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Abstract

Abstract. This paper studies the relationship between house prices and financing conditions. In the analysis, it exploits a sudden reduction in the mortgage rates of state-owned banks in Turkey during the summer of 2020 as an exogenous shock to provide causal estimates of the cost of credit on house prices. The effects are estimated using a detailed dataset on all house sales with mortgages. Our results show that a 1 percentage point decrease in annual interest rates raised house prices by 2.1%. This impact is driven by a corresponding increase in individual mortgage loans of 6.6%.

JEL classifications: G21, G28

Keywords: Mortgage rates; Mortgage lending; House prices

Özet. Bu makale, konut fiyatları ile finansman koşulları arasındaki ilişkiyi incelemektedir. Analizde, konut fiyatları üzerindeki kredi maliyetinin nedensel etkisini tahmin etmek için, Türk kamu bankalarının 2020 yazında konut kredisi faiz oranlarını ani olarak düşürmesi dışsal bir şok olarak kullanılmaktadır. Etkilerin tahmini, tüm kredili konut satışlarını kapsayan, ayrıntılı bir veri seti ile yapılmaktadır. Sonuçlarımız, yıllık faiz oranlarındaki 1 puanlık düşüşün, konut fiyatlarını % 2,1 artırdığını göstermektedir. Bu etki, bireysel konut kredilerindeki % 6,6 oranındaki bir artış kanalıyla oluşmaktadır.

JEL sınıflandırması: G21, G28

Anahtar kelimeler: Konut kredisi faiz oranları; Konut kredileri; Konut fiyatları

Non-technical Summary

Housing assets usually hold a significant share in household portfolios, whose market value is sensitive to domestic credit conditions. While domestic credit conditions can be affected by global capital flows, local monetary and financial policies can also directly affect domestic credit conditions by altering cost of credit. One example of this type was recently implemented in Turkey. As part of the stimulus package aiming to combat adverse economic impact of the COVID-19 pandemic, the state-owned banks reduced their monthly mortgage lending rate by about 0.20 percentage point. We exploit this sudden drop in mortgage rates to identify the causal impact of a decrease in the cost of mortgage credit on house prices by studying a rich micro dataset on mortgage loan approvals at the house sale level.

Our results indicate that the sudden drop in the mortgage rate caused an increase in average house prices given the nearly inelastic nature of housing supply in the short-run. In particular, we find that houses sold via lower-cost mortgage credits issued by state-owned banks valued at a 3.24 percent higher square meter price than the ones sold via mortgages by privately-owned banks. This result implies that a 1 percentage point decrease in annual mortgage rates increases house prices per square meter by about 2.1 percent. We also find that the volume of an individual mortgage loan increased by about 10.3 percent more for state-owned banks compared to privately-owned ones. The low cost credits drove loan demand up and increased households' demand for housing assets. As a result, average house prices went up. In addition, the reduction in interest rates led to a considerable increase in the LTV (loan-to-value) ratio of the mortgage loans, which indicates a reduction in average down payments. It is worth noting that the policy impact on average house prices was higher in the first month, e.g., June, which then diminished in July and August.

1 Introduction

Does reduced cost of credit affect house prices? The answer to this question is central to understand the impact of changes in the mortgage markets on the real economy. However, it is difficult to measure the causal relationship between the cost of credit and house prices since the cost of credit is not an exogenous variable. A decrease in the cost of credit might increase demand for housing by relaxing borrowers' financial constraints, and this would increase house prices. At the same time, expectations of an increase in house prices might decrease the cost of credit since the collateral for the credit, which is the house itself, becomes more valuable. As a result, the causality could go both ways and this makes it challenging to identify the causal impact of a reduction in the cost of credit on house prices.

To overcome this identification challenge, we use a sudden reduction in mortgage interest rates of state-owned banks in Turkey, and study the impact of this cost reduction on house prices. The outbreak of the COVID-19 pandemic created significant uncertainties all around the world especially for emerging economies including Turkey. In response to the pandemic, the Turkish government introduced a COVID-19 stimulus package with the aim to boost the economic activity. As part of this package, on May 20, 2020, it was announced that the state-owned banks would reduce their mortgage rates: Starting from the beginning of June 2020, the monthly mortgage rates would decrease to 0.64% for new houses, that are sold for the first time, and to 0.74% for second-hand houses. We exploit this sudden drop in mortgage interest rates to identify the causal impact of a decrease in mortgage rates on house prices.

Our goal is to quantify the impact of the interest rate reduction on house prices by using this sudden drop in interest rates as a quasi-natural experiment. In May 2020, the average monthly cost of mortgage loans for state-owned banks was 0.97% and it was the same for privately-owned banks as shown in Figure 1.[1] There was no difference between the average cost of mortgage loans for these two types of banks right before the announcement of the interest rate reduction. In June 2020, the average monthly cost of mortgage loans dropped significantly to 0.77% for state-owned banks – a drop of 0.20 percentage point. On the other hand, the cost of mortgage loans for privately-owned banks decreased only slightly to 0.93% – a drop of 0.04 percentage point. This suggests that, compared to privately-owned banks, the relative drop in the monthly mortgage rates of state-owned banks was 0.16 percentage point from May to June. This translates into a relative drop of 1.92 percentage points in annual mortgage rates, which is both statistically and economically significant.[2] We use this sudden significant drop in mortgage rates and employ a difference-in-differences estimation approach to examine the relative change in the price of houses where the mortgage loan was issued by a state-owned (treated) bank compared to houses with a mortgage loan from a privately-owned (control) bank.

It is important to note that we do not claim that either the introduction of the COVID-19 stimulus package or the reduction in the mortgage rates of state-owned banks was exogenous to the state of the economy. We instead argue that the impact of the state of the economy on house prices would have been similar for houses sold with a mortgage from state-owned banks and from privately-owned banks in the absence of the reduction in mortgage rates. As a result, by applying a difference-in-differences setting, we control for the trends in house prices and the economy by studying the relative effect on treated banks compared to control banks. This setting enables us to identify and quantify the impact of this sudden reduction in the cost of credit on house prices.

We use a comprehensive dataset on house sales with mortgages starting from the begin-

[1]We download the data on cost of mortgage loans from hesapkurdu.com – a website that provides data on the average cost of mortgage loans for each bank in Turkey. The cost of mortgage loans includes the mortgage rates plus the additional fees associated with the mortgages. Figure 1 plots the cost of mortgage loans for state-owned banks and for privately-owned banks from the beginning of 2020.

[2]As shown in Figure 1, the average monthly cost of mortgage loans during the period from June to August was 0.81% for state-owned banks and 0.94% for privately-owned banks. This indicates that the average relative drop from May to the following three months was 0.13 percentage point more for state-owned banks. This is equivalent to a 1.56 percentage point relative drop in annual mortgage rates.

ning of 2019 until the end of August 2020. The data includes the mortgage originations of all Turkish banks reported to the Central Bank of the Republic of Turkey. Banks report rich micro data on house prices and house characteristics like size, exact location, and expert evaluations of the house quality. The rich dataset allows us to saturate models with district times year-month fixed effects. As a result, our analysis compares changes in house prices in the same district-year-month for houses sold with a mortgage from a state-owned bank and for houses sold with a mortgage from a privately-owned bank.[3]

The important assumption of the difference-in-differences estimation approach is the parallel trends assumption. In our setting, this suggests that state-owned banks and privately-owned banks would have behaved similarly if there had been no sudden decrease in the mortgage rates of the state-owned banks. To support this assumption, we find evidence of the parallel trends between prices of houses sold through mortgages from state-owned and privately-owned banks by conducting a falsification test for the same months of 2019. Our findings indicate that parallel trends assumption holds. In addition, we show that state-owned banks and privately-owned banks had similar levels in house prices, in the volume of individual loans and in LTV ratios for the mortgage loans that they issued before the treatment.

Our key finding is that the sudden change in the cost of credit affected the price of housing, where the effect is causal. According to our results, house prices per square meter increased by about 3.24 percent more during June, July, and August for houses with cheaper mortgages issued by state-owned banks compared to the ones issued by privately-owned banks. As expected, the largest relative increase happens in June by about 4.23 percent and the lowest in August by about 1.94 percent. These findings indicate that a 1 percentage point decrease in annual mortgage rates increases house prices per square meter by about 2.1 percent.

The appreciation in house prices comes through the impact of the interest rate reduction

[3]We repeat the analysis with the neighborhood times year-month fixed effects and report that the results are similar in section 6.

on the credit. The channel is such that cheaper credit relaxes borrowers' financial constraints and increases demand for housing which, in response, increases the price of housing. To investigate this, we study whether the impact of the reduced cost of credit on house prices is via its effect on credit. We find that state-owned banks increased the volume of an individual mortgage loan by about 10.3 percent more compared to privately-owned banks. Consistent with the changes in house prices, the largest relative increase in the loan demand happens in the first month by about 12.93 percent and the impact is much smaller in August by about 4.34 percent. These estimates suggest that a 1 percentage point decrease in the interest rate of a mortgage increases mortgage demand by about 6.6 percent.

In addition, the reduction in interest rates led to a significant increase in the LTV (loan-to-value) ratio of the mortgage loans. The average relative increase in the LTV ratio is about 4.3 percentage points for three months. The increase in June is about 4.93 percentage points and the increase in July is about 5.37 percentage points, where the impact disappears in August. This indicates that the reduction in mortgage rates decreased the average down payment that is necessary for the purchase of the houses which implies an increase in risk taking by state-owned banks.

One potential explanation of our results could be the possible self selection of borrowers across state-owned and privately-owned banks. Given that the mortgage rates were significantly lower in state-owned banks, it could be that only borrowers that were not able to get loans from state-owned banks took mortgages from privately-owned banks. If these borrowers are more likely to buy cheaper houses, this might be driving our results. In this case, we expect that house prices for houses with a mortgage from privately-owned banks would decrease from June onwards. We show that this is not the case – house prices instead increased significantly for houses with a mortgage from privately-owned banks. As we do not have borrower characteristics in our dataset, we cannot study the changes in the characteristics of borrowers for state-owned and privately-owned banks after the treatment. We instead examine the changes in the characteristics of houses that are sold with a mortgage from a state-owned bank relative to houses with a mortgage from a privately-owned bank. We find no significant differential changes on house characteristics. This implies that the significant differential increase in house prices is not driven by changes in the characteristics of houses purchased by the borrowers of two types of banks.

