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State Ownership and Bank Lending: Evidence from Turkish Banking

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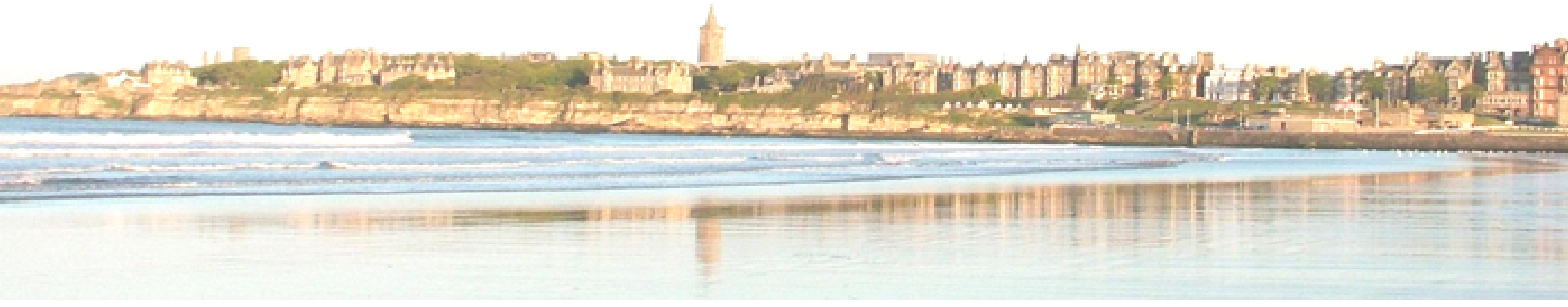
WP Nº 24-030

4th Quarter 2024



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State Ownership and Bank Lending:

Evidence from Turkish Banking

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Abstract

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JEL Codes: G21, R51, C30

Keywords: State Banks, Market Failures, Political Motives, Difference-in-Differences

A revised version of this Manuscript is forthcoming at the International Journal of Banking, Accounting and Finance. www.inderscience.com/ijbaaf

1. Introduction

Financial crises often lead to a decline in lending by privately-owned banks (Cull and Peria, 2013; Adams-Kane et al., 2017). This can lead to a credit crunch and amplify deteriorating financial and economic conditions with resultant negative implications for the financial system and the real economy. Evidence (including the global financial crisis) suggests that state banks play an important role in reducing credit crunches by continuing to lend to households and corporates during crisis periods (Fungáčová et al., 2013).[1] In this paper, we examine state bank lending under crisis conditions. We use Turkey as a setting, given its long tradition of state banking that co-exists alongside other forms of bank ownership. The availability of detailed province-level regulatory data allows us to investigate: the extent to which state bank lending diverges from that of other bank ownership forms; and whether any observed differences are driven by state banks' role in resolving market failures or merely attributable to political concerns.

Our research design is based on a quasi-experimental setting determined by the duration of the global financial crisis. Using a dataset of quarterly frequency spanning the period 2007Q4-2011Q4, we utilize a difference-in-differences (DiD) framework to compare the change in state bank lending pre- and post-crisis with that of non-state banking counterparts. We use data on 81 provinces (which captures banking activities at the NUTS-3 level) to: account for geographical heterogeneities; proxy traditional channels of state lending behavior; and disentangle demand from supply-side factors in driving lending outcomes (Behr et al., 2017; Degryse et al., 2019).

In order to investigate the role of state banks in resolving market failures (arising from financing constraints of households and corporates), we examine how the intensity of competition influences the availability and cost of loans. The co-existence of state banks alongside other types of banks may increase competition and expand access to financial services. However, if state banks dominate the loan market, their presence may result in the crowding out of private bank lending. Using state bank market shares, we rank individual

[1] This has led to ongoing debates regarding the role of direct state participation in the banking sector (Cull and Peria, 2013; De Haas et al., 2015; Cull et al., 2018). Prior literature provides mixed evidence concerning the efficacy of state involvement in banking. On the one hand, state ownership can lead to political interference, agency problems and a misallocation of resources. Financial fragility hypothesis posits that political risk is adversely associated with bank stability in emerging markets (Al-Shboul et al., 2020). On the other hand, state banks can alleviate informational asymmetries, and maintain the flow of funds to firms, households and regions, which had been excluded by private sector banks (Stiglitz, 1993; Brei and Schclarek, 2013, 2015). Altunbas et al. (2001) document that state banks have cost advantages over their private sector counterparts.

provinces based on the intensity of loan market competition. We then assign provinces into two groups based on the median threshold value of state bank presence. If differential state bank lending is more pronounced in provinces with greater loan market competition, then this could imply that state banks step in to provide funding to the customers who are likely to be financially excluded by non-state banks during crisis periods. However, if lending differences are more pronounced in regions with already higher market share of state banks, this would not reflect the ability of state banks to contain market failures.

We also investigate whether state bank lending is driven by political motives. We use a proxy similar to that of Bircan and Saka (2021) to capture the degree of political contestability of each province. This proxy is constructed by calculating the voting difference margin between the ruling and opposition parties at local municipality elections. Using this classification, we categorize provinces into two groups based upon the median threshold value. We then examine whether changes in state bank lending from pre- to post-crisis periods is subject to variation across provinces experiencing varying degrees of political connectedness.

By way of preview, we find that relative to non-state banks, state banks maintain lending during crisis periods. The dominant market position of state banks in lending is evident when different fixed effects and provincial control variables are included. This finding also remains similar when the original control group comprising all types of non-state banks is restricted to only domestic private and foreign-owned banks, incrementally. The continued lending of state banks reduces market failures arising from financing constraints. Political motives do not appear to drive changes in state bank lending. Our results also suggest that state bank lending is efficient, given state banks' low level of loan delinquencies and extensive lending activities across a broader group of loan sub-components. In other words, the change in the ratio of non-performing loans (NPL) to total loans for state banks stays lower compared to other banks. Robust state bank lending is not concentrated on specific loan types, but rather is observed across a wide spectrum of consumer and business loan segments.

We assess the validity of our baseline results against a myriad of robustness tests. The stronger provincial lending exhibited by state banks is not explained entirely by time-varying bank characteristics such as capital adequacy, liquidity position, profitability, size, derivative positions and non-core funding structure. Our baseline inferences hold regardless of: modeling choices; event windows; province coverage; spatial autocorrelation; data handling; clustering of standard errors; placebo tests; and controlling for loan interest rates. We also implement entropy balancing and propensity score matching to alleviate the concerns that selection bias

might be driving our findings. Moreover, in order to achieve external validity, we use the recent COVID-19 pandemic as a shock to local economic activity and re-estimate our baseline model. Following the tightening in domestic financial conditions due to COVID-19 outbreak, state banks continue to preserve robust lending relative to banks with different ownership structure.

The contribution of this paper to prior literature is twofold. First, we add to the salient literature on how direct state participation influences lending policies (Micco and Panizza, 2006; Brei and Schclarek, 2013; Bertay et al., 2015; Panizza, 2023). Evidence suggests that state involvement in the banking industry results in: softer lending standards (Cao et al., 2023); and less profitable operations (Cornett et al., 2010); but also, countercyclical lending (Bertay et al., 2015); higher long-term economic development (Andrianova et al., 2012); lower cash flow sensitivity of firm investments (Srinivasan and Thampy, 2017); reduced firm liquidation risk (Kariya, 2021); and improved financial inclusion (Allen et al., 2016). We augment this literature by combining lending cyclicality (during crisis periods) with traditional determinants of state bank lending. We find that in addition to continued lending under crisis conditions, state banks are useful in preventing market failures.

Second, our study extends the existing literature on bank lending in emerging markets, such as Turkey (Ongena and Şendeniz-Yüncü, 2011; Önder and Özyıldırım, 2013; Bircan and Saka, 2021). Prior evidence for Turkey shows that state involvement in the banking industry may create: more funding for smaller firms (Ongena and Şendeniz-Yüncü, 2011); mixed effects on income disparity (Önder and Özyıldırım, 2010); lower net interest margins and revenues (Baum et al., 2010); and resilient bank risk exposure (İsik and Hassan, 2003). We augment this literature by using high-frequency provincial banking data in a quasi-experimental research design to show how the lending behavior of state banks diverges from other bank ownership forms during stressed economic conditions in a way that supports the local economic activity.

The rest of the paper is structured as follows. Section 2 provides a background on the Turkish banking industry, and highlights the importance of state banks. In Section 3, we review salient literature and develop testable hypotheses. Section 4 describes data sources and the research design. In Section 5, we discuss the empirical findings. Section 6 concludes.

2. Background on Turkish Banking Industry

Banks play a central role in the financial system of Turkey. The ratio of private sector loans to GDP increased from 16.5% in 1990 to 35.3% in 2007, and 89.6% in 2020. The dependence on bank financing is further reflected in the balance sheet composition of economic

units. As of 2021Q1, for real sector firms, the share of bank loans in total liabilities and equity is 33% (CBRT, 2021). For households, almost 95% of financial liabilities comprise conventional bank loans.

As of 2021Q1, there are 34 operational commercial banks in Turkey, comprising three state-owned, eight privately-owned and 21 foreign-owned institutions. Larger private banks in Turkey are affiliated to (owned by) prominent industrial holding companies, while smaller counterparts focus on wholesale banking. Some foreign banks are branches of parent companies, while others are structured as joint ventures or subsidiaries. International banks such as ING, BBVA, Deutsche Bank, QNB and ICBC have a presence in the Turkish banking industry via a variety of organizational forms. Three large majority state-owned commercial banks comprise Ziraat Bank, Vakıf Bank and Halk Bank.

State involvement in the Turkish banking industry dates back before the foundation of the modern republic in 1923. However, the 2001 banking crisis was a turning point for the structure of the industry, after which a comprehensive wave of reforms was initiated to restore financial stability in parallel to the macroeconomic stabilization program supervised by IMF. Despite competitive pressure, market consolidation and rumored privatization, state banks remain an integral part of the financial system.

