same time. The latter is focused on energy-saving home changes like insulation, double glazing, or solar panels. In contrast, energy-efficient mortgages assist the borrowers to renovate the property to the sustainable style. The use of items that are more likely to be subjected to minimization in the future is encouraged. Organizing an capable mortgage effort provides the borrower with certain gains.

5- Conclusion

The trends in mortgage rates have seen substantial shifts in recent times, with interest rates rising at an unprecedented rate, driven by the Federal Reserve's actions to combat inflation. As highlighted in the 2023 Mortgage Industry Outlook by Canale et al., interest rates have climbed rapidly, with seven rate hikes in 2022 alone. These hikes, while aimed at curbing inflation, have sparked concerns about a potential economic downturn, given historical precedents linking rate increases to recessions. Such fluctuations in interest rates have had a direct impact on home affordability, with mortgage rates

surging alongside rising interest rates, leading to a significant decrease in demand and originations in the housing market.

The home loan biz of today is changing quicker than ever before. Tons of global things are pushing it to the edge and altering the way the home loan biz runs. Tech gains and low-interest rates have become mighty drivers of change. The people are changing, too. Tech gains are bringing invention to the biz. Optimization and a great client experience are key to remaining alive in the digital age. It is especially key because young clients need handy digital fixes. A more varied clientele and a growing number of first-time home buyers require lenders to offer more personal advice.

It is possible to say that the use of digital tools within mortgage steps is an amazing change with a wide assortment of benefits for both lenders and people getting a loan. Improved talk, speed, and accuracy, as well as effectiveness and comfort, are the main outcomes of bringing new tech into mortgage steps. The mortgage field drives effectiveness by the ability to control and share the data, optimize the error dangers, and boost the speed of talk. As a result, all the parts are happy with the outcomes and the high-tech ways that have been introduced. The lending industry has undergone quite a lot of changes recently because of the breakthroughs in FinTech. The use of blockchain tech, artificial brains, and machine study has served to radically change the conventional lending methods. In addition, the rise of online lending platforms has contributed to decreasing the number of steps required for lending approval, and consequently, the customer now has more power and access to loans. FinTech fundamentally helps rethink the traditional lending sector because the client experience has been enhanced, the transaction has become more see-through and safe. The tech helps the lending industry satisfy the needs and outlooks of modern clients. In the future, it can streamline the process of loans and make it more available to the general public.

The extremely crucial aspect for the purpose of the universal trade is the lending industry, the immediate bond with the home market gives the field the significance it holds. Lending industry is essential for the Turkish environment, and the lending unit is included in the Residence section and thus it is in association to the Turkish Financial Sector. The housing market in Turkey is impacted by global dynamics. Because the population of Turkey is transforming rapidly and the size of a household decreases profoundly each year, there is a requirement of shelter in the nation. The mortgage part of Turkey encounters difficulties and feature as the decrease of Turkish Lira and variation in exchange rate due to stated decrease. As stated by Güneş et al., (2021), the mortgage market portion in the GDP is low. Since Turkey unusually increased its housing market in terms of GDP, the mortgage part in the nation is likely to develop if excessive interest rates are decreased and economic stability is obtained.

Worldwide mortgage industry data unveils that in the first century of 2023, the level of obligation is more than the half of the debt of the whole planet which is \$307 trillion. This quantity is almost 80% and is composed from mature marketplaces such as U.S., Japan, UK, France that in the first half of the century were more than 4 nation in number. Worldwide ratio of debt to GDP is also increasing and it is 336% (Tiftik et al., 2023). Thus, global economic changes have a considerable impact on this mortgage rate and its availability. In fact, financial costs have risen with the anti-inflation policies post-elections which have kept the prices on the building market stable. These are the overall costs for homebuyers (borrowers). And in general, such things as the cost of borrowing, mortgage charge, and accessibility of loans. So, advancements have occupied a significant spot also in this area; for instance, the main heading here is this zone of online and computerized application. And all this represents in many chances in the mortgage industry. In the same manner, this type of global patterns (technological progressions) is not very long-lasting. Also, many regulatory and lawful questions are posed to the mortgage market. For example, the overall high inflation is still going on at the moment This implies that the lending has to be probably regulated less and controlled more. The yearly inflation increments, however, under more strict approaches, it consistently will in general stabilize. So, strategy chiefs generally kept these drifts at the top of the priority list. It ought to diminish from the lenders' side, at some measure (Gyoder Indicator, Turkey Real Estate Sector 2023).

When we look at the applications and developments worldwide, the housing loan sector in Turkey faces a variety of opportunities and a range of issues influenced by numerous global factors. While it has bettered local practices, it is essential to escalate home loan support to international standards. The conclusion from the field's research predicts the home loan trade in Turkey to adopt global tendency for digital change and fresh innovative financial goods. Thus, Turkish home loan companies have a chance to open more chances for growing and help in customer help to become nearer to their needs. Therefore, as the home loan field changes, it is time for its leaders to start sensible planning to think about answers to the difficulties and keep up pace with chances. The housing loan sector in Turkey can undergo significant transformation by aligning with global trends and embracing technological advancements. In this transformation process, mortgage providers should accelerate digitization, utilize blockchain technology, leverage artificial intelligence and machine learning, develop mobile applications, and offer personalized services through data analytics. Implementing these recommendations can enhance the sector's competitiveness and provide customers with a better experience. The increasing global environmental awareness is boosting the demand for green loans. In this context, the housing loan sector can enhance customer satisfaction by offering sustainable housing finance products.

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