To further control for the self selection of borrowers and the possible changes in the borrower characteristics, we additionally define a new treatment measure at the district level: the average pre-treatment market share of state-owned banks in a district, calculated in year 2019.[4] This pre-determined treatment measure is not affected by the sudden reduction in interest rates, i.e., the treatment itself. As a result, it helps us to tackle the self selection of borrowers across banks in the post-treatment period. In this identification, we control for province times year-month fixed effects – we compare districts with different levels of exposure in the same province-year-month. Our results show that a 1 standard deviation increase in the pre-treatment market share of state-owned banks in a district increases house prices per square meter by about 0.4 percent more during June, July, and August. Comparing a district where all mortgages were given by state-owned banks to a district where all mortgages were given by privately-owned banks reveals an increase of 5 percent in house prices per square meter.

The rest of the paper is organized as follows. Section 2 reviews the relevant literature. In section 3, we outline the banking system and the mortgage market in Turkey. Section 4 introduces the data. In section 5, the empirical analysis and the results of the paper are presented. Section 6 includes the robustness checks and section 7 presents the economic magnitude of the estimates and compares them with the literature. Section 8 concludes.

[4]The mortgage market share of state-owned banks does not change much over time. The correlation of one month's mortgage market share with the previous month's mortgage market share was 0.6 in 2019, which is highly significant.

2 Literature Review

Earlier theoretical studies establish the link between house prices and mortgage rates using a user cost approach (Hendershott and Slemrod, 1982; Poterba, 1984; Himmelberg et al., 2005).[5] This approach provides elasticities of around 17.5 as shown in Himmelberg et al. (2005). Glaeser et al. (2012) simplify some of the assumptions and argue that a more realistic model can produce much lower elasticity of house prices to interest rates. These changes reduce the elasticity from 17.5 to 8. Similarly, Fuster and Zafar (2020) calculate predictions from a calibrated user cost model which generate elasticities between 5 and 8.

There are only few empirical papers that quantify the interest rate elasticity of house prices since it is difficult to identify a shift in interest rates that is exogenous to the current or expected house prices that would enable us to estimate the causal effect of credit cost reduction on house prices. The main contribution of our paper to the literature is to use a sudden reduction in interest rates and calculate the causal change in house prices with respect to changes in interest rates. One important advantage of our empirical identification is that the considered shift in interest rates is sudden and we have a reliable control group of banks, privately owned-banks, that did not decrease their interest rates.

There are two recent papers that use the government subsidy for loans below the conforming loan limit (CLL) as an instrument for the cost of credit. It is estimated that the mortgage rates are about 10-25 basis points higher above the CLL. Using this discontinuity in interest rates around the CLL, Adelino et al. (2012) compare house prices for houses with conforming loans and with jumbo loans.[6] They find a local elasticity of house prices to interest rates by between 1.2 and 9.1. Similarly, DeFusco and Paciorek (2017) study the interest rate elasticity of mortgage demand by comparing loans around the CLL. They find

[5] In addition, several papers study the theoretical effects of down payment restrictions on house prices (Stein, 1995; Ortalo-Magne and Rady, 2006; Justiniano et al., 2015; Favilukis et al., 2017).

[6] Jumbo loans are loans with a loan amount that is above the conforming loan limits set by the Federal Housing Finance Agency (FHFA). These loans are used to finance high value houses.

that the interest rate elasticity of first mortgage demand is between 2 and 3.[7] Both of these papers study the changes in equilibrium interest rates on house prices and mortgage demand by exploiting annual increases in CLL.

In related papers, Martins and Villanueva (2006) and Bhutta and Ringo (2020) focus on the extensive margin effect of a decrease in interest rates. Martins and Villanueva (2006) study the impact of an interest rate subsidy for low-income households in Portugal on the likelihood of obtaining a new mortgage loan. They find that the elasticity of the probability of borrowing to changes in the interest rate subsidy varies between -1.3 to -2.8. Bhutta and Ringo (2020) exploit a surprise 50 basis point cut in the effective interest rate on mortgages insured by the Federal Housing Administration (FHA) and show that this led to a 14 percent increase in home buying.[8]

In addition, there is a more recent paper that uses a survey with hypothetical scenarios to study the effect of interest rate changes on house prices. Fuster and Zafar (2020) use a strategic survey in which respondents are asked for their willingness to pay for a house under different financing scenarios. They find that changing the mortgage rates by 2 percentage points changes willingness to pay on average by about 5 percent. This is equivalent to an elasticity of house prices to interest rates by 2.5, which is very close to our estimate of 2.1.

Our paper also contributes to the literature that examines the effect of mortgage credit supply on house prices. Favara and Imbs (2015) use U.S. branching deregulations between 1994 and 2005 as an exogenous expansion on mortgage loan supply and study the impact of this expansion on house prices. Di Maggio and Kermani (2017) exploit the preemption of national banks from local laws in 2004 to study the effect of credit supply on house prices and employment. Dursun-de Neef (2019) uses maturing long-term debt during the last financial

[7]Several other studies focus on the interest rate elasticity of demand for other types of loans such as micro loans, credit cards, consumer loans and car loans (Gross and Souleles, 2002; Alessie et al., 2005; Attanasio et al., 2008; Karlan and Zinman, 2008; Dehejia et al., 2012; Alan and Loranth, 2013; Karlan and Zinman, 2019).

[8]There are several other studies that focus on the deduction of interest expense from the personal income and measure the response of mortgage loans to changes in the amount of deduction (Follain and Dunsky, 1997; Ling and McGill, 1998; Dunsky and Follain, 2000; Jappelli and Pistaferri, 2007). These papers do not study the interest rates explicitly.

crisis as an exogenous liquidity shock and studies the transmission of this liquidity shock to house prices via a reduction in real estate loans. Saadi (2020) finds that the Community Reinvestment Act (CRA) led to an increase in the growth rate of mortgage lending by CRA-regulated banks and a larger increase in house prices in eligible census tracts during the housing boom. Our contribution to this literature is to study the changes in the amount of mortgage loans due to a reduction in mortgage rates and examine how this, in turn, affects house prices.

Finally, our paper contributes to the literature that studies the determinants of house prices in emerging economies (Gupta et al., 2010; Kasai and Gupta, 2010; Phiri, 2016; Cerutti et al., 2017; Cesa-Bianchi et al., 2015; Cerutti et al., 2017; Silva et al., 2019). Cesa-Bianchi et al. (2015) show that house prices in emerging economies are more volatile, grow faster and less persistent relative to house prices in advanced economies. Cerutti et al. (2017) study house prices in a sample of more than 50 countries. They find that the amount of credit and booms in house prices are highly correlated, where the booms are more likely to happen in countries with higher loan-to-value (LTV) ratios and with more securitization. Silva et al. (2019) find that monetary policy is an important source of variation in house prices in Brazil via its impact on financing. To the best of our knowledge, there are no papers that report interest rate elasticity of house prices for emerging economies. We contribute to this literature by quantifying the interest rate elasticity of house prices and mortgage demand using detailed house sales data from Turkey.

3 Turkish Banking System and Mortgage Market

Turkish banking system consists of state-owned and privately-owned institutions.[9] Out of roughly 52 registered banks, there are 32 depository banks (3 state-owned banks, 8 privately-

[9]Privately-owned institutions include both domestic and foreign institutions.

owned domestic banks and 21 foreign banks) that engage primarily in consumer lending.[10] Although the state-owned and the privately-owned domestic banks are less in numbers, they hold the vast majority of the financial assets in the country. For instance, the state-owned depository banks have 62 percent of the outstanding mortgage loans as of May 2020, while the privately-owned banks hold 38 percent. The state-owned banks alone own 35 percent of the total depository bank branches, while privately-owned domestic banks own roughly the same share, and foreign banks have the remaining part. There is a state-owned bank branch in almost every district, where at least one privately-owned bank also provides services.All major banks, including the state-owned banks, are quoted at the Borsa Istanbul, the country's primary stock market. They are highly integrated into the international financial system, providing regular financial reporting, audited by international independent auditing firms, and closely monitored by the international rating agencies.

In line with Basel standards, the mortgage loan provision follows a standard procedure in Turkey that is highly regulated by the domestic authorities. The credit risk assessment process must consider individual permanent income, the credit rating provided by the Credit Registry Bureau, and an expert valuation of the collateral, which is the underlying housing unit subject to the loan. In their risk assessments, banks also consider soft information that is usually only available for their existing customers. Soft information is essential as the standard Credit Registry Bureau rating assessment only covers individuals credit card and loan payment history while excluding other valuable information such as rent and bill payments. As monthly salary payments are obliged to be made through banks in Turkey, the salary accounts of customers are useful sources of soft information for banks. Therefore, banks compete on attracting more customers with salary accounts and collect soft information on their customers such as bill payments, credit card payments, other personal payments, income, and cash transfers. Overall, after satisfying the regulatory limits, individuals likelihood of

[10] There are also six participation (Islamic) banks active in the Turkish financial system, however their total market share is relatively small with roughly 7.5 percent of the outstanding mortgage loans as of May 2020.

obtaining loans from the bank with their salary accounts is relatively higher compared to other banks.

Like any other state-owned institution, state-owned banks' business model also includes public service engagements such as prioritized loans for disadvantaged segments of the society, subsidized loan programs, free financial services (or low cost), etc. The outbreak of the COVID-19 pandemic created significant uncertainties, especially for emerging market economies including Turkey. As a result of the pandemic, the local currencies depreciated considerably that increased upward pressure on inflation and loan rates. In response, the Turkish government introduced a COVID-19 stimulus package to boost the economic activity.As part of the package, they launched a subsidized mortgage program with the state-owned banks and lowered the mortgage rates. According to the policy, starting from the beginning of June 2020, the monthly mortgage rates would decrease to 0.64% for new houses, that are sold for the first time, and to 0.74% for second-hand houses. The policy took place for three months, from June to August of 2020.

According to Figure 1, the cost of credit for mortgage loans was the same (0.97%) for state-owned banks and for privately-owned banks in May, 2020. Starting from the beginning of June, the cost of mortgage for state-owned banks decreased to 0.77% for state-owned banks and it stayed the same in July. It increased to 0.90% in August, and to 1.08% in September. Privately-owned banks followed the state-owned banks by slightly lowering their rates to 0.93% in June, to 0.92% in July, and then increasing it back to 0.98% in August. This suggests that the state-owned banks decreased their monthly mortgage rates by 0.16 percentage point more in June relative to the privately-owned banks. If we do a similar calculation for all three months, the relative decrease becomes 0.13 percentage point more. During these three months, state-owned banks significantly increased their mortgage market share from 62 percent to almost 70 percent as shown in Figure 2. The amount of outstanding mortgage loans of state-owned banks and of privately-owned banks had a similar trend until the end of May, 2020. Afterwards, the amount for state-owned banks increased from about

121 billion TL to almost 173 billion TL in three months. On the other hand, there was a slight increase in the amount of outstanding mortgage loans for privately-owned banks – from 73 billion TL to 76 billion TL.