Panel A of Figure 1 depicts the share of state banks in total assets, loans and deposits. The presence of state banks in the Turkish banking industry has accelerated since the global financial crisis. As of 2020, state banks held 39.9% of total assets, extended 41.7% of total loans and collected 45.1% of total deposits. The relative importance of direct state ownership is also evident from cross-country comparisons. Panel B of Figure 1 compares the share of total assets controlled by state banks with a selected group of emerging country peers. These characteristics illustrate the continued importance of state banks, and makes Turkey an ideal laboratory to examine state bank lending behavior during crisis periods.

[**Insert Figure 1 Here**]

3. Literature Review and Hypothesis Development

State banks are often essential in promoting regional and industrial development of emerging economies. The involvement of state banks is often considered necessary to address a paucity of loans, and for the effective allocation of long-term funds to strategic sectors and projects (Lewis, 1950; Gerschenkron, 1962). Moreover, state banks can facilitate short-term financial intermediation activities by stabilizing credit crunches, alleviating contagion risks,

accommodating retail deposits and serving as an interventionist policy tool (World Bank, 2012). However, state banks are likely to suffer inefficiencies and often engage in politically motivated lending.

The importance of ownership form in driving bank lending has been investigated in the extant literature. Evidence from the global financial crisis suggests that the lending behavior of state banks differs from that of conventional counterparts (World Bank, 2012). There are two strands of the literature, which examine: state bank lending over the business cycle; and how state bank lending reacted to the onset of the global financial crisis. Using bank-level data from 119 countries for the period 1995-2002, Micco and Panizza (2006) find that state bank lending is less procyclical in developing countries. Utilizing data from banks operating in 50 countries located in Latin America and Europe over the interval 1994-2009, Brei and Schclarek (2013) find that state bank lending is countercyclical, while private bank lending follows a procyclical pattern over the business cycle. Using a data for banks from 111 countries for the period 1999-2010, Bertay et al. (2015) find that relative to privately owned counterparts, state bank lending is less responsive to changes in macroeconomic conditions. Panizza (2023) uses comprehensive bank-level data covering 180 countries for the period 1995-2018 to highlight that state banks smooth lending over the business cycle.[2]

Another strand of literature examines lending patterns during the global financial crisis (Aisen and Franken, 2010). The results of cross-country studies suggest that state participation in banking ensures the continued flow of lending during crisis periods in: Latin America (Cull and Peria, 2013); Asia (Chen and Wu, 2014); and Central and Eastern Europe (De Haas et al., 2015). In line with the aforementioned studies, our baseline hypothesis conjectures that, relative to other ownership forms, lending of state banks in Turkey is less responsive during crisis periods. The main hypothesis is formulated as follows:

H1: *During crisis periods, state-owned banks are likely to maintain higher loan growth relative to private and foreign banks.*

During financial turmoil and elevated levels of credit risk, commercial banks typically re-orientate their asset portfolios from less creditworthy borrowers to high-yielding non-lending activities such as fee-based intermediation tasks and securities trading (Dell'Ariccia et al., 2014). Moreover, market volatilities exacerbate information asymmetries faced by the banking

[2] Di Flippo and Panizza (2023) employ firm-level data from 36 emerging economies and document that firms that borrow from state-owned banks react less to business cycle movements.

sector resulting in coordination problems, transactions costs and adverse selection issues (Atkinson and Stiglitz, 1980; Stiglitz and Weiss, 1981; Stiglitz, 1993). Such considerations can deter domestic private and foreign-owned banks from transacting with small firms and households, given that information sharing among private lenders may not be developed efficiently (Berger et al., 2008; Cull et al., 2018). Any resultant squeeze in lending may not be restricted to small firms and households. Evidence suggests that lending to large firms declined considerably during the global financial crisis (Ivashina and Scharfstein, 2010).

Theory suggests that state banks are better able to mitigate market imperfections. First, the so-called social view argues that state banks are not bound to maximize profits. Their mandates normally involve maximizing social welfare (Micco et al., 2007; Brei and Schclarek, 2015; Bertay et al., 2015). Since state banks are better able to internalize the positive externalities of financing opportunities allocated to strategic borrowers, their lending behavior is often driven by social objectives. Consequently, state banks can address market failures by expanding lending to potentially underserved households and firms.

State banks can also utilize soft information and customer relationships to sustain lending during crisis periods (Ferri et al., 2014). The role played by state-owned banks in remedying information asymmetries is not limited to direct lending practices. By promoting efficient credit reporting, the presence of state institutions can disseminate information through the banking sector and facilitate financial inclusion (World Bank, 2012). In the case of Turkey, young and small firms characterized by opaque structures tend to enter more lending relations with state-owned banks (Ongena and Şendeniz-Yüncü, 2011).

During crisis periods, state banks are better positioned to maintain lending, given the benefits of government backing and the higher desire to adjust capital towards target levels (Brown and Dinç, 2011, Jiang et al., 2019). Moreover, the ability of state banks to fill any lending void left by private and foreign banks around the crisis is further supported by those banks' flexibility to accommodate rapid increases in credit risk (Brei and Schclarek, 2013).

Assuming that the function of state banks to address market failures would be evident if the lending difference between state banks and non-state counterparts during the crisis is more visible in provinces with higher levels of loan market competition, our second hypothesis is:

H2: During crisis, *the differential loan growth of state-owned banks relative to non-state counterparts is more pronounced in provinces with greater loan market competition.*

Another motive governing the state bank lending is derived from the political economy view, which argues that agency problems pave way for politicized lending. State banks are often utilized as tools: to circumvent governmental budget constraints; to serve political interests; and to extract political rents (Shleifer and Vishny 1994; Shleifer, 1998; La Porta et al., 2002). Politically motivated lending is likely to create an inefficient allocation of resources, and impose an additional burden on taxpayers. State-owned banks are more open to political exploitation, given their unique corporate governance structure (Blau et al., 2013). Managers of state banks are not entitled to cash flow rights. This reduces the incentive to pursue economically efficient policies, and is exacerbated by political influence exerted by government officials (Banerjee, 1997).

Political patronage is a common form of expropriation in banking sector. Bank lending might be systematically channeled toward firms, industries, households and regions which traditionally provide political support to the incumbent government (Shleifer and Vishny 1998; Sapienza, 2004). In order to circumvent political opposition and maximize voting support (by providing additional employment, subsidized funding and other financial benefits) around election times, tactical redistribution may also take place as lending is diverted to regions with higher levels of political competition.

Assuming that the dominance of political motives would be evident if the lending difference between state banks and non-state counterparts during the crisis is more visible in provinces where the political rivalry is prevalent, our hypothesis is that:

H3: During crisis, t*he differential loan growth of state-owned banks relative to non-state counterparts is more pronounced in provinces with a higher level of political contestability.*

4. Data and Methods

4.1. Data

We use the FinTurk database compiled by the Banking Regulation and Supervision Agency of Turkey (BRSA). This dataset provides banking and branching information for the 81 provinces of Turkey based on NUTS-3 geocoding. The dataset covers the complete universe of loans, deposits and branches on a regional basis, and is aggregated and reported by ownership form at quarterly frequency. FinTurk provides geographical data for sub-categories of consumer and commercial loans. We are also able to extract geographical details regarding credit risk and

loan delinquencies. The categorization based on ownership status is taken from readily available regulatory classification provided by the BRSA.[3]

Our sample period covers the period 2007Q4 through 2011Q4. The beginning of the sample period is determined based upon the availability of spatial regulatory data. The end period is chosen according to the course of business cycle that is measured by the composite output gap indicator.[4] The output gap indicator monitors the course of domestic economic activity, determines the timing of exogenous disturbance (caused by the global financial crisis) and defines the post-treatment phase. We retrieve the quarterly GDP index adjusted for seasonality and calendar effects from the Turkish Statistical Institute (TurkStat) for this calculation. The sample period is terminated when the negative output gap ceases to exist, and economic growth returns to its long-term trend.[5]

In order to investigate possible channels driving state bank lending behavior, we supplement our primary geographical banking data with secondary information on province characteristics. The competition indicators used in later analyses are constructed from loan balances at provincial level, which are included in FinTurk database. To construct measures of political contestability (used in later analyses), we gather local election results from TurkStat.[6]

4.2. Empirical Design

Our baseline model utilizes a DiD framework as follows:

$$Loan\ Growth_{ipt} = \beta_1 Post_t + \beta_2 State_i + \beta_3 (Post_t\ x\ State_i) + \gamma X_{ipt} + f_p + \delta_t + \varepsilon_{ipt} \qquad (1)$$

where i stands for bank ownership type, p indexes individual provinces and t denotes time dimension. $Loan\ Growth_{ipt}$ is the quarterly logarithmic growth rate of province-level total loans allocated by bank ownership type i at time t. This variable is used to capture new loans. $State_i$ is a dummy variable, which assumes a value of one for banks owned by the state,

[3] Thus, we can avoid making subjective assessments regarding the minimum ownership threshold levels of different parties to define bank ownership type, as opposed to usual implementation in the empirical banking literature (Dinç, 2005; Bertay et al., 2015; Panizza, 2023). We also directly account for any changes in shareholder structure of banks during the sample period by working with the regulatory bank ownership criteria.

[4] As explained in detail in the next section, we utilize two time series filters (Hodrick-Prescott and Christiano-Fitzgerald) and model averaging approach to retrieve the deviation of economic growth from its long-run trend. Based upon this calculation, we observe that the end of 2011 is the time point when local economic activity in the Turkey converged to its normal course.

[5] We choose the end of the sample period to exclude any effect of macroprudential policies implemented by Turkish authorities to contain macro-financial risks attributable to excessive credit growth driven by capital inflows, especially after 2011.

[6] The data is retrieved for the 2007 General Parliamentary and 2009 Local Municipality Elections held in Turkey.

and zero otherwise. $Post_t$ is a dummy variable separating the pre-crisis and post-crisis periods. The variable of interest is an interaction term composed of $Post_t$ and $State_i$. The associated coefficient of interest, β_3, quantifies the extent to which state bank lending changes from the pre- to post-crisis period relative to other (private and foreign) bank ownership types.