The stimulus brought a significant cost reduction in house financing from state-owned banks. in Turkey, unlike US and many European markets, the mortgage interest rate is fixed across all the borrowers for a given bank and thus, varies only across banks. To illustrate the size of the decline in financing costs, we present basic mortgage payment simulations from the perspective of an average household income earner for different mortgage rates in Table 1. The rough calculations show that a 0.36 percentage point reduction in the monthly mortgage rate (from 1 percent to 0.64 percent) for a 100,000 TL mortgage loan with ten years of maturity brings about a 28,680 TL reduction in total and 239 TL reduction in monthly payments. The overall loan payment reduces by 17 percent, and the average household income earner pays 4.8 percent less on monthly mortgages.

The reduction in mortgage rates increased house sales substantially. The total number of house sales per month was around 51 thousand in May, and it increased to more than 190 thousand in June, 230 thousand in July, and 170 thousand in August. The share of mortgage financed house sales was at a record high in these three months as shown in Figure 3: In May, 2020, 36% of houses were sold with a mortgage and this increased to 53% in June, 57% in July and 45% in August. Therefore, the policy injected a considerable amount of liquidity into the market while providing affordable mortgage conditions to the public.

4 Data

In their mortgage loan approvals, banks are obligated to use valuation reports from real estate appraisal companies to assess the market value of underlying housing assets. The valuation reports contain a detailed set of information on several observable house characteristics, precise location and the market value. Using this data, the Central Bank of the Republic of Turkey (CBRT) constructs and releases monthly aggregate Hedonic House Price Index (Hülagü et al., 2016). The underlying micro data that covers all the house sales made through mortgage credits between January 2018 to August 2020 is used in this paper.

For prices to reflect the financing conditions, the bank providing the loan must be known when the prices are formed. Although expert valuations may not one-to-one map to realized prices, there is a considerable overlap between the two valuations given the common knowledge of housing market and financial conditions. In fact, under the current regulations, the maximum loan size issuable to a housing asset (i.e., LTV) is determined based on its market value assessed by the expert valuations. Therefore, any significant divergence between the realized price and the expert valuation would lead to an inefficiency in the housing market. In practice, when the evaluation request is posted by a bank, the associated expert is aware of the financing bank and hence, the underlying financing conditions for the housing unit. This information is presumably reflected on the expert valuation of the housing units, especially during the time of the policy, given the significant differences in credit costs across the state-owned and private-owned banks.[11]

Our rich dataset contains information on the market value of the house, the exact location at parcel level, the mortgage loan issuing bank and a set of observable building and housing unit characteristics including building quality, construction year, gross area (in square meters), number of rooms, bathrooms and balconies, and the heating system type. Additionally, we know whether the building (or the residential complex) has a private security, a parking area, a swimming pool, and an elevator. We control for house characteristics in the regression analysis to exclude effects from changes in house composition. Using house market value and size (in square meters), we construct house prices per square meter to obtain a size free price measure. To avoid extreme outliers, we winsorize the price variable

[11] Additionally, it is common for house sales to be made through large housing projects in Turkey that are listed via pre-agreed mortgage deals with the local financial institutions. In fact, banks also list their mortgage deals for specific housing projects on their website. For instance, the list of housing projects with mortgage deals can be found for the largest state bank, Ziraat Bank, in the link.

at the 1% and 99% levels for each province-year group.[12] There are mortgage transactions from 765 districts and 9972 unique neighborhoods during the sample period.[13]

Summary statistics of our data is presented in Table 2 for before and after the treatment. The LTV ratio increased to 67.5% in the post-treatment period from 61% which implies that the average house buyer could use more mortgage financing than before. In other words, the policy seems to have helped financially constrained house buyers to buy houses, and, thus, increased house demand. There seems to be only a moderate increase in the average and median house prices per square meter in the post-treatment period that is roughly 2.5 percent. State-owned banks' market share in the mortgage market increased from 70% to 80% in this period. Other variables mostly remain similar to their average pre-treatment trends, which is expected given the very short-term nature of the policy.

5 Methods and Results

5.1 Baseline Result

To evaluate the effect of the interest rate reduction on house prices, we estimate a difference-in-differences regression of house prices of individual house sales on a treatment dummy whether the mortgage loan is issued by a state-owned bank or a privately-owned bank, as follows:

$$ln\, P_{i,j,c,t} = \alpha_0 + \alpha_1\, State-owned_j \times Post_t + \alpha_2\, State-owned_j + \alpha_3\, Controls_{i,j,c,t} + \delta_{c,t} + u_{i,j,c,t}, \quad (1)$$

where i indexes the individual house sold, j indexes the bank that issued the mortgage loan, c indexes district that the house is located in and t indexes the year-month of the sale.

The dependent variable, $ln\, P$, is the logarithm of the house price per square meter for

[12] In addition, we exclude mortgage transactions where the loan to value ratio is greater than the legal limit of 90%. This corresponds to 0.2% of the total sample.

[13] Turkey is divided into 81 provinces, which are further divided into 923 districts (Bircan and Saka, 2018).

each house sold with a mortgage loan. The treatment variable $State - owned$ takes a value of one if the mortgage loan is issued by a state-owned bank, and zero for a privately-owned bank.[14] The time period captures twenty months from January 2019 to August 2020. $Post$ is an indicator variable that takes a value of one for the post-treatment period from June 2020 to August 2020 and zero for the pre-treatment period from January 2019 to May 2020.[15] Standard errors are clustered at the bank level.

We control for several house characteristics since our data includes detailed information on each house bought with a mortgage loan. $Controls$ include size, age, number of rooms, bathrooms and balconies, and whether there is a security, a pool, a heating system, a parking space or an elevator in the building. In our baseline setting, we absorb district times year-month fixed effects by including $\delta_{c,t}$. This enables us to remove time varying district-level changes or shocks. In addition, this allows us to compare house prices with mortgages issued by state-owned banks versus by privately-owned banks in the same district in the same year-month.

In our empirical identification with a difference-in-differences setting, we assume that house prices for houses sold with mortgages issued by state-owned banks and by privately-owned banks would have had a similar trend in the absence of the treatment, i.e., parallel trends assumption (Roberts and Whited, 2013). If there had been no reduction in interest rates for state-owned banks in the post-treatment period, there would have been a similar change in house prices for two groups. The coefficient estimate on $State - owned$ dummy measures pre-treatment differences between prices of houses sold with mortgages issued by state-owned banks and by privately-owned banks. For example, if state-owned banks issue mortgage loans to houses with higher house prices compared to privately-owned banks independent of the treatment, then α_2 should capture this variation. As shown in Table 3, this coefficient estimate is insignificant for all specifications with fixed effects. This indicates that

[14] A similar identification is used by Bircan and Saka (2018) to study the political influence by the central government on local lending.

[15] $Post$ dummy is omitted in the regression equation due to the district times year-month fixed effects.

there was no significant difference between the house prices for houses sold with a mortgage issued by a state-owned bank versus a privately-owned bank in the pre-treatment period. To further test the validity of the parallel trends assumption, we perform a falsification test and report the results in section 6.

Column 5 of Table 3 reports the results of estimating equation 1.We find a significant positive causal effect of the mortgage rate reduction on house prices. House prices per square meter increased by about 3.24 percent more in the post-treatment period, during June, July and August, for houses with cheaper mortgages issued by state-owned banks compared to the ones issued by privately-owned banks. Given that the relative drop in annual mortgage rates of state-owned banks was 1.56 percentage point, our estimate indicates that a 1 percentage point decrease in mortgage rates led to about 2.1 percent increase in house prices per square meter.

One potential explanation of our results could be the possible self selection of borrowers across state-owned and privately-owned banks. Given that the mortgage rates were significantly lower in state-owned banks, it could be that only borrowers that were not able to get loans from state-owned banks applied for mortgages from privately-owned banks. If these borrowers are more likely to buy cheaper houses, this might be driving our results. In this case, we expect that house prices for houses with a mortgage from privately-owned banks would decrease from June onwards. We find that this is not the case – house prices increased significantly for houses with a mortgage from privately-owned banks as well. As shown in Column 1 of Table 3 for the specification with no year-month fixed effects, house prices per square meter increased by about 15.7 percent in the post-treatment period for houses purchased with a mortgage from a privately-owned bank, where the increase was 24.35 percent for houses with a mortgage from a state-owned bank.

In addition, state-owned banks are known to grant loans only to their well-known customers to avoid additional risks. As a result of this, we do not expect a change in the customer profile of state-owned banks from pre-treatment to post-treatment period. Given that we do not have the data on the characteristics of customers that take out mortgage loans from banks, we cannot study whether the characteristics of borrowers for state-owned and privately-owned banks changed after the treatment. We instead examine the changes in the characteristics of houses that are sold with a mortgage from a state-owned bank relative to houses with a mortgage from a privately-owned bank. We find no significant differential change on house characteristics as shown in Section 5.5. This implies that the significant differential increase in house prices is not driven by changes in the characteristics of houses purchased by the borrowers of two types of banks.[16]

Columns 1-4 of Table 3 show the results for specifications with different combinations of district, province and year-month fixed effects.[17] The coefficients from all different specifications point to a significant relative increase in house prices for houses bought with a mortgage from a state-owned bank. The impact ranges from 3.24 percent to 7.49 percent increase in house prices, thus, a 1 percentage point decrease in mortgage rates led to a significant increase in house prices by between 2.08 and 4.80 percent.

According to the policy, the reduction in monthly mortgage rates of state-owned banks was 0.10% larger for new houses that are sold first time relative to the second-hand houses: monthly mortgage rates for new houses decreased to 0.64% and to 0.74% for second-hand houses. To investigate whether this larger drop in interest rates indicate a relatively larger increase in prices for new houses, we next perform a triple difference-in-differences estimation. We do not see whether a house is sold first time or not in our dataset. We proxy this with a dummy New that is equal to one for houses aged between zero and one year old, and zero otherwise. This assumes that houses below one year old are sold first time and the rest are second-hand houses. The results are reported in Table 4. We find no additional effects on new houses in any of the specifications. A potential explanation could be that new houses

[16] To tackle this possible self selection of borrowers further, we use pre-determined mortgage market share of state-owned banks in a district as treatment and show that our results hold at the district level in Section 5.4. This setting ensures that the selection into treatment is pre-determined at the time of the treatment which controls for possible self selection problem.