Our research design assumes that the occurrence of the global financial crisis is reasonably exogenous to the lending activity of a domestic bank situated outside the US (Dekle and Lee, 2015). Focusing on a single-country case (Turkey) also insulates our findings from concerns attributed to longitudinal cross-country studies involving sample selection and endogeneity problems that are likely to be caused by unobservable latent differences between countries (Baum et al., 2010; Berger et al, 2020).

In order to identify the exact timing of the shock to local economic activity, we undertake an auxiliary time series analysis, which utilizes the overall GDP index. In the first step, we apply the widely used Hodrick-Prescott (HP) filter to the GDP index to disentangle the cyclical component from the long-term trend. We follow the conventional approach by selecting smoothing coefficient as 1600 for the quarterly data (Hodrick and Prescott, 1997). As an alternative technique, we employ Christiano-Fitzgerald (CF) band-pass filter to identify the cyclical component of GDP (Christiano and Fitzgerald, 2003). Following this, we construct the composite output gap indicator by taking the simple average of filtered series obtained from the two methods (Figure 2). An assessment of composite indicator movements shows that the output gap began to hover around negative territory from the 2008Q4. Therefore, our $Post_t$ variable takes the value of one following this date, and is assigned with the value of zero in the pre-crisis episode.

[**Insert Figure 2 Here**]

In equation (1), f_p denotes province fixed effects. Banks operating in the same location are likely to face similar economic conditions and loan demand. With respect to individual banks in the same province, demand-driven changes in loan outcomes are anticipated to be similar, while supply-induced variations are generally bounded by bank characteristics (Raunig et al., 2017). To the extent that local loan demand conditions are similar across different bank ownership types, the comparison within the same geographical unit using aggregated bank ownership type-location data should reflect the outcome heterogeneities driven by supply factors (Carlson et al., 2013; Degryse et al., 2019). Thus, controlling for fixed effects at the province-level allows us to absorb demand shocks, and isolate how the lending behavior of

state-owned banks differs from other bank ownership types.[7] We also add quarter fixed effects (δ_t) to encapsulate the effect of time-varying forces and possible seasonality in loan extension. In the saturated specifications, we incorporate higher degree province-by-quarter fixed effects to accommodate time-varying features relevant to provinces. ε_{ipt} describes the error term of the regressions. We cluster the standard errors at the province-level.

Our regulatory data provides a set of province-level control variables which are represented in equation (1) by the vector of covariates X_{ipt}. The deposit base is regarded as the most stable source of retail bank funding. Therefore, the degree (and stability) of deposit funding serves as a determinant of cyclical lending behavior (Behr et al., 2017). To control for this factor, we proceed with the variable $Deposit\ Growth_{ipt}$ identifying the quarterly logarithmic growth rate observed in the province-level deposits of bank ownership types.

The extant literature argues that improvements in financial access and the alleviation of barriers against financial inclusion combined with stronger geographical bank presence through branch systems could potentially enhance financial development and depth, particularly in emerging markets dominated by traditional banking practices (Beck et al., 2009). To account for the bank presence and accessibility dimension of banking services as well as their impacts on loan growth tendencies, the first variable we construct is $Branch_{ipt}$ monitoring the change in the number of bank branches in individual provinces operated by bank groups with different ownership status. We also utilize the variable $Population_{ipt}$ which is calculated as the logarithmic change of population per branch for bank ownership type i in province p. In the former case, we expect a positive correlation between bank branch growth and lending activities, whereas, for the latter variable, we expect a negative relationship between growth in population per branch (as a proxy for financial inclusion) and lending activities.

For the sake of robustness tests, additional analyses utilize empirical models involving bank features that are not varied across province dimension such as capital, liquidity, profitability, derivate transactions and non-core funding which are considered as important predictors of loan growth in the extant literature for the case of crises (Liu and Wilson, 2010; Cornett et al., 2011; Berger and Bouwman, 2013).

[7] The spatial diversification of banking activities should be accounted owing to the fact that geographical distribution of bank presence might determine the extent of mitigating role played by individual banks against exogenous economic shocks (Koetter et al., 2020). The amount of loans can be heavily heterogenous across different districts if lending decisions are finalized within a centralized system utilizing hard information, which further requires a regional focus in econometric analysis (Berger et al., 2005).

To assess the efficiency aspect of state bank lending, we replace the dependent variable with the ratio of non-performing loans to total loans $NPL\ Ratio_{ipt}$ to proxy asset quality of bank portfolios. In a similar vein, to analyze whether state bank lending is concentrated on certain loan categories, we incorporate an alternative dependent variable termed as $Segment\ Loan\ Growth_{ipt}$ which refers to the quarterly logarithmic loan growth realized in particular consumer loan types including credit cards, general-purpose, vehicle, housing as well as commercial loans extended to industries such as food production, construction, mining, textile, wholesale trade, tourism, agriculture, energy and fishery.

All time-varying province-level variables are winsorized at 1st and 99th percentiles to eliminate the influence of outliers. Detailed variable definitions are given in Table 1. The summary statistics are presented in Table 2.

[**Insert Table 1 Here**]

[**Insert Table 2 Here**]

5. Empirical Results

5.1. Baseline Estimations

Table 3 reports the results of estimating equation (1). In column (1), we present results without including fixed effects and other controls. In columns (2) and (3), we incrementally introduce individual province and quarter fixed effects as well as other province-level controls. The estimates in column (4) are based on the most saturated model involving higher degree province-by-quarter fixed effects together with other control variables. In these specifications, the coefficient of $Post\ x\ State$ term is positive and statistically significant at the 1% level. This suggests that relative to non-state bank counterparts, state banks maintain lending following the onset of crisis. Our baseline results support hypothesis (H1), and prior research findings (Cull and Peria, 2013; Bertay et al., 2015; Coleman and Feler, 2015; Allen et al., 2017). The impact of state ownership on lending is also economically significant, given that the coefficient in column (4), which is our most saturated specification corresponds to a 16% (=4x4%) differential annual loan growth rate.

Next, we investigate the validity of our findings, to differing compositions of our control group. The results presented in columns (1) to (4) include both private and foreign banks in the control group. However, foreign and private bank lending may respond differently to a change in economic conditions. In order to ensure that our baseline findings are not driven by the

composition of our control group, we estimate a saturated specification of column (4) using only private or only foreign-owned banks. The results presented in column (5) and (6) suggest state bank lending exceeds that of control counterparts, however defined.

Turning to our control variables, the change in deposit funding is a significant predictor of loan growth, consistent with Behr et al. (2017) and Allen et al. (2017). $Branch$ is not significant. The coefficient on $Population$ is significant and negative across most specifications, suggesting that any increase in population per branch for bank ownership types is associated with diminished loan growth. This is compatible with the anticipation that greater spatial presence and financial outreach help banks maintain lending despite adverse economic conditions (Koetter et al., 2020; Nguyen and Wilson, 2020).

[**Insert Table 3 Here**]

5.2. Underlying Mechanisms: Solving Market Failures or Serving Political Interests

In order to investigate whether higher state bank lending during crisis periods is driven by attempts to correct market failures or merely politically motivated, we undertake a triple-differences analysis to test hypotheses (H2) and (H3). We augment our research design by estimating a triple-differences model, which incorporates province-level characteristics:

$$Loan\ Growth_{ipt} = \beta_1 Post_t + \beta_2 State_i + \beta_3 Province_p + \beta_4 (Post_t\ x\ State_i) + \beta_5 (Post_t\ x\ Province_p) + \beta_6 (State_i\ x\ Province_p) + \beta_7 (Post_t\ x\ State_i\ x\ Province_p) + \gamma X_{ipt} + \delta_t + \varepsilon_{ipt} \quad (2)$$

where $Province_p$ is a binary variable separating provinces into two different groups based on pre-determined characteristics (either competition or contestability as explained below). In equation (2), the coefficient of interest is β_7, attached to the triple interaction term ($Post\ x\ State\ x\ Province$) capturing how state bank lending varies by province level characteristics. Our estimates contain province-level covariates and quarter fixed effects (but no province fixed effects).

If state bank lending increases in provinces where state banks enjoy market dominance, then our baseline results estimations would merely reflect a "crowding-out" effect on non-state bank ownership types. On the other hand, if differential state lending is stronger in provinces where loan market competition (from private and foreign banks) is prevalent, then our results suggest a role for state banks in mitigating short-term market failures in terms of geographical access to bank financing. To assess this possible channel, we create the variable, $Competition_p$,which assumes a value of one for the provinces where loan market

concentration (which proxies for competition) is low (high), and zero otherwise. We calculate the time-varying market shares of state banks in total provincial lending over the sample period. The province-averaged state bank loan market shares are used to rank provinces in a cross-sectional fashion. The binary variable is constructed based upon the median threshold value of state bank market shares across provinces. The provinces with less than the median value of state bank loan market are assigned a value of one, while others are assigned zero.[8]

A second indicator $Contestability_p$ captures the impact of political motives on state bank lending during the crisis period. State-owned banks could be used by government to engage in the tactical distribution of funds across provinces in order to gain political support. The cross-sectional variation in the political alignment of provinces is measured in a similar fashion to Bircan and Saka (2021). This approach quantifies the political contestability of individual provinces. We collect province-level voting data for the 2009 Local Municipality Elections from TurkStat. Then we calculate the margin of victory or loss faced by the ruling party candidate, against the most popular opposition candidate in provinces. We then construct a continuous variable equal to one minus the absolute value of voting margin. Higher values represent less political alignment with the ruling party. Finally, we construct a dummy variable based upon whether there is high or low political connectedness according to the median threshold value of the margin indicator.[9] The geographical distribution of both province characteristics is shown in Figure 3.

[**Insert Figure 3 Here**]

Table 4 presents the results of estimating equation (2). To evaluate the ability of state banks to resolve market failures, we employ a specification using $Competition$. In column (1), we exclude other controls. Column (2) adds other province-level covariates. In both cases, the $Post\ x\ State\ x\ Competition$ term has a positive and significant coefficient, thus supporting hypothesis (H2). We validate that state bank lending growth (relative to non-state counterparties) is stronger in provinces with higher bank competition. Thus, state banks fill the lending void left by private and foreign banks during the crisis period.

[8] The same analysis is repeated by measuring the province-level concentration in loan markets via Herfindahl-Hirschman Index (HHI). In unreported results, triple-difference estimations are replicated by using the alternative version of the dummy variable formulated on the HHI indicator.

[9] In untabulated results, estimations are reproduced with a substitute form of proxy for political contestability. This variable is composed of province-level results of 2007 General Parliamentary Elections obtained through TurkStat data sources.

The results presented in Columns (3) and (4) demonstrate empirical findings related to political motives. In this case, we augment our baseline model with a $Contestability$ variable. This binary variable captures the extent of political competition, and equals one if political rivalry measure in a specific province is higher than median threshold, and zero otherwise. This allows us to assess whether the government distributes funds strategically in order to maximize political influence in line with the hypothesis (H3). The coefficients on $Post\ x\ State\ x\ Contestabilityedness$ terms are insignificant, suggesting that political motives do not drive state bank lending.

[**Insert Table 4 Here**]

5.3. Efficiency of State Bank Lending

Thus far, we document that state banks maintain lending during crisis periods in order to mitigate market failures (rather than to pursue the political objectives of government). However, pursuing social and economic development objectives may bring inefficient bank performance and higher bank risk (Wilson et al., 2010). In order to evaluate the extent to which state bank lending leads to an efficient allocation of funds, we re-estimate our baseline model using alternative outcome variables.

Table 5 provides the results when the $NPL\ Ratio$ is used as the dependent variable, representing the spatial variation in loan quality. Column (1) present the results of estimating the simplest specification of the model. Column (2) includes individual province and quarter fixed effects. In column (3), we include other controls, while column (4) includes province-by-quarter fixed effects together with other province-level controls. The coefficient on $Post\ x\ State$ term is negative and statistically significant at the 1% level across all specifications. This suggests that state banks have a lower level of loan delinquencies relative to non-state counterparts. The effect is economically significant given the size of the coefficient on $Post\ x\ State$ term. This coefficient shown in column (4) corresponds to a 48.9% (=0.0207/0.0423) decrease in the trend $NPL\ Ratio$ proportionate to mean of $NPL\ Ratio$ faced by all banks during the sample period. In columns (5) and (6), the results suggest that the lower relative level of credit risk of state banks remains significant when the control group consists of only private or foreign banks.

[**Insert Table 5 Here**]

Lending efficiency is also related to the distribution of activity across consumer and commercial loan categories. We re-estimate equation (1) with $Segment\ Loan\ Growth$ as the dependent variable. The results presented in Table 6 suggest that the differential lending of state banks is not restricted to a specific lending category, but rather across a spectrum of loan types. Relative to non-state counterparts, state banks extend more vehicle loans, other consumer loans and credit card loans during the crisis period. State banks also extend more loans to firms operating in the food production, construction, textile, wholesale trade, agriculture and energy sectors.[10] Overall, our findings suggest that state bank lending is efficient in terms of lower credit risk and sectoral allocation of financing than is observed by non-state banking counterparts.

[**Insert Table 6 Here**]

5.4. Internal and External Validity Checks

In order to ensure the robustness of our results, we undertake extensive additional analyses. First, we saturate the empirical model with bank level covariates (including capitalization, profitability, liquidity, non-core funding and derivatives transactions) to remedy any potential omitted variables bias (see Appendix 1 of the online appendix for details). Second, we run a battery of robustness checks by revising: the post-crisis sample period; provincial coverage; data handling; dependent variable definition; winsorization; standard error clustering; fixed effects; and control variables representing cost of lending; among others (see Appendix 2 of the online appendix for details). In the context of these robustness checks, we also follow entropy balancing and propensity score matching procedures to address the selection concerns due to observable differences between treatment and control groups. Overall, these checks corroborate the main finding that state banks maintain lending throughout the downturn business cycle due to global financial crisis. Third, we assess the applicability of the underlying parallel trends assumption in the DiD model via graphical analysis and univariate test of pre-shock trends (see Appendix 3 of the online appendix for details). We also execute placebo tests by randomizing the treatment status across bank ownership types and observation dates. The results of these tests suggest a reliable causal effect in terms of the role of state banks in

[10] Such a differential lending impact is not observed in housing loans possibly due to the highly collateralized and long-term nature of contracting terms in this loan group which alleviates the sensitivity to macroeconomic shocks and systemwide instabilities in the banking industry. The lending in the tourism and fishery sectors is also found to be irrelevant to ownership status during financial turmoil. Given that the demand conditions and financing needs of such sectors are rather unique and the geographical distribution of firms engaging in these lines of business is mostly concentrated in certain regions, province-level data disaggregated on bank ownership types might not be able to capture loan supply.

preserving lending during crisis times. Finally, we evaluate the external validity of our findings by utilizing alternative exogenous variation in the domestic business cycle caused by the COVID-19 outbreak (see Appendix 4 of the online appendix for details). Using this alternative sample period 2019Q1-2020Q4, we show that state banks maintain lending during the COVID-19 pandemic.

6.Conclusion

The importance of direct state participation in banking sector has been long debated, especially following the global financial crisis.[11] This paper uses Turkey as a setting to investigate the role of state bank lending during crisis periods by exploiting the global financial crisis as an exogenous shock, and a high-frequency spatial banking dataset. The results of an extensive analysis suggest that relative to privately-owned and foreign banks, state banks exhibit less procyclical lending patterns. Moreover, the observed additional state bank lending is rooted in the ability of state banks to mitigate market failures. As often found in prior research, state bank lending does not lead to an inefficient allocation of resources, given that loan delinquencies are low and lending is distributed across a spectrum of consumer and commercial loan segments.

Overall, our findings highlight the mitigating role of state bank lending during financial turmoil. This lending is not motivated by political considerations, but rather is a solution to market failures. This ensures access to finance for companies and households during stressed periods. These findings have policy relevance for government agencies considering the depth and breadth of state involvement in the financial system.

[11] Bank nationalizations, bailout programs, credit guarantee schemes and state-sponsored capital injections were taken to stabilize the financial system and ensure the continued flow of loans to the real economy (Goddard et al., 2009). The quicker recovery of countries with dominant state banks from the crisis has also paved way for a re-kindled interest on the relationship between state ownership and lending, where a conventional view associates state banks with political capture and inefficient lending practices, and an alternative view regards them as useful tools to overcome market failures.

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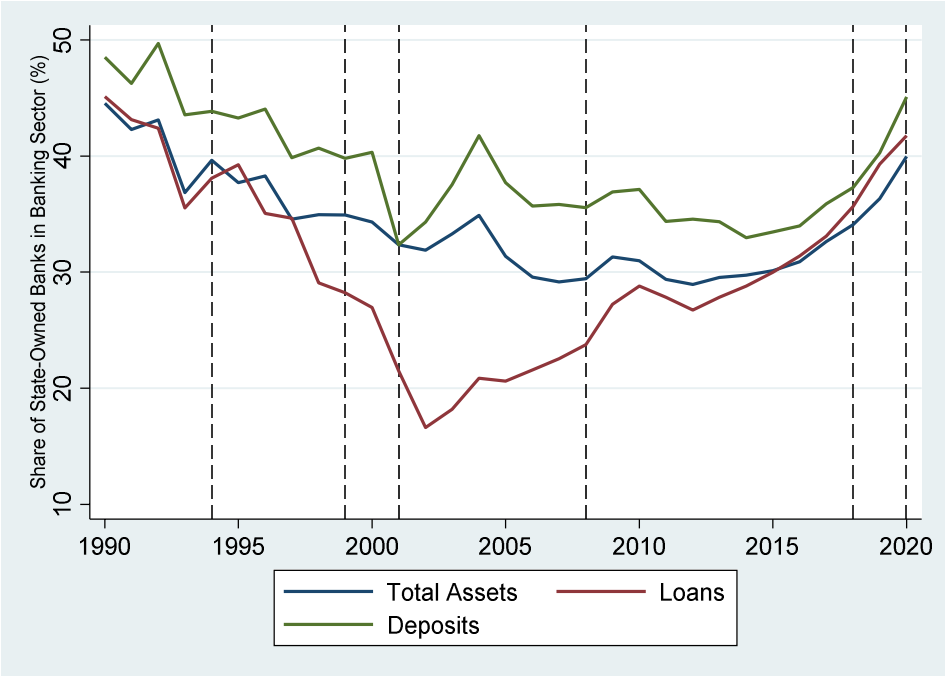
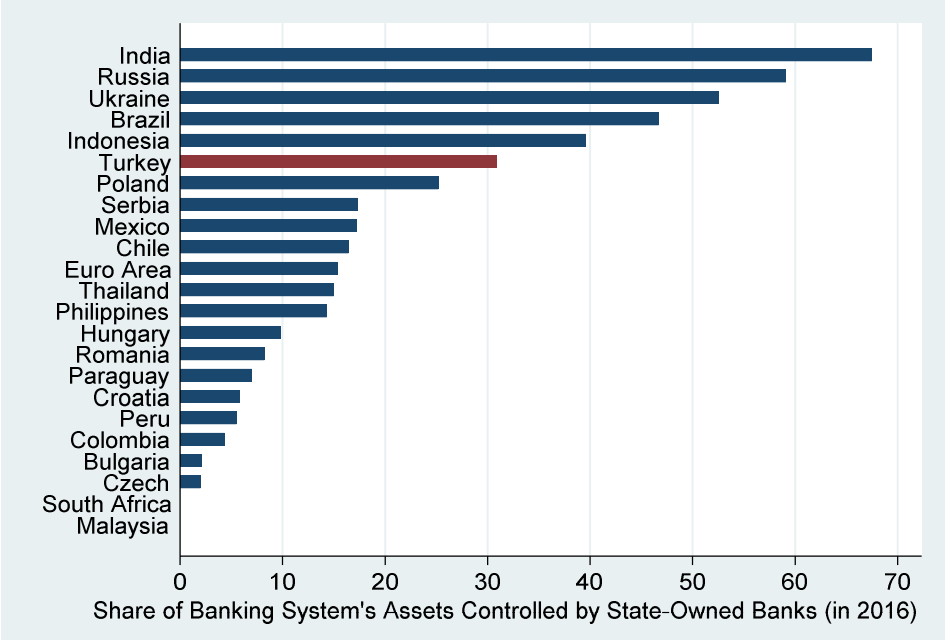
Figure 1: The role of state-owned banks in Turkish banking industry