[17] In section 6,we further show that our results hold with neighborhood and neighborhood times year-month fixed effects as well.

are nearly perfect substitutes for second-hand houses for house buyers and that the prices between these two house types move in tandem.

5.2 Results for Each Month

In our main specification, the estimate captures the average impact of the interest rate reduction on house prices for three months from June until August 2020. We expect that the effect of this sudden reduction in mortgage rates would be largest in the first month and would slowly decrease in the following months.

To investigate this, we next estimate the effect on house prices in each month separately by using the following regression:

$$\begin{aligned} ln\, P_{i,j,c,t} &= \alpha_0 + \alpha_1\, State-owned_j \times June + \alpha_2\, State-owned_j \times July \\ &+ \alpha_3\, State-owned_j \times August + \alpha_4\, Controls_{i,j,c,t} + \delta_{c,t} + u_{i,j,c,t}, \end{aligned} \tag{2}$$

where i indexes the individual house sold, j indexes the bank that issued the mortgage loan, c indexes district that the house is located in and t indexes the year-month of the sale. *June* is an indicator variable that takes a value of one for June 2020 and zero for the rest of the time period. *July* and *August* are constructed similarly. Controls and fixed-effects are exactly the same as in the regression equation 1.

Column 5 of Table 5 reports the results of the regression equation 2. The effect of the interest rate reduction on house prices is significant for all three months. As expected, the largest increase happens in June, the first month, by about 4.23 percent and the lowest increase happens in August, the last month, by about 1.94 percent. This indicates that a 1 percentage point decrease in the interest rate of a mortgage increased house prices per square meter by about 2.2 percent in June given that the relative drop in annual mortgage rates was 1.92 percentage point for state-owned banks compared to privately-owned banks.

We report the coefficient estimates for specifications with different combinations of district, province and year-month fixed effects in Columns 1-4 of Table 5. The effect of the interest rate reduction is significant for all months in all specifications. The increase in house prices in June ranges from 4.23 percent to 8.81 percent. The estimates indicate that a 1 percentage point decrease in the annual mortgage rates increases house prices per square meter by between 2.2 to 4.6 percent.

5.3 Mechanism

Our line of argument is that cheaper credit increased demand for housing by relaxing borrowers' financial constraints and this increased house prices. Thus, the effect of the reduction in mortgage rates on house prices was via its effect on credit. To examine whether this was the mechanism that drives our results, we next study the effect of the drop in interest rates on the amount of individual mortgage loans. We repeat the regression analysis in equation 1 by changing the dependent variable to the logarithm of the volume of each mortgage.

Results are reported in Panel A of Table 6. Column 5 shows the estimate for the baseline regression with district times year-month fixed effects. According to the coefficient estimate, the volume of an individual mortgage loan issued by state-owned banks increased by about 10.3 percent more compared to privately-owned banks. In other words, mortgage demand increased by 10.3 percent more for state-owned banks relative to privately-owned banks. We report the coefficient estimates for several specifications with different combinations of fixed effects. The effect is significant in all specifications: The increase in the individual mortgage loan ranges between 10.3 percent to 14.10 percent. This suggests that a 1 percentage point decrease in mortgage rates led to an increase in the volume of individual mortgage loans by between 6.6 and 9.04 percent.

We next study the relative change in each month separately following the regression equation 2 where we again change the dependent variable accordingly. The results are reported in Panel A of Table 7. Consistent with the changes in house prices, the largest relative increase in the loan demand happens in the first month by about 12.93 percent and the lowest happens in the last month by 4.34 percent. This indicates that a 1 percentage point decrease in the interest rate of a mortgage increases mortgage demand by about 6.73 percent in June.

By repeating the analysis with combinations of different fixed effects as reported in Panel A of Table 7, we find that the increase in mortgage demand in June ranges from 12.93 percent to 16.49 percent. This suggests that a 1 percentage point decrease in the annual mortgage rate increases mortgage demand by between 6.73 to 8.59 percent.

In addition, we investigate the effect of the interest rate reduction on the loan-to-value (LTV) ratio of the mortgages. We repeat the regression in equation 1 by changing the dependent variable to LTV ratios. Panel B of Table 6 reports the results. According to the baseline estimate reported in Column 5, the LTV ratio of mortgages increased by about 4.3 percentage points more for state-owned banks. This indicates that a 1 percentage point decrease in the mortgage rate led to a significant increase in the LTV ratio by 2.76 percentage points.

When we study the change in each month separately, we find that the largest increase happens in July by about 5.37 percentage points. As reported in Panel B of Table 7, the change in June is also highly significant and large by about 4.93 percentage points. The increase in August is not significant but still positive. When we repeat the analysis with different fixed effects, we find that the effect on the LTV ratio in June ranges from 4.47 to almost 5 percentage points. This suggests that a 1 percentage point decrease in the annual mortgage rates increased the LTV ratio in the first month by between 2.33 to 2.6 percentage points.

5.4 Aggregate Effects

In our core set of tests, we compare house prices for houses purchased with mortgages from state-owned banks and from privately-owned banks in the same district-year-month. Given that the mortgage rates decreased mainly for state-owned banks and the mortgage rates of privately-owned banks stayed significantly higher during the post-treatment period, it could be that only the borrowers that could not take out a mortgage loan from a state-owned bank ended up getting a loan from a privately-owned bank. This suggests that the characteristics of borrowers for state-owned banks and for privately-owned banks might have changed from pre-treatment to post-treatment. To control for this, we define a new treatment variable that is the mortgage market share of state-owned banks in a district calculated before the treatment. This pre-determined nature of the new treatment measure ensures that it is not affected by the sudden reduction in interest rates, i.e., the treatment itself. As a result, it helps us to tackle the self selection of borrowers across banks in the post-treatment period.

In this identification, we use province times year-month fixed effects instead of district times year-month fixed effects. We also include time-invariant district fixed effects. We estimate the following regression:

$$ln\, P_{i,j,c,t} = \alpha_0 + \alpha_1\, Ratio_c \times Post_t + \alpha_2\, Ratio_c + \alpha_3\, Controls_{i,j,c,t} + \delta_{p,t} + \gamma_c + u_{i,j,c,t}, \quad (3)$$

where i indexes the individual house sold, j indexes the bank that issued the mortgage loan, c indexes district that the house is located in and t indexes the year-month of the sale. $Controls$ are the same house characteristics as in the regression equation 1. $\delta_{p,t}$ is the province times year-month fixed effects and γ_c is the district fixed effects. Standard errors are clustered at the district level.

$Ratio_c$ is the market share of state-owned banks in the mortgage market of each district c and is measured as the total volume of mortgages issued by state-owned banks divided by the total volume of mortgages issued in district c in 2019. This ratio measures the importance of state-owned banks in each district's mortgage market. This, in turn, gauges the exposure of each district to the exogenous interest rate reduction. It is important that this ratio is calculated in 2019, and, as a result, is not affected by the treatment.

With this identification, we compare the changes in house prices between districts with different levels of exposure to the mortgage rate reduction in the same province and the same year-month. Table 8 reports the results. Column 3 shows the estimate for our baseline regression: Districts with a 1 standard deviation increase in state-owned banks' market share experienced a 0.43 percent relative increase in house prices per square meter. We report results for specifications with different combinations of fixed effects. According to the results, a 1 standard deviation increase in the ratio increases house prices per square meter by between 0.43 and 0.77 percent.

Similar to our baseline results, we next study the changes in house prices in each month separately by estimating the following regression:

$$\begin{aligned} ln\, P_{i,j,c,t} &= \alpha_0 + \alpha_1\, Ratio_c \times June + \alpha_2\, Ratio_c \times July \\ &+ \alpha_3\, Ratio_c \times August + \alpha_4\, Controls_{i,j,c,t} + \delta_{p,t} + \gamma_c + u_{i,j,c,t}, \end{aligned} \tag{4}$$

where i indexes the individual house sold, j indexes the bank that issued the mortgage loan, c indexes district that the house is located in and t indexes the year-month of the sale.

According to the results reported in Table 9, higher pre-treatment market share of state-owned banks led to a significant increase in house prices in June and marginally insignificant increase in July.[18] The effect disappears in August. Based on the estimate reported in Column 3, districts with a 1 standard deviation higher market share of state-owned banks experienced a significant increase in house prices per square meter by about 0.52 percent in June and 0.43 percent in July. We also report the coefficients for different combinations of fixed effects and the impact in June ranges between 0.52 to 1.4 percent.

We further report the effects at the district level in Table 10. In this analysis, we have the average house prices in each district as dependent variable. The point estimates remain similar but are less precise, which is not surprising given that we cannot control for individual house characteristics in this specification. In addition, average house prices at the district

[18] The coefficient estimate for July is highly significant if we do not include the province times year-month fixed effects as reported in Column 2.

level might be correlated with unobserved time varying district level characteristics.

5.5 Effect on House Characteristics

We next examine whether the reduction in interest rates led to changes in house characteristics for houses that are bought with a mortgage from state-owned banks in the post-treatment period. We study the effect on three characteristics: number of rooms, size and building quality. We repeat the same regression specification as in equation 1 by replacing the dependent variable by the logarithm of the number of rooms, the logarithm of the size in square meters and the expert evaluation of the building material quality that ranges between 1 and 4 (1 for luxury and 4 for poor).

Column 5 in Table 11 reports the results. There is no significant effect on any of the house characteristics. This suggests that the characteristics of houses sold before and after the treatment are similar.

We then study the effect at the aggregate level by repeating the regression in equation 3 by replacing the dependent variable accordingly and excluding the controls for house characteristics. As reported in Table 12, districts with higher market share of state-owned banks did not experience any change in the average house characteristics for houses that are sold in the post-treatment period once we control for province level time effects. As a result, the reduction in interest rates did not lead to any changes in house characteristics.

While we control for a number of house characteristics when estimating the effects on house prices, a potential driver for an increase in house prices might be a change in the composition of houses sold in the post-treatment period. The lack of significant effects on house characteristics further confirms that the impact on prices are not driven by a change in the quality of houses sold.