Panel A. Historical Share of State Banks in Banking Industry Aggregates



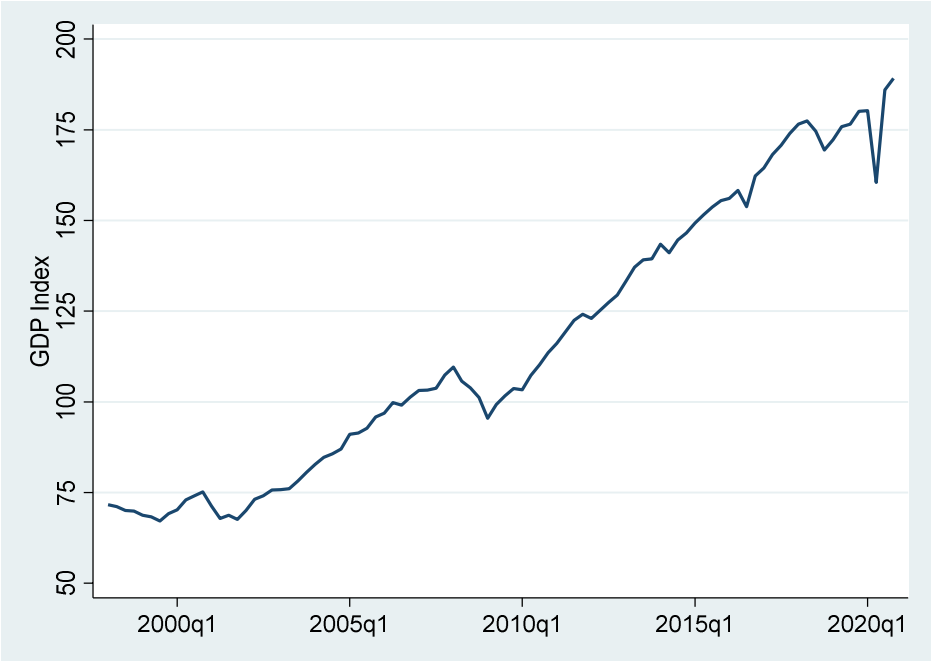
Panel B. % of Banking Assets Controlled by State Banks - Cross-Country Comparison



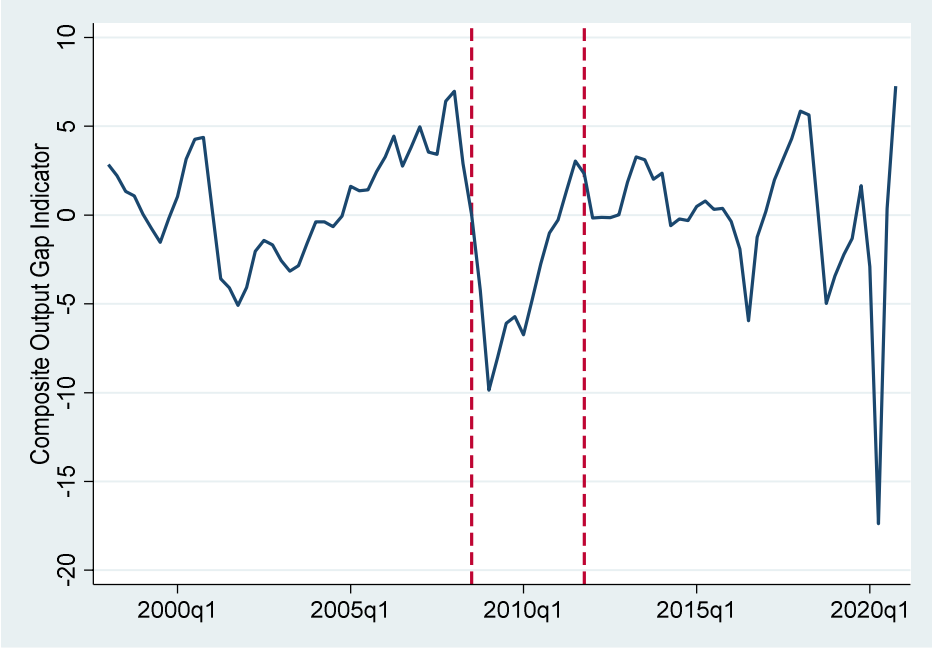
Notes: These figures depict the presence of state-owned banks in the Turkish banking industry. Panel A reports the share of total assets held, total loans extended and total deposits collected by state banks based on the annual data retrieved from Bank Association of Turkey. Vertical dashed black lines mark the domestic and global crisis events. Panel B describes the comparison between Turkey and a selected group of emerging economies in terms of the share of total banking assets controlled by state banks. This data is taken from World Bank Regulation and Supervision Survey.

Figure 2: Timing of exogenous shock to local economic activity

Panel A. GDP Index



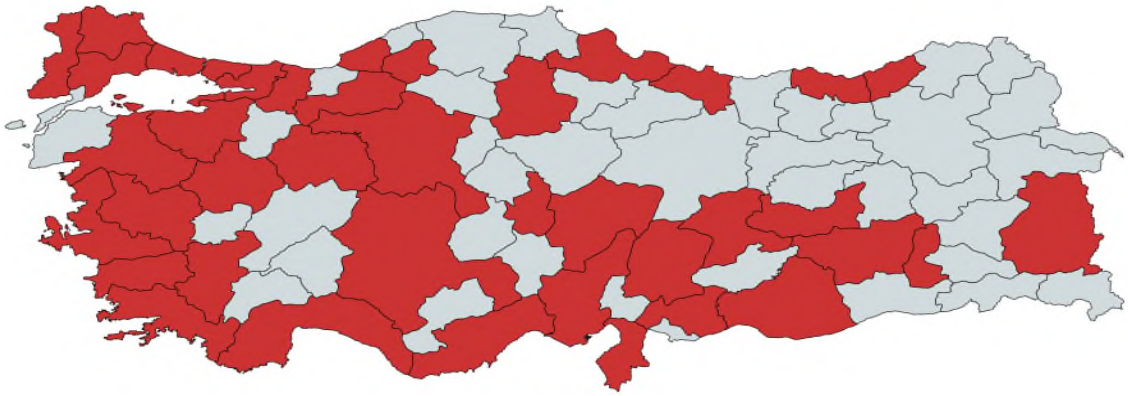
Panel B. Composite Output Gap Indicator



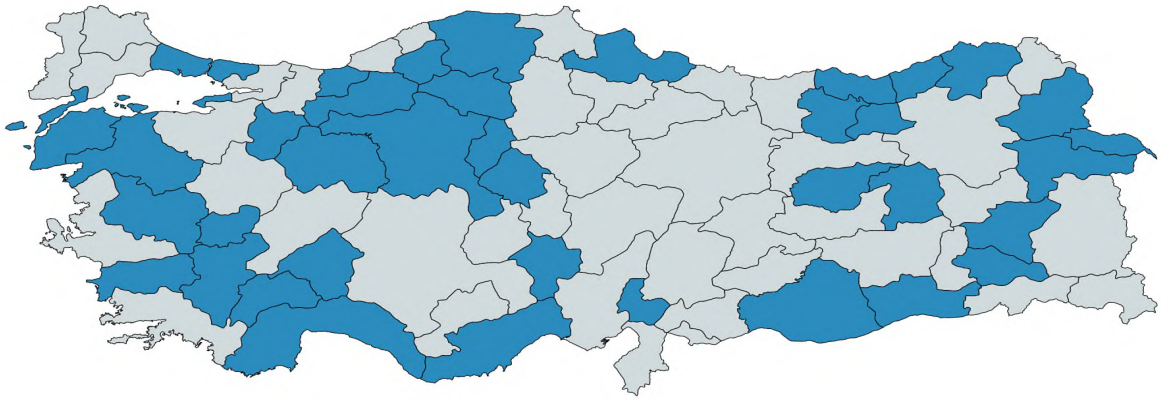
Notes: These figures present time series analysis performed to determine the timing of the domestic business cycle downturn in Turkey that occurred during the GFC. Panel A scatters GDP series adjusted for seasonal and calendar effects (2009=100) obtained from TurkStat. Panel B depicts the composite output gap indicator created from the GDP series through a simple average of cyclical components formed by HP and CF filtering procedures. Vertical dashed red lines in Panel B represent the post-treatment period chosen for our analysis covering the interval between 2008Q4 and 2011Q4.

Figure 3: Geographical distribution of province characteristics

Panel A. Competition



Panel B. Political Contestability



Notes: This figure displays the geographical distribution of province characteristics covered in triple differences estimations. The red-colored provinces in panel A correspond to the localities for which channel variable $Competition$ takes the value of one, while the blue-colored provinces in panel B stand for the localities for which the channel variable $Contestability$ takes the value of one. The grey shaded provinces in both panels show the provinces for which the specific channel variable assumes the value of zero.

Table 1: Variable definitions

Variables	Definition	Data Source
Panel A: Bank Ownership Type-Province Level		
$Loan\ Growth_{ipt}$	Quarterly logarithmic growth of total loans extended by bank ownership type i in province p at time t	BRSA FinTurk Database
$Segment\ Loan\ Growth_{ipts}$	Quarterly logarithmic growth of loans in sub-segment s extended by bank ownership type i in province p at time t	BRSA FinTurk Database
$NPL\ Ratio_{ipt}$	The ratio of non-performing loans to total loans for bank ownership type i in province p at time t	BRSA FinTurk Database
$Deposit\ Growth_{ipt}$	Quarterly logarithmic growth of total deposits held by bank ownership type i in province p at time t	BRSA FinTurk Database
$Branch_{ipt}$	Quarterly logarithmic change of number of domestic branches of bank ownership type i in province p at time t	BRSA FinTurk Database
$Population_{ipt}$	Quarterly logarithmic change of population per branch for bank ownership type i in province p at time t	BRSA FinTurk Database
Panel B: Bank Ownership Type Level		
$Capital_{it}$	The ratio of equity to total assets for bank ownership type i at time t	BRSA Monthly Bulletin
$Liquidity_{it}$	The ratio of securities to total deposits for bank ownership type i at time t	BRSA Monthly Bulletin
ROA_{it}	The ratio of net income to total assets for bank ownership type i at time t	BRSA Monthly Bulletin
NIM_{it}	The ratio of net interest income to total assets for bank ownership type i at time t	BRSA Monthly Bulletin
$Derivatives_{it}$	The ratio of off-balance sheet derivative positions to total assets for bank ownership type i at time t	BRSA Monthly Bulletin
$FX\ Non-Deposit\ Liabilities_{it}$	The ratio of FX-denominated non-deposit liabilities to total FX liabilities for bank ownership type i at time t	BRSA Monthly Bulletin
$Loan\ Interest\ Rate_{it}$	The weighted average interest rate applicable to loans extended by bank ownership type i at time t	CBRT
Panel C: Province Level Characteristics (Channel Variables)		
$Competition_p$	A dummy variable taking the value of 1 for the provinces where the level of banking concentration is low, otherwise assuming the value of 0. In the first step, the shares of state banks in the total loans extended in each province over the sample period are calculated. In the second step, average province-level market shares are	Authors' Calculations, BRSA FinTurk Database

	retrieved. Dummy variable is created based on the median threshold value of averaged state bank market shares across provinces.	
$Contestability_p$	A dummy variable taking the value of 1 for the provinces where the level of political contestability is high, otherwise assuming the value of 0. In the first step, province-level voting shares of political parties regarding the 2009 Local Municipality Elections of Turkey are collected. In the second step, the margin of victory or loss faced by the ruling party candidate against the most popular opposition candidate in the province is determined. The degree of political contestability is proxied as 1 minus the absolute value of voting margins. Dummy variable is created based on the median threshold value of the degree of political contestability across provinces.	Authors' Calculations, TurkStat

Notes: This table reports the detailed definitions and data sources for the dependent, independent and channel variables used in the regressions.

Table 2: Summary statistics

Variables	Obs.	Mean	Std. Dev.	Median	P10	P90
Panel A: Bank Ownership Type-Province Level						
Loan Growth	3,796	0.0847	0.1023	0.0673	-0.0034	0.1776
NPL Ratio	4,040	0.0423	0.0227	0.0381	0.0162	0.0740
Deposit Growth	3,796	0.0581	0.1144	0.0418	-0.0332	0.1535
Branch	3,778	0.0201	0.0716	0.0000	0.0000	0.0741
Population	3,778	-0.0183	0.0726	0.0000	-0.0741	0.0119
Panel B: Bank Ownership Type Level						
Capital	51	0.1278	0.0094	0.1279	0.1158	0.1413
Liquidity	51	0.4201	0.1277	0.4439	0.2449	0.5652
ROA	51	0.0051	0.0027	0.0054	0.0013	0.0084
NIM	51	0.0120	0.0028	0.0085	0.0119	0.0159
Derivatives	51	0.4522	0.3705	0.3365	0.0374	0.9579
FX Non-Deposit Liabilities	51	0.3774	0.0828	0.3873	0.2565	0.4962
Loan Interest Rate	51	0.1838	0.0422	0.1822	0.1268	0.2363

Notes: This table reports summary statistics for dependent and control variables used in regressions. The sample covers the observations of three bank ownership types (state, private and foreign) across 81 Turkish provinces over the period 2007Q4-2011Q4. To alleviate the impact of outliers, we winsorize all continuous province-level variables at 1st and 99th percentiles. Detailed variable definitions are available in Table 1.

Table 3: Baseline estimations

	(1) Loan Growth	(2) Loan Growth	(3) Loan Growth	(4) Loan Growth	(5) Loan Growth	(6) Loan Growth
Post x State	0.0757***	0.0766***	0.0419***	0.0397***	0.0114**	0.0750***
	(0.0077)	(0.0076)	(0.0058)	(0.0056)	(0.0053)	(0.0095)
Deposit Growth			0.3501***	0.3960***	0.1929***	0.4088***
			(0.0355)	(0.0338)	(0.0374)	(0.0349)
Branch			-0.0138	-0.1728	-0.0373	-0.4573**
			(0.1453)	(0.2148)	(0.2423)	(0.2279)
Population			-0.2773*	-0.4288*	-0.2796	-0.6414***
			(0.1462)	(0.2224)	(0.2428)	(0.2342)
Other Controls	No	No	Yes	Yes	Yes	Yes
Province FE	No	Yes	Yes	No	No	No
Quarter FE	No	Yes	Yes	No	No	No
Province x Quarter FE	No	No	No	Yes	Yes	Yes
Obs.	3,796	3,796	3,778	3,778	2,592	2,482
Adjusted R^2	0.049	0.082	0.311	0.328	0.104	0.381

Notes: This table presents the estimation results of the baseline DiD model specified in equation (1). The sample period covers the interval between 2007Q4 and 2011Q4. In all columns, the dependent variable is the quarterly logarithmic growth of total loans. Column (1) is the most parsimonious specification. In column (2), we control for individual province and quarter fixed effects. Column (3) augments other province-level control variables $Deposit\ Growth$, $Branch$ and $Population$. In column (4), province-by-quarter fixed effects are employed together with other controls. Columns (5) and (6) utilize the same specification but the former excludes foreign banks from the control sample, whereas the latter discards private banks. The main independent variable is $Post\ x\ State$ interaction term. For the estimations presented in all columns, we include $Post$ and $State$ terms individually in DiD estimations, but they are omitted from the table for the sake of brevity. To alleviate the impact of outliers, we winsorize all province-level continuous variables at 1st and 99th percentiles. Detailed variable definitions are available in Table 1. Standard errors clustered at the province level are reported in parentheses. ***, **, and * denote statistical significance at 1%, 5%, and 10% levels, respectively.

Table 4: Examining the mechanism: The role of state lending in addressing market failures or furthering political interests - Estimations

	(1) Loan Growth	(2) Loan Growth	(3) Loan Growth	(4) Loan Growth
Post x State x Competition	0.0292*** (0.0094)	0.0203** (0.0086)		
Post x State x Contestability			-0.0005 (0.0099)	0.0033 (0.0089)
Other Controls	No	Yes	No	Yes
Quarter FE	Yes	Yes	Yes	Yes
Obs.	3,796	3,778	3,796	3,778
Adjusted R^2	0.077	0.306	0.064	0.301

Notes: This table presents the estimation results of the triple differences model specified in equation (2). The sample period covers the interval between 2007Q4 and 2011Q4. In all columns, the dependent variable is the quarterly logarithmic growth of total loans. Columns (1) and (2) analyze how state bank lending changes depending on loan market competition. Columns (3) and (4) analyze how state bank lending changes depending on political motives. Columns (2) and (4) augment other province-level control variables $Deposit\ Growth$, $Branch$ and $Population$. All columns include quarter fixed effects. The main independent variable is $Post\ x\ State\ x\ Province$ interaction term. The dummy variable $Province$ describes the province characteristics used to identify channels driving lending behavior of state-owned banks. For the estimations presented in all columns, we include $Post$, $State$, $Province$, $Post\ x\ State$, $Post\ x\ Province$, $State\ x\ Province$ terms individually in triple differences estimations, but they are omitted from the table for the sake of brevity. To alleviate the impact of outliers, we winsorize all province-level continuous variables at 1st and 99th percentiles. Detailed variable definitions are available in Table 1. Standard errors clustered at the province level are reported in parentheses. ***, **, and * denote statistical significance at 1%, 5%, and 10% levels, respectively.

Table 5: Quality of loan portfolio

	(1) NPL Ratio	(2) NPL Ratio	(3) NPL Ratio	(4) NPL Ratio	(5) NPL Ratio	(6) NPL Ratio
Post x State	-0.0220***	-0.0222***	-0.0208***	-0.0207***	-0.0151***	-0.0283***
	(0.0015)	(0.0015)	(0.0014)	(0.0014)	(0.0016)	(0.0019)
Other Controls	No	No	Yes	Yes	Yes	Yes
Province FE	No	Yes	Yes	No	No	No
Quarter FE	No	Yes	Yes	No	No	No
Province x Quarter FE	No	No	No	Yes	Yes	Yes
Obs.	4,040	4,040	3,778	3,778	2,592	2,482
Adjusted R^2	0.173	0.372	0.370	0.332	0.298	0.371

Notes: This table presents the estimation results of the DiD model predicting provincial credit risk. The sample period covers the interval between 2007Q4 and 2011Q4. In all columns, the dependent variable is the ratio of non-performing loans to total loans. Column (1) is the most parsimonious specification. In column (2), we control for individual province and quarter fixed effects. Column (3) augments other province-level control variables $Deposit\ Growth$, $Branch$ and $Population$. In column (4), province-by-quarter fixed effects are employed together with other controls. Columns (5) and (6) utilize the same specification but the former excludes foreign banks from the control sample, whereas the latter discards private banks. The main independent variable is $Post\ x\ State$ interaction term. For the estimations presented in all columns, we include $Post$ and $State$ terms individually in DiD estimations, but they are omitted from the table for the sake of brevity. To alleviate the impact of outliers, we winsorize all province-level continuous variables at 1st and 99th percentiles. Detailed variable definitions are available in Table 1. Standard errors clustered at the province level are reported in parentheses. ***, **, and * denote statistical significance at 1%, 5%, and 10% levels, respectively.