6 Robustness

6.1 Shorter Pre-Treatment Period

In our baseline regression, the sample period starts from January 2019 and the pre-treatment is seventeen months until May 2020. To ensure that we are not capturing a heterogenous effect on house prices by bank type from the COVID-19 crisis, we next estimate the effects using only the period after the first COVID-19 case was identified in Turkey. We restrict the sample period for six months around the treatment: three months of pre-treatment, March, April, and May 2020, and three months of post-treatment, June, July, and August 2020.

Results are reported in Table 13. As reported in Panel A, the effect of the interest rate reduction on house prices is significantly positive although the magnitude is smaller. In addition, we repeat the analysis for the amount of mortgage loans and the LTV ratio of loans. The results are reported in Panel B and C. The effect is significantly positive for both with smaller magnitudes.[19]

Overall, our results are robust to a shorter pre-treatment period and they are not driven by changes related to the COVID-19 crisis.

6.2 Repeated Sales

We next focus on a sample of houses that are sold at least twice during our sample period. By including house fixed effects in our regressions, we compare the change in the price of the same house from pre- to post-treatment period where the mortgage loan is borrowed from a state bank relative to a private bank. This setting enables us to control for any changes in the distribution of houses sold during the post-treatment period.

Table 14 shows the results for different fixed effects. According to the coefficients in Column (4) with house and district times year-month fixed effects, the price of the same

[19] In unreported robustness tests, we found similar results for the aggregate district level effects.

house increased by almost 2 percent more in the post-treatment period if the house is sold with a mortgage issued by a state-owned bank relative to another house with a mortgage from a privately-owned bank. Panel (B) and (C) show the results for the amount of mortgage loans and the LTV ratios of the issued loans. Similar to the main results, we find a significant increase in both: the amount of the mortgage that is issued for the same house increased by almost 13 percent more for mortgages from a state-owned bank and the LTV ratio also increased by almost 6 percentage points more.

This implies that the relative increase in house prices is not driven by a change in the house characteristics, it is instead a result of the change in the mortgage rates.

6.3 Falsification Test

The results from the difference-in-differences estimation show that house prices increased significantly more for houses bought with a mortgage from a state-owned bank relative to houses with a mortgage from a privately-owned bank due to the sudden drop in mortgage rates of state-owned banks. This result is only valid if the parallel trends assumption is fulfilled. We assume that house prices would have changed similarly for these two groups absent of the shock on mortgage rates. To test whether this is indeed the case, we repeat our analysis for a time period where there was no sudden change in the interest rates. In this falsification test, we choose the twenty months from January 2018 until August 2019 as our sample period, in which the last three months, June, July and August 2019, are selected as the post-period and the months from January 2018 until May 2019 are selected as the pre-treatment period.

As reported in Table 15, the treatment effect is indistinguishable from zero. The change in house prices is the same for both state-owned banks and privately-owned banks. There is no significant difference between the two groups. We repeat the falsification test at the aggregate level as well. As reported in Table 16, the treatment effect is not significant in any of the specifications. This indicates that the change in house prices is the same for districts with different exposure to the state-owned banks.

Overall, the falsification test ensures that the parallel trends assumption holds and the observed relative change in house prices is due to the reduction in mortgage rates of state-owned banks.

6.4 Alternative Specifications

We next repeat our main specification with different combinations of neighborhood and bank fixed effects. As reported in Table 17, the significant positive effect holds in each specification. The coefficient estimate is slightly smaller (2.74%) when we do the analysis with neighborhood times year-month fixed effects. This compares the house prices for houses located in the same neighborhood and purchased in the same year-month with a mortgage from a state-owned bank and a mortgage from a privately-owned bank. Even in this specification the estimate is highly significant at the 1% level.

7 Economic Magnitude

In this section, we compare our coefficient estimates with the recent estimates from the literature. Earlier studies establish the link between house prices and mortgage rates using a user cost approach (Hendershott and Slemrod, 1982; Poterba, 1984; Himmelberg et al., 2005). This approach provides elasticities of around 17.5 as shown in Himmelberg et al. (2005). Glaeser et al. (2012) simplify some of the assumptions and argue that a more realistic model can produce much lower elasticity of house prices to interest rates. These changes reduce the elasticity from 17.5 to 8. Similarly, Fuster and Zafar (2020) calculate predictions from a calibrated user cost model which generate elasticities between 5 and 8. In addition, Fuster and Zafar (2020) estimate the effect of the mortgage rate on the willingness to pay to be 2.5 percent using a survey on respondents' willingness to pay for a home under randomized hypothetical interest rate scenarios. Their predictions from the calibrated user cost model are well above their predictions from the survey. Within the range of estimates, Adelino et al. (2012) obtain estimates that vary between 1 and 9 in their empirical analysis. Our estimates for the elasticity of house prices to interest rates range between 2.1 to 4.8, which are in the range of the estimates from Adelino et al. (2012). The estimate from our baseline model is 2.1, which is very close to Fuster and Zafar (2020)'s estimate of 2.5.

In addition, we find that the impact of a 1 percentage point decrease in mortgage rates on the volume of the individual loans ranges from 6.6 to 9 percent. DeFusco and Paciorek (2017) document an elasticity of mortgage demand to interest rates between 1.5 to 2, and Fuster and Zafar (2020) find an elasticity between 0.6 and 1.8. Our estimates for the interest rate elasticity of mortgage demand are larger than the recent estimates. One reason for this could be that the effects we estimate are for short-run only since the interest rates of state-owned banks stayed low for only three months. This might have caused a front-loading in demand. In addition, the decline in mortgage rates of state-owned banks had a widespread media coverage, which might have led to a larger increase in loan demand as well.

Using our baseline estimates, we additionally calculate the elasticity of house prices to mortgage credit. According to our estimates, a 1 percent increase in the volume of the individual mortgage loans leads to an increase of about 0.32 percent in house prices. Favara and Imbs (2015) find that a 1 percent increase in the growth rate of credit results in a 0.12 percent increase in the growth rate of house prices. Our estimate is much larger than the estimate of Favara and Imbs (2015). Since we study the impact on house prices in the immediate aftermath of the reduction in mortgage rates, our estimates are for only short-term. Previous findings in the literature indicate that supply is inelastic in the short-run (Harter-Dreiman, 2004; Green et al., 2005). As a result, our elasticity estimates might be larger than the elasticity to long-term shifts in interest rates and in credit.

8 Conclusion

Our main contribution to the literature is to quantify the causal effect of a reduction in mortgage rates on the volume of individual mortgage loans and house prices by using a sudden shift in the mortgage rates. In May 2020, Turkish government announced that state-owned banks would reduce their mortgage rates starting from the beginning of June 2020 as part of the economic stimulus package related to COVID-19. According to the announcement, the monthly mortgage rates would decrease to 0.64% for new houses, that are sold for the first time, and to 0.74% for second-hand houses.

We exploit this sudden drop in mortgage interest rates of state-owned banks as an exogenous shift in interest rates to study the causal impact of changes in mortgage rates on house prices. We apply a difference-in-differences methodology to study the relative increase in house prices for houses with mortgages from state-owned banks compared to houses with mortgages from privately-owned banks. This enables us to control for the general trends in house prices and the economy.

Our baseline estimates show that a 1 percentage point decrease in mortgage rates leads to 2.1 percent increase in house prices per square meter. The impact on house prices comes through the effect of the interest rate reduction on the credit: Cheaper credit relaxes borrowers' financial constraints which increases the demand for housing, and, as a result, house prices increase. We find that a 1 percentage point decrease in the interest rate of a mortgage increases mortgage demand by about 6.6 percent. This also increases the LTV ratio of the mortgage loans by about 2.73 percentage points.

According to our monthly results, the magnitude of the increase in house prices is largest in June (4.23 percent) and decreases over time (1.94 percent in August). This suggests that, instead of a sudden decrease, a gradual decrease in mortgage interest rates that is extended over a longer time period could smooth out the increase in demand which, in turn, would lead to a smaller increase in house prices.

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Figures

Figure 1. Monthly interest rates by bank ownership
This figure plots the monthly average mortgage costs for the three largest state-owned banks and the four largest privately-owned banks in Turkey. Mortgage costs for smaller banks follow similar patterns. The data on mortgage costs is downloaded from hesapkurdu.com, a website that provides data on the average cost of mortgage loans for each bank in Turkey. The cost of mortgage loans includes the mortgage rates plus the additional fees associated with the mortgages.

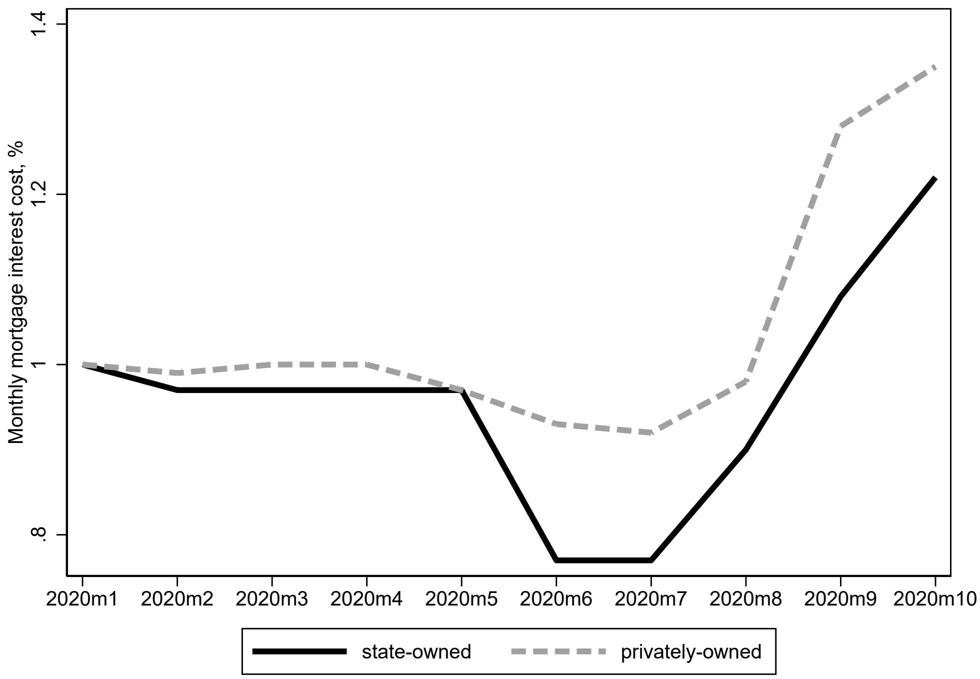

Figure 2. Outstanding mortgage credits by bank ownership
This figure plots the weekly outstanding mortgage loans for state-owned banks and for privately-owned banks. The histogram plots the market share of state-owned banks in the mortgage market in Turkey. The data on the amount of mortgage loans is downloaded from the Banking Regulation and Supervision Agency website.

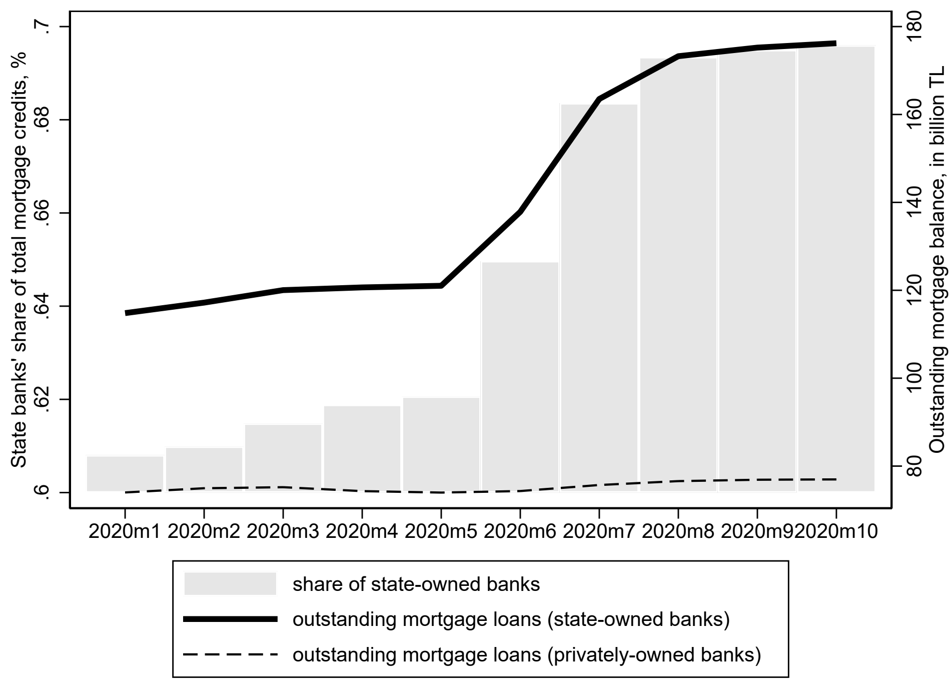

Figure 3. House sales by financing type
This figure plots the total number of house sales and the number of house sales for houses purchased with a mortgage. The histogram plots the fraction of house sales that are purchased with a mortgage.

Tables

Table 1. Mortgage Payment Simulations
This table shows the expected changes in the monthly mortgage payments for different monthly mortgage rates. Mortgage cost is the mortgage interest rate plus fees and charges, including average loan application fees and insurance cost. The simulations are conducted on the loan with a principal of 100,000 TL and 10 years (120 months) maturity. The average monthly household income is assumed to be 4,990 TL based on the Turkish Statistics Agency reporting as of 2019.

Monthly Mortgage Cost	Annual Mortgage Cost	Total Loan (TL)	Monthly Payment (TL)	Monthly Pay. Relative to Average Household Income
1.35%	17.5%	202560	1688	33.8%
1.28%	16.5%	196200	1635	32.8%
1.00%	12.7%	172200	1435	28.8%
0.97%	12.3%	169680	1414	28.3%
0.90%	11.4%	163920	1366	27.4%
0.77%	9.6%	153600	1280	25.7%

Table 2. Summary Statistics
This table reports the summary statistics for our main variables. The dataset covers all houses sold with mortgage loans in Turkey. We split the time period as pre-treatment and post-treatment. The pre-treatment indicates the period between January 2019 and May 2020. The post-treatment indicates the period between June and August 2020. The price variable is the log of the nominal price in Turkish Liras per square meters.

	Mean	p50	SD	min	max	N
Pre-treatment						
Loan-to-value ratio	0.608	0.640	0.177	0.014	0.900	455,421
Loan (log)	11.863	11.849	0.540	8.854	17.728	455,421
Price (log)	7.755	7.703	0.447	6.385	9.845	455,421
State owned	0.699	1.000	0.459	0.000	1.000	455,421
State-owned ratio (district)	0.757	0.762	0.086	0.000	1.000	455,421
Size (square meters)	113.319	110.000	43.407	15.000	1,404.000	455,421
Age	8.101	3.000	10.425	0.000	120.000	455,421
Living rooms	1.005	1.000	0.124	0.000	6.000	455,421
Rooms	2.703	3.000	0.857	1.000	16.000	455,421
Bathrooms	1.343	1.000	0.524	0.000	12.000	455,421
Balconies	1.522	2.000	0.792	0.000	32.000	455,421
Security present	0.137	0.000	0.344	0.000	1.000	455,421
Heating system	2.161	2.000	0.839	1.000	4.000	455,421
Elevator present	0.718	1.000	0.450	0.000	1.000	455,421
Parking space	0.569	1.000	0.495	0.000	1.000	455,421
Swimming pool	0.282	0.000	0.450	0.000	1.000	455,421
Post-treatment						
Loan to value ratio	0.674	0.703	0.189	0.020	0.900	256,474
Loan (log)	12.166	12.196	0.528	8.987	16.204	256,474
Price (log)	7.951	7.902	0.449	6.479	9.845	256,474
State owned	0.813	1.000	0.390	0.000	1.000	256,474
State-owned ratio (district)	0.757	0.762	0.085	0.000	1.000	256,474
Size (square meters)	113.305	110.000	43.123	20.000	851.000	256,474
Age	9.115	5.000	10.786	0.000	119.000	256,474
Living rooms	1.004	1.000	0.118	0.000	4.000	256,474
Rooms	2.707	3.000	0.865	1.000	13.000	256,474
Bathrooms	1.349	1.000	0.525	0.000	10.000	256,474
Balconies	1.535	2.000	0.808	0.000	10.000	256,474
Security present	0.138	0.000	0.345	0.000	1.000	256,474
Heating system	2.176	2.000	0.856	1.000	4.000	256,474
Elevator present	0.705	1.000	0.456	0.000	1.000	256,474
Parking space	0.608	1.000	0.488	0.000	1.000	256,474
Swimming pool	0.108	0.000	0.310	0.000	1.000	256,474

Table 3. Effect on houses sold with state-owned bank mortgages

The regressions in this table examine the relative change in house prices for houses sold with a mortgage from state-owned banks compared to privately-owned banks. The dependent variable is the log of the house prices per square meter. The sample contains all houses sold through mortgages between January 2019 and August 2020. The *Post* dummy indicates the period between June and August 2020. The $State-owned$ dummy indicates mortgages provided by a state-owned bank. Standard errors are clustered at the bank level.

	(1)	(2)	(3)	(4)	(5)
Post	0.1457***				
	(0.0122)				
State-owned	-0.0707***	0.0021	0.0027	0.0067	0.0075
	(0.0117)	(0.0087)	(0.0088)	(0.0073)	(0.0073)
Post x State-owned	0.0722***	0.0405***	0.0389**	0.0326***	0.0319***
	(0.0166)	(0.0140)	(0.0143)	(0.0095)	(0.0094)
Size	-0.0037***	-0.0007***	-0.0007***	-0.0007***	-0.0007***
	(0.0002)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Age	0.0033***	0.0008*	0.0009*	-0.0043***	-0.0043***
	(0.0005)	(0.0004)	(0.0004)	(0.0002)	(0.0002)
Number of living rooms	0.1609***	-0.0723***	-0.0724***	-0.0688***	-0.0696***
	(0.0075)	(0.0086)	(0.0083)	(0.0060)	(0.0059)
Number of rooms	-0.0072	-0.0367***	-0.0368***	-0.0294***	-0.0299***
	(0.0054)	(0.0022)	(0.0022)	(0.0022)	(0.0021)
Number of bathrooms	0.1613***	0.0661***	0.0659***	0.0503***	0.0502***
	(0.0065)	(0.0035)	(0.0034)	(0.0022)	(0.0023)
Number of balconies	-0.0658***	-0.0116***	-0.0115***	0.0011*	0.0014**
	(0.0063)	(0.0012)	(0.0011)	(0.0006)	(0.0006)
Security present	0.3392***	0.1785***	0.1787***	0.1691***	0.1688***
	(0.0180)	(0.0121)	(0.0121)	(0.0090)	(0.0088)
Elevator present	0.0543***	0.0704***	0.0708***	0.0619***	0.0625***
	(0.0102)	(0.0058)	(0.0059)	(0.0026)	(0.0027)
Parking available	0.0259**	0.0692***	0.0690***	0.0384***	0.0383***
	(0.0124)	(0.0031)	(0.0032)	(0.0032)	(0.0031)
Swimming pool present	0.0375	0.0747***	0.0757***	0.0653***	0.0664***
	(0.0527)	(0.0115)	(0.0114)	(0.0109)	(0.0110)
R-squared	0.292	0.629	0.631	0.786	0.790
N	711,858	711,858	711,850	711,809	710,059
Year - month		+		+	
Province		+			
District				+	
Province x year-month			+		
District x year-month					+

*** p<0.01, ** p<0.05, * p<0.1

Table 4. Effect on houses sold with state-owned bank mortgages: New versus second-hand houses

The regressions in this table examine the relative change in house prices for houses sold with a mortgage from state-owned banks compared to privately-owned banks by focusing on the differences between new and second-hand houses. The dependent variable is the log of the house prices per square meter. The sample contains all houses sold through mortgages between January 2019 and August 2020. The *Post* dummy indicates the period between June and August 2020. The $State-owned$ dummy indicates mortgages provided by a state-owned bank. The New indicates houses aged between zero and one year old. The coefficients of house characteristics are not reported in the interest of parsimony although regressions include all controls. Standard errors are clustered at the bank level.