Table 6: Analysis of lending activity across economic segments

Panel A	(1) Vehicle	(2) Housing	(3) Other Consumer	(4) Credit Cards	(5) Food	(6) Construction	(7) Metal & Minery
Post x State	0.0403***	-0.0134*	0.0296***	0.1113**	0.1103***	0.0410**	0.0359
	(0.0106)	(0.0073)	(0.0048)	(0.0484)	(0.0197)	(0.0192)	(0.0330)
Other Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province x Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	3,751	3,758	3,764	3,529	3,700	3,750	3,404
Adjusted R^2	0.210	0.275	0.281	0.293	0.116	0.118	0.032
Panel B	(8) Textile	(9) Wholesale Trade	(10) Tourism	(11) Agriculture	(12) Energy	(13) Marine & Fishery	
Post x State	0.1063***	0.1319***	0.0116	0.0616***	0.0899***	-0.0123	
	(0.0288)	(0.0144)	(0.0322)	(0.0173)	(0.0321)	(0.1206)	
Other Controls	Yes	Yes	Yes	Yes	Yes	Yes	
Province x Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes	
Obs.	3,542	3,757	3,621	3,720	3,470	1,101	
Adjusted R^2	0.040	0.091	0.032	0.073	0.035	0.012	

Notes: This table presents the estimation results of the DiD model predicting the growth in sub-categories of consumer and commercial loans. The sample period covers the interval between 2007Q4 and 2011Q4. In all columns, the dependent variable is the quarterly logarithmic growth of loans extended in the corresponding loan category. All columns augment province-by-quarter fixed effects and other province-level control variables $Deposit\ Growth$, $Branch$ and $Population$. The main independent variable is $Post\ x\ State$ interaction term. For the estimations presented in all columns, we include $Post$ and $State$ terms individually in DiD estimations, but they are omitted from the table for the sake of brevity. To alleviate the impact of outliers, we winsorize all province-level continuous variables at 1st and 99th percentiles. Detailed variable definitions are available in Table 1. Standard errors clustered at the province level are reported in parentheses. ***, **, and * denote statistical significance at 1%, 5%, and 10% levels, respectively.

Online Appendix to

"State Ownership and Bank Lending:

Evidence from Turkish Banking Industry"

Appendix 1. Controlling for Bank Ownership Type Characteristics

Given the limited number of province-level controls available in our dataset, we attempt to alleviate the omitted variables problem by saturating the baseline model with bank-type covariates. These variables are stable across provinces, but vary over time. We collect additional balance sheet and income statement items of Turkish banks from the BRSA Monthly Bulletin. This data source monitors the developments in the Turkish banking industry. These items are also available in aggregated form based on bank ownership type for the period October 2007 through December 2011. Monthly data series are later transformed into quarterly frequency by taking end-of-quarter values, which are then matched with the original province-level sample. Given the high correlation between these ratios, we introduce them incrementally to our empirical specification to avoid possible multicollinearity problems.[12]

In line with the prior literature, we incorporate bank characteristics typically influencing bank output, performance and lending (Goddard et al., 2004; Gambacorta, 2005; Altunbas et al., 2010; Liu and Wilson, 2010; Berger and Bouwman, 2013; Li and Marinč, 2014; Mayordomo et al., 2014; Fendoğlu and Ongena, 2018). We control for the ratio of total equity to total assets ($Capital$), the ratio of securities to total deposit ($Liquidity$), the ratio of net income to total assets (ROA), the ratio of net interest income to total assets (NIM), the notional outstanding amount of off-balance sheet derivative transactions normalized by total assets ($Derivatives$), the ratio of FX non-deposit liabilities to total FX liabilities ($FX\ Non-Deposit\ Liabilities$). The results, which are presented in Table A1 suggest that our baseline findings remain significant.

[12] In untabulated regressions, we follow an alternative approach by combining all the covariates representing bank characteristics. The incremental state bank lending in the post-crisis period is still found significant in that analysis.

Table A1: Controlling for bank type characteristics

	(1) Loan Growth	(2) Loan Growth	(3) Loan Growth	(4) Loan Growth	(5) Loan Growth	(6) Loan Growth
Post x State	0.0619***	0.0385***	0.0393***	0.0379***	0.0442***	0.0397***
	(0.0054)	(0.0057)	(0.0056)	(0.0057)	(0.0055)	(0.0056)
Capital	1.8683***					
	(0.1626)					
Liquidity		-0.0528***				
		(0.0172)				
ROA			-2.1156***			
			(0.7481)			
NIM				-3.2607***		
				(0.4755)		
Derivatives					0.0533***	
					(0.0064)	
FX Non-Deposit Liabilities						0.0542***
						(0.0197)
Other Controls	Yes	Yes	Yes	Yes	Yes	Yes
Province x Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	3,778	3,778	3,778	3,778	3,778	3,778
Adjusted R^2	0.353	0.330	0.330	0.335	0.342	0.329

Notes: This table presents the estimation results incorporating time-varying bank type characteristics which are invariant at the province level. The sample period covers the interval between 2007Q4 and 2011Q4. In all columns, the dependent variable is the quarterly logarithmic growth of total loans. Column (1) incorporates equity to assets ratio ($Capital$), column (2) incorporates securities to deposits ratio ($Liquidity$), column (3) incorporates net income to assets ratio (ROA), column (4) incorporates net interest income to assets ratio (NIM), column (5) incorporates derivatives to assets ratio ($Derivatives$) and column (6) incorporates FX non-deposit liabilities to total FX liabilities ratio ($FX\ Non-Deposit\ Liabilities$). All columns augment province-by-quarter fixed effects and other province-level control variables $Deposit\ Growth$, $Branch$ and $Population$. The main independent variable is $Post\ x\ State$ interaction term. For the estimations presented in all columns, we include $Post$ and $State$ terms individually in DiD estimations, but they are omitted from the table for the sake of brevity. To alleviate the impact of outliers, we winsorize all province-level continuous variables at 1st and 99th percentiles. Detailed variable definitions are available in Table 1. Standard errors clustered at the province level are reported in parentheses. ***, **, and * denote statistical significance at 1%, 5%, and 10% levels, respectively.

Appendix 2. Robustness Checks

In this sub-section, we evaluate the robustness of our main findings to a myriad of alternative modeling choices and diagnostics (Table A2). The main empirical specification uses a post-treatment period following the global financial crisis, which spans 13 quarters. In rows (1) to (3), we restrict the sample period to four, six and eight post-treatment quarters. Over these shorter intervals, the heterogeneous response of bank lending by bank ownership structure remains significant. In rows (4) and (5), we calculate average quarterly loan balances in provinces over the sample period in order to discern the individual provinces with the largest and smallest market shares.[13] To ensure that size effects do not distort our baseline findings, we exclude these provinces from our sample. The higher loan growth of state banks remains significant.[14]

A particular weakness of the DiD approach is the possible downward bias in standard error estimates caused by serial correlation (Bertrand et al., 2004). To address this issue, we collapse our provincial data in pre- and post-treatment period by calculating averages of $Loan\ Growth$, $Deposit\ Growth$, $Branch$ and $Population$. In row (6), we present the results of estimating our baseline model with control variables and province fixed effects, while ignoring the time-series dimension of the sample. The results confirm our earlier inferences concerning the dominant lending role of state banks following the financial crisis.

To alleviate possible simultaneity concerns, in row (7), we estimate the baseline equation by using one-quarter lagged values of control variables. In row (8), we assume that the post-treatment period commences 2009Q1 rather than 2008Q4. In row (9), we present results where we employ an alternative method that utilizes quarterly percentage changes instead of logarithmic changes to calculate province-level dependent and control variables. In rows (10) and (11), we alter the data handling process by working with non-winsorized series and winsorizing the sample observations at the 2% level. The results of these analyses are in line with prior findings.

In row (12), we adopt alternative handling of standard errors by clustering at the region level (based on 26 administrative units corresponding to the NUTS-2 classification). In row (13), we adopt a two-way clustering strategy over province and year. As argued by Kelly

[13] The provinces with the largest average loan balances are İstanbul, Ankara and İzmir. The provinces with the smallest loan balances are Tunceli, Kilis, Bayburt, Hakkari and Ardahan.

[14] To complement this, we also conduct sensitivity analysis by excluding individual provinces one-by-one and estimating the baseline model. Figure A1 demonstrate that none of the individual provinces solely drive the extent and significance of the baseline findings.

(2019), failing to account for autocorrelation in observational studies regarding geographical distribution could result in acutely inflated t-statistics, in turn complicating inferences. Prior empirical studies also highlight possible spatial spillover effects and distance-related trends in lending, cost of financing and loan delinquencies, all of which are likely to exacerbate serial correlation issues (Degryse and Ongena, 2005; Becker, 2007; Gupta, 2019). In row (14), we employ an approach to correct the standard errors for spatial autocorrelation (Colella et al., 2019).[15] This method involves a sandwich-type estimator for the variance-covariance matrix, allowing for dependence across geographical units within arbitrary clusters (White, 1980; Cameron et al., 2011). The results suggest that the positive coefficient assigned to $Post\ x\ State$ remains significant, even after we correct for spatial autocorrelation.

In row (15), we modify equation (1) by augmenting the $Post\ x\ State$ term and other controls with bank type and time fixed effects (instead of separate $Post$ and $State$ terms). Moreover, to control for cost effects, we add another control variable monitoring loan interest rates charged by bank ownership types. In order to achieve this, we first collect time-varying loan rates applicable to each bank type from the CBRT. These are aggregated through weighted averages across individual banks and loan maturities based on loan balances. In row (16), we expand our baseline empirical specification with a loan interest rate variable, while in row (17), we use the spread of loan rates in excess to interbank borrowing rate (proxied by overnight interest rate determined in Borsa Istanbul (BIST) interbank repo/reverse repo market).[16] The

[15] Before implementing the correction, we retrieve the latitude and longitude information of individual provinces of Turkey to enrich the geographical characterization of our sample. Then, we analyze the existence of spatial correlation by performing the widely preferred Moran's I test (Moran, 1950; Cliff and Ord, 1970; Getis and Ord, 1992). We use the "spatwmat" and "spatgsa" commands developed by Pisati (2001) to undertake this analysis. Based on locational information and the maximum Euclidean distance between any two provinces in our sample, we initially derive the spatial weight matrix. Following this, we calculate the average loan growth of individual provinces over the sample period and implement the procedure to retrieve Moran's I statistics, as reported in the Table A3 of the Online Appendix. The test statistic is found to be positive which reveals that positive spatial autocorrelation is evident at province-level loan growth. In other words, in our sample, the neighboring locations of the provinces with higher loan growth also tend to display stronger lending themselves. This finding also turns out to be significant at conventional levels rejecting the null hypothesis of zero spatial autocorrelation for our setting.
We use the "acreg" command outlined by Colella et al. (2020) to perform the main correction procedure. Given that it is infeasible to include higher degree fixed effects in this method, we base our analysis on the model specification predicting loan growth that is estimated in column (3) of Table 3, which consider province and quarter fixed effects separately alongside other controls varying over bank type, time and province dimensions. The method requires the input for the distance cutoff threshold to formulate the arbitrary clusters of provinces. These clusters are defined in the form of a circle (with its radius being equal to the distance threshold) beyond which the correlation between observational units is assumed to decay to zero instantly. We specify the cutoff threshold as 500 km but our results are robust to the use of alternative 100, 200, 300 and 400 km threshold values.
[16] The data on the Turkish interbank borrowing rate is retrieved from Bloomberg Terminal.

positive and significant coefficient on $Post\ x\ State$ is not subject to sizeable variation when we control for these aspects.