	(1)	(2)	(3)	(4)	(5)
Post	0.1416***				
	(0.0127)				
State-owned	-0.0704***	0.0027	0.0031	0.0071	0.0077
	(0.0118)	(0.0088)	(0.0089)	(0.0073)	(0.0073)
Post x New	0.0265**	0.0518***	0.0510***	0.0273***	0.0249***
	(0.0115)	(0.0081)	(0.0082)	(0.0044)	(0.0045)
Post x State-owned	0.0719***	0.0408***	0.0397**	0.0323***	0.0319***
	(0.0163)	(0.0140)	(0.0144)	(0.0091)	(0.0091)
Post x New x State-owned	-0.0070	-0.0192**	-0.0189*	-0.0080	-0.0073
	(0.0138)	(0.0092)	(0.0092)	(0.0051)	(0.0053)
R-squared	0.293	0.630	0.631	0.786	0.790
N	711,858	711,858	711,850	711,809	710,059
Year - month		+		+	
Province		+			
District				+	
Province x year-month			+		
District x year-month					+

*** p<0.01, ** p<0.05, * p<0.1

Table 5. Monthly effects on houses sold with state-owned bank mortgages

The regressions in this table examine the relative change in house prices for houses sold with a mortgage from state-owned banks compared to privately-owned banks in each month separately. The dependent variable is the log of the house prices per square meter. The sample contains all houses sold through mortgages between January 2019 and August 2020. The *Post* dummy indicates the period between June and August 2020. The *June* dummy indicates mortgages issued in June, the *July* dummy indicates mortgages issued in July and the *August* dummy indicates mortgages issued in August. Standard errors are clustered at the bank level.

	(1)	(2)	(3)	(4)	(5)
June x State-owned	0.0844***	0.0505***	0.0471***	0.0427***	0.0414***
	(0.0101)	(0.0157)	(0.0165)	(0.0111)	(0.0113)
July x State-owned	0.0838***	0.0401***	0.0387***	0.0323***	0.0313***
	(0.0159)	(0.0132)	(0.0134)	(0.0081)	(0.0082)
August x State-owned	0.0527**	0.0271*	0.0277*	0.0188*	0.0192*
	(0.0202)	(0.0148)	(0.0147)	(0.0100)	(0.0095)
R-squared	0.294	0.629	0.631	0.786	0.790
N	711,858	711,858	711,850	711,809	710,059
Year - month		+		+	
Province		+			
District				+	
Province x year-month			+		
District x year-month					+

*** p<0.01, ** p<0.05, * p<0.1

Table 6. Effect on mortgages issued by state-owned banks
The regressions in this table examine the relative change in the volume of individual mortgages issued by state-owned banks compared to privately-owned banks. The dependent variable is the log of the loan amount in panel A and the loan to value ratio in panel B. The sample contains all houses sold through mortgages between January 2019 and August 2020. The *Post* dummy indicates the period between June and August 2020. The $State-owned$ dummy indicates mortgages provided by a state-owned bank. Standard errors are clustered at the bank level.

	(1)	(2)	(3)	(4)	(5)
A- Loans					
Post	0.1934***				
	(0.0126)				
State-owned	-0.0378	0.0170	0.0165	0.0201	0.0199
	(0.0228)	(0.0186)	(0.0185)	(0.0204)	(0.0201)
Post x State-owned	0.1319***	0.1043***	0.1046***	0.0983***	0.0984***
	(0.0177)	(0.0223)	(0.0232)	(0.0223)	(0.0232)
R-squared	0.300	0.448	0.450	0.508	0.515
B- Loan to value ratio					
Post	0.0276*				
	(0.0139)				
State-owned	0.0118	0.0040	0.0038	0.0035	0.0033
	(0.0148)	(0.0109)	(0.0108)	(0.0107)	(0.0106)
Post x State-owned	0.0415**	0.0424**	0.0424**	0.0432**	0.0429**
	(0.0172)	(0.0166)	(0.0168)	(0.0162)	(0.0165)
R-squared	0.064	0.114	0.117	0.131	0.145
N	711,858	711,858	711,850	711,809	710,059
Year - month		+		+	
Province		+			
District				+	
Province x year-month			+		
District x year-month					+

*** p<0.01, ** p<0.05, * p<0.1

Table 7. Monthly effects on mortgages issued by state-owned banks
The regressions in this table examine the relative change in the volume of individual mortgages issued by state-owned banks compared to privately-owned banks in each month separately. The dependent variable is the log of the loan amount in panel A and the loan to value ratio in panel B. The sample contains all houses sold through mortgages between January 2019 and August 2020. The *Post* dummy indicates the period between June and August 2020. The *June* dummy indicates mortgages issued in June, the *July* dummy indicates mortgages issued in July and the *August* dummy indicates mortgages issued in August. Standard errors are clustered at the bank level.

	(1)	(2)	(3)	(4)	(5)
A- Loans					
June x State-owned	0.1526***	0.1286***	0.1271***	0.1224***	0.1216***
	(0.0243)	(0.0285)	(0.0290)	(0.0274)	(0.0275)
July x State-owned	0.1504***	0.1194***	0.1205***	0.1140***	0.1141***
	(0.0200)	(0.0263)	(0.0269)	(0.0273)	(0.0284)
August x State-owned	0.0661***	0.0482**	0.0498**	0.0419*	0.0425*
	(0.0192)	(0.0219)	(0.0231)	(0.0213)	(0.0221)
R-squared	0.300	0.448	0.450	0.508	0.516
B- Loan to value ratio					
June x State-owned	0.0447**	0.0492**	0.0490**	0.0499**	0.0493**
	(0.0181)	(0.0183)	(0.0184)	(0.0181)	(0.0181)
July x State-owned	0.0470**	0.0527**	0.0530**	0.0537**	0.0537**
	(0.0179)	(0.0196)	(0.0197)	(0.0191)	(0.0194)
August x State-owned	0.0141	0.0177	0.0175	0.0186	0.0181
	(0.0139)	(0.0153)	(0.0154)	(0.0149)	(0.0151)
R-squared	0.071	0.115	0.117	0.131	0.145
N	711,858	711,858	711,850	711,809	710,059
Year - month		+		+	
Province		+			
District				+	
Province x year-month			+		
District x year-month					+

*** p<0.01, ** p<0.05, * p<0.1

Table 8. Aggregate effect on prices in districts with higher state-owned bank ratio
The regressions in this table examine the effect of the state-owned banks' mortgage market share in each district on house prices in the post-treatment period. The dependent variable is the log of the house prices per square meter. The sample contains all houses sold through mortgages between January 2019 and August 2020. The *Post* dummy indicates the period between June and August 2020. The *Ratio* is the market share of state-owned banks in the mortgage market of each district and is measured as the amount of mortgages issued by state-owned banks divided by the total volume of mortgages issued in each district in 2019. Standard errors are clustered at the district level.

	(1)	(2)	(3)
Post	-2.3938***		
	(0.2137)		
Ratio	0.1273***		
	(0.0326)		
Ratio x Post	0.0903**	0.0712***	0.0502**
	(0.0402)	(0.0221)	(0.0209)
R-squared	0.457	0.786	0.787
N	711,789	711,756	711,748
Year - month		+	
District		+	+
Province x year-month			+

*** p<0.01, ** p<0.05, * p<0.1

Table 9. Aggregate monthly effects on prices in districts with higher state-owned bank ratio
The regressions in this table examine the effect of the state-owned banks' mortgage market share in each district on house prices in the post-treatment period in each month separately. The dependent variable is the log of the house prices per square meter. The sample contains all houses sold through mortgages between January 2019 and August 2020. The *Ratio* is the market share of state-owned banks in the mortgage market of each district and is measured as the amount of mortgages issued by state-owned banks divided by the total volume of mortgages issued in each district in 2019. The *June* dummy indicates mortgages issued in June, the *July* dummy indicates mortgages issued in July and the *August* dummy indicates mortgages issued in August. Standard errors are clustered at the district level.

	(1)	(2)	(3)
Ratio x June	0.1649***	0.0821***	0.0612***
	(0.0319)	(0.0179)	(0.0163)
Ratio x July	0.0853**	0.0815***	0.0508
	(0.0409)	(0.0269)	(0.0338)
Ratio x August	-0.0160	0.0262	-0.0026
	(0.0497)	(0.0320)	(0.0385)
R-squared	0.458	0.786	0.787
N	711,789	711,756	711,748
Year - month		+	
District		+	+
Province x year-month			+

*** p<0.01, ** p<0.05, * p<0.1

Table 10. Aggregate monthly effects on prices in districts with higher state-owned bank ratio at the district level

The regressions in this table examine the effect of the state-owned banks' mortgage market share in each district on house prices in the post-treatment period in each month separately. The dependent variable is the district average log of the house prices per square meter. The sample contains all houses sold through mortgages between January 2019 and August 2020. The *Ratio* is the market share of state-owned banks in the mortgage market of each district and is measured as the amount of mortgages issued by state-owned banks divided by the total volume of mortgages issued in each district in 2019. The *June* dummy indicates mortgages issued in June, the *July* dummy indicates mortgages issued in July and the *August* dummy indicates mortgages issued in August. Standard errors are clustered at the district level.

	(1)	(2)	(3)	(4)
Ratio x June	0.1080**	0.1005**	0.0741*	0.0291
	(0.0511)	(0.0489)	(0.0412)	(0.0673)
Ratio x July	0.1031**	0.0928*	0.0634	0.0534
	(0.0523)	(0.0500)	(0.0429)	(0.0613)
Ratio x August	0.0397	0.0346	0.0022	-0.0153
	(0.0577)	(0.0561)	(0.0448)	(0.0623)
R-squared	0.508	0.988	0.989	0.991
N	12,569	12,534	12,534	12,447
Year - month		+	+	
District		+	+	+
Province trend			+	
Province x year-month				+

*** p<0.01, ** p<0.05, * p<0.1

Table 11. Effect of state-owned mortgages on house characteristics
The regressions in this table examine the relative change in house characteristics for houses sold with a mortgage from state-owned banks compared to privately-owned banks. The dependent variable is the log of the number of rooms in panel A, the log of residence size in square meters in panel B and the expert evaluation of building material quality that ranges between 1 and 4 (1 for luxury and 4 for poor) in panel C. The sample contains all houses sold through mortgages between January 2019 and August 2020. The *Post* dummy indicates the period between June and August 2020. The $State-owned$ dummy indicates mortgages provided by a state-owned bank. Standard errors are clustered at the bank level.

	(1)	(2)	(3)	(4)	(5)
A- Number of rooms					
Post	-0.0059				
	(0.0048)				
State-owned	0.0089	-0.0079	-0.0073	-0.0089	-0.0081
	(0.0132)	(0.0148)	(0.0147)	(0.0142)	(0.0140)
Post x State-owned	0.0048	0.0058	0.0048	0.0050	0.0038
	(0.0050)	(0.0056)	(0.0056)	(0.0053)	(0.0054)
R-squared	0.000	0.099	0.101	0.134	0.146
B- Size (square meters)					
Post	-0.0077				
	(0.0079)				
State-owned	0.0396**	0.0105	0.0106	0.0051	0.0057
	(0.0175)	(0.0183)	(0.0183)	(0.0167)	(0.0166)
Post x State-owned	0.0024	0.0062	0.0063	0.0047	0.0045
	(0.0089)	(0.0083)	(0.0081)	(0.0075)	(0.0078)
R-squared	0.002	0.172	0.175	0.227	0.239
C- Building quality					
Post	0.0205				
	(0.0165)				
State-owned	-0.1133*	-0.1023*	-0.1034*	-0.0986*	-0.0994*
	(0.0596)	(0.0589)	(0.0588)	(0.0570)	(0.0566)
Post x State-owned	0.0076	0.0104	0.0145	0.0115	0.0146
	(0.0180)	(0.0170)	(0.0174)	(0.0160)	(0.0164)
R-squared	0.008	0.031	0.035	0.052	0.068
N	711,964	711,964	711,956	711,915	710,165
Year - month		+		+	
Province		+			
District				+	
Province x year-month			+		
District x year-month					+

*** p<0.01, ** p<0.05, * p<0.1

Table 12. Effect of state-owned mortgage ratio on district level house characteristics
The regressions in this table examine the effect of the state-owned banks' mortgage market share in each district on house prices in the post-treatment period. The dependent variable is the log of the number of rooms in panel A, the log of residence size in square meters in panel B and the expert evaluation of building material quality that ranges between 1 and 4 (1 for luxury and 4 for poor) in panel C. The sample contains the averages at the district-month level between January 2019 and August 2020. The *Post* dummy indicates the period between June and August 2020. The *Ratio* is the market share of state-owned banks in the mortgage market of each district and is measured as the amount of mortgages issued by state-owned banks divided by the total volume of mortgages issued in each district in 2019. Standard errors are clustered at the district level.

	(1)	(2)	(3)
A- Number of rooms			
Post	0.5825***		
	(0.0224)		
Ratio	-0.0269***		
	(0.0077)		
Post x Ratio	0.0344***	0.0302**	-0.0270
	(0.0094)	(0.0120)	(0.0187)
R-squared	0.021	0.133	0.136
B- Size (square meters)			
Post	1.0703***		
	(0.0233)		
Ratio	0.0028		
	(0.0108)		
Post x Ratio	-0.0051	0.0183*	-0.0094
	(0.0117)	(0.0092)	(0.0216)
R-squared	0.058	0.227	0.229
C- Building quality			
Post	-0.5000***		
	(0.0786)		
Ratio	0.0335		
	(0.0283)		
Post x Ratio	-0.0263	-0.0524**	0.0400
	(0.0268)	(0.0236)	(0.0312)
R-squared	0.006	0.047	0.051
N	711,831	711,798	711,790
Year - month		+	
District		+	+
Province x year-month			+

*** $p<0.01$, ** $p<0.05$, * $p<0.1$

Table 13. Robustness: Sample restricted to last 6 months - monthly effects
The regressions in this table examine the relative change in house prices for houses sold with a mortgage from state-owned banks compared to privately-owned banks for a shorter sample period between March 2020 and August 2020. The dependent variable is the log of the house prices per square meters in panel A, the log of the loan amount in panel B and the loan to value ratio in panel C. The sample contains all houses sold through mortgages in this period. The *Post* dummy indicates the period between June and August 2020. The *June* dummy indicates mortgages issued in June, the *July* dummy indicates mortgages issued in July and the *August* dummy indicates mortgages issued in August. Standard errors are clustered at the bank level.

	(1)	(2)	(3)	(4)	(5)
A- Price					
June x State-owned	0.0256***	0.0243***	0.0212**	0.0195***	0.0171***
	(0.0080)	(0.0071)	(0.0078)	(0.0052)	(0.0059)
July x State-owned	0.0249***	0.0140*	0.0131*	0.0091*	0.0072
	(0.0083)	(0.0077)	(0.0075)	(0.0052)	(0.0055)
August x State-owned	-0.0058	0.0003	0.0020	-0.0050	-0.0050
	(0.0104)	(0.0100)	(0.0095)	(0.0065)	(0.0065)
R-squared	0.296	0.609	0.610	0.774	0.776
B- Loans					
June x State-owned	0.0949***	0.0927***	0.0920***	0.0889***	0.0879***
	(0.0196)	(0.0227)	(0.0237)	(0.0222)	(0.0232)
July x State-owned	0.0926***	0.0833***	0.0854***	0.0804***	0.0804***
	(0.0237)	(0.0245)	(0.0249)	(0.0251)	(0.0265)
August x State-owned	0.0093	0.0125	0.0154	0.0088	0.0094
	(0.0173)	(0.0188)	(0.0199)	(0.0183)	(0.0197)
R-squared	0.285	0.413	0.414	0.481	0.486
C- Loan to value ratio					
June x State-owned	0.0422***	0.0415***	0.0418**	0.0418***	0.0418**
	(0.0134)	(0.0146)	(0.0149)	(0.0145)	(0.0150)
July x State-owned	0.0444**	0.0449**	0.0457**	0.0455***	0.0461**
	(0.0159)	(0.0165)	(0.0167)	(0.0161)	(0.0169)
August x State-owned	0.0117	0.0101	0.0104	0.0108	0.0108
	(0.0127)	(0.0129)	(0.0132)	(0.0126)	(0.0132)
R-squared	0.066	0.097	0.098	0.116	0.124
N	324,008	324,008	324,006	323,960	323,501
Year - month		+		+	
Province		+			
District				+	
Province x year-month			+		
District x year-month					+

*** p<0.01, ** p<0.05, * p<0.1

Table 14. Robustness: Repeated sales

The regressions in this table examine the relative change in house prices for houses sold with a mortgage from state-owned banks compared to privately-owned banks for a sample of houses sold at least twice during the period between January 2019 and August 2020. The dependent variable is the log of the house prices per square meters in panel A, the log of the loan amount in panel B and the loan to value ratio in panel C. The *Post* dummy indicates the period between June and August 2020. Standard errors are clustered at the bank level.

	(1)	(2)	(3)	(4)
A- Price				
Post	0.1720***			
	(0.0032)			
State-owned	-0.0258***	-0.0066	-0.0053	-0.0019
	(0.0029)	(0.0043)	(0.0048)	(0.0049)
Post x State-owned	0.0409***	0.0249***	0.0239***	0.0196***
	(0.0046)	(0.0053)	(0.0060)	(0.0060)
R-squared	0.972	0.976	0.979	0.983
B- Loans				
Post	0.1709***			
	(0.0266)			
State-owned	-0.0401	-0.0159	-0.0162	-0.0295
	(0.0320)	(0.0313)	(0.0302)	(0.0351)
Post x State-owned	0.1141***	0.0954***	0.0976***	0.1196***
	(0.0285)	(0.0289)	(0.0281)	(0.0251)
R-squared	0.833	0.839	0.854	0.879
C- Loan to value ratio				
Post	0.0008			
	(0.0153)			
State-owned	-0.0027	-0.0001	-0.0020	-0.0100
	(0.0151)	(0.0151)	(0.0143)	(0.0156)
Post x State-owned	0.0432***	0.0423***	0.0442***	0.0562***
	(0.0152)	(0.0148)	(0.0133)	(0.0102)
R-squared	0.651	0.656	0.692	0.752
N	20,682	20,682	20,195	17,352
Year - month		+		
House	+	+	+	+
Province x year-month			+	
District x year-month				+

*** p<0.01, ** p<0.05, * p<0.1

Table 15. Robustness: Falsification test
We repeat the main specification for a period with no sudden reduction in mortgage rates: between January 2018 and August 2019. The dependent variable is the log of the house prices per square meter. The sample contains all houses sold through mortgages in this period. The *Post* dummy indicates the period between June and August 2019. The $State - owned$ dummy indicates mortgages provided by a state-owned bank. Standard errors are clustered at the bank level.

	(1)	(2)	(3)	(4)	(5)
Post	0.0538***				
	(0.0098)				
State-owned	-0.0446**	0.0053	0.0071	0.0009	0.0035
	(0.0169)	(0.0071)	(0.0071)	(0.0060)	(0.0063)
Post x State-owned	-0.0235	-0.0138	-0.0227**	-0.0050	-0.0135
	(0.0142)	(0.0094)	(0.0096)	(0.0089)	(0.0086)
R-squared	0.237	0.619	0.622	0.783	0.791
N	369,373	369,373	369,363	369,307	367,506
Year - month		+		+	
Province		+			
District				+	
Province x year-month			+		
District x year-month					+

*** p<0.01, ** p<0.05, * p<0.1

Table 16. Robustness: Falsification test at the district level
We repeat the main aggregate level specification for a period with no sudden reduction in mortgage rates: between January 2018 and August 2019. The dependent variable is the log of the house prices per square meter. The sample contains all houses sold through mortgages in this period. The *Post* dummy indicates the period between June and August 2019. The *Ratio* is the market share of state-owned banks in the mortgage market of each district and is measured as the amount of mortgages issued by state-owned banks divided by the total volume of mortgages issued in each district in 2019. Standard errors are clustered at the district level.

	(1)	(2)	(3)
Post	-0.0747**		
	(0.0349)		
Ratio	-1.5388***		
	(0.2252)		
Ratio x Post	0.1652***	0.1642***	-0.0332
	(0.0504)	(0.0272)	(0.0292)
R-squared	0.334	0.779	0.786
N	369,324	369,284	369,274
Year - month		+	
District		+	+
Province x year-month			+

*** p<0.01, ** p<0.05, * p<0.1

Table 17. Robustness: alternative specifications
We repeat the main specification with different combinations of neighborhood and bank fixed effects. The dependent variable is the log of the house prices per square meter. The sample contains all houses sold through mortgages between January 2019 and August 2020. The *Post* dummy indicates the period between June and August 2020. The $State-owned$ dummy indicates mortgages provided by a state-owned bank. Standard errors are clustered at the bank level.

	(1)	(2)	(3)	(4)
State-owned		0.0017	0.0037	
		(0.0073)	(0.0071)	
Post x State-owned	0.0327***	0.0283***	0.0276***	0.0274***
	(0.0094)	(0.0069)	(0.0067)	(0.0068)
R-squared	0.790	0.860	0.876	0.876
N	710,059	705,644	671,762	671,762
Year - month				
Bank	+			+
District x year-month	+			
Neighborhood		+		
Neihborhood x year-month			+	+

*** p<0.01, ** p<0.05, * p<0.1

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