The empirical approach we follow assigns a set of observations (that varies on the dimensions of the province, bank type and time) to the treatment group based on whether they are associated with state banks. However, this allocation is essentially non-random, and as such there could be further confounding forces correlated with both treatment type and lending policy. Any latent factor exerting influence on observable characteristics of treatment and control groups is also capable of inducing loan growth differences, which might be mistaken as a treatment effect. Consequently, such dynamics lead to sample selection bias, endogeneity problems, covariance imbalance and misinterpretation of causal findings. The endogeneity concerns are likely to be exacerbated by possible omitted variables and presumptions of functional form in our regressions (Roberts and Whited, 2013).

Prior studies use traditional matching methods to mitigate endogeneity problems arising in investigations of the impact of ownership structures on lending behavior (Havrylchyk and Juryzk, 2011; Rodnyansky and Darmouni, 2017; Molyneux et al., 2020). In the present study, we opt for the entropy balancing method to mitigate endogeneity concerns (Hainmueller, 2012).[17] Entropy balancing has certain advantages over conventional estimators such as propensity score matching (Neuenkirch and Neumeier, 2016; Zhao and Percival, 2017; McMullin and Schonberger, 2020; Çolak and Öztekin, 2021).[18] Entropy balancing is a re-weighting scheme applied to the pre-processing of units in a binary treatment observational study with the intent that the moments of covariate distributions are identical across treatment and re-weighted control group (Hainmueller, 2012; Hainmueller and Xu, 2013).[19] We

[17] We perform this analysis with the "ebalance" command developed by Hainmueller and Xu (2013). The transformation of resulting weights to subsequent regressions is performed by the "svy" command.

[18] First, unlike other traditional methods discarding unmatched observations, entropy balancing simply creates a synthetic version of the control sample by applying a weighting scheme so that it retains valuable information about the entire sample. Second, entropy balancing ensures perfect covariate balance through higher-order moments of distributional properties involving mean, variance and skewness to construct a reflection of the treated group within control sample. Third, entropy balancing does not suffer from researcher discretion in terms of defining the empirical model to predict the assignment to the treatment group and manually foraging covariate balance. Thus, the estimation of treatment effects is not contaminated by the limitations of first-stage regression models. Fourth, the simulation exercises and empirical analyses performed by existing studies verify the superiority of entropy balancing over other techniques in reducing the bias associated with latent factors (Hainmueller, 2012; Parish et al., 2018; Amusa et al., 2019; McMullin and Schonberger, 2020). Fifth, the method is fairly flexible in the sense that re-weighted data can be directly used in subsequent estimations to achieve treatment effects without additional evaluation of covariate balance. Given these advantages, entropy balancing is growingly employed in finance and banking research (Balima, 2017; Çolak and Öztekin, 2021; Kutubi et al., 2021; Chakraborty et al., 2021).

[19] This method essentially integrates the balance of control variables directly into the weight function applicable to units in the control group. The assigned weights are chosen by minimizing the entropy distance metric subject

incorporate province-level time-varying bank characteristics to the set of controls in balancing conditions, including $Deposit\ Growth$, $Branch$ and $Population$. The results based on the entropy-balanced sample are presented in row (18) for which the re-weighting framework is constructed by balancing on mean, variance and skewness of the covariate distributions. The findings imply that state bank loan growth exceeds that of other bank ownership types using the re-balanced sample.

To complement our entropy balancing analysis, we further adopt a propensity score matching technique into our DiD framework (Rosenbaum and Rubin, 1983; Roberts and Whited, 2013). In a first step, we estimate probit regressions to predict the probability of being allocated to the state bank group based on observable bank features at province level ($Deposit\ Growth$, $Branch$ and $Population$).[20] In a second step, we use the derived propensity scores to create matched samples via a one-to-one matching without replacement. The results for the matched sample are presented in row (19). We find that $Post\ x\ State$ remains positive and significant using a matched sample.

to balance and normalizing constraints imposed on the moments of transformed control units' distributional properties. Such balancing constraints include first, second and third moments which are mean, variance and skewness, respectively.

[20] In untabulated set of results, we implement the propensity score matching by also covering the province-invariant time-varying bank characteristics like $Capital$, $Liquidity$, ROA and NIM in addition to other controls. The findings are similar when this extension is considered.

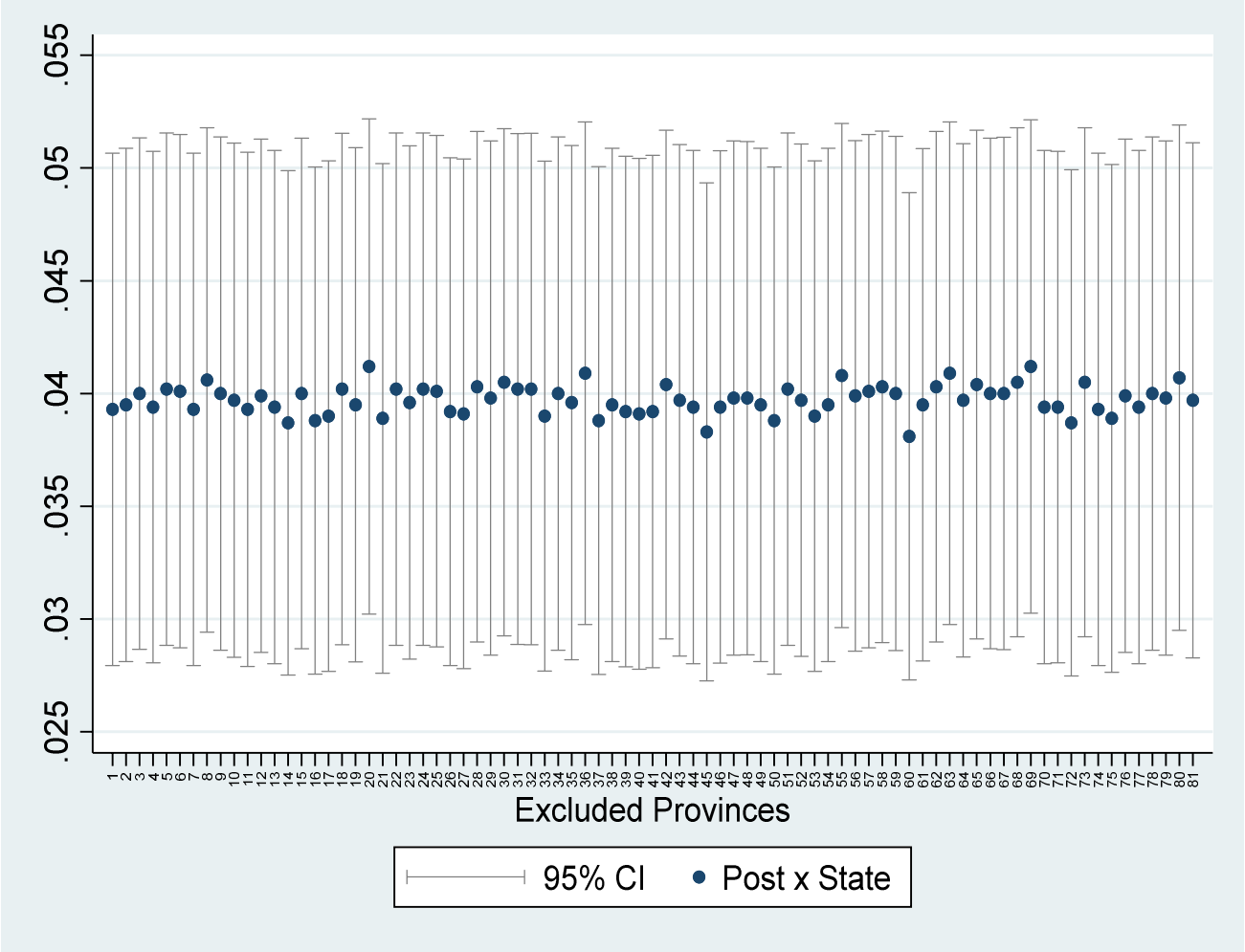
Table A2: Robustness checks

	(1) Loan Growth		
	Coefficient	S.E.	Obs.
(1) 4-Quarter post period	0.0403***	(0.0106)	1,629
(2) 6-Quarter post period	0.0319***	(0.0063)	2,103
(3) 8-Quarter post period	0.0291***	(0.0065)	2,581
(4) Excluding provinces with largest loan balances	0.0405***	(0.0058)	3,634
(5) Excluding provinces with smallest loan balances	0.0406***	(0.0056)	3,621
(6) Collapsed data estimations	0.0297***	(0.0086)	324
(7) Lagged covariates	0.0652***	(0.0063)	3,536
(8) Alternative post variable	0.0398***	(0.0041)	3,778
(9) Percentage change form of dependent variable	0.0440***	(0.0067)	3,778
(10) Non-winsorized series	0.0259**	(0.0117)	3,778
(11) Winsorization at 2% level	0.0400***	(0.0053)	3,778
(12) Standard errors clustered at region level	0.0397***	(0.0050)	3,778
(13) Standard errors clustered at province-year level	0.0397***	(0.0085)	3,778
(14) Standard errors corrected for spatial autocorrelation	0.0419***	(0.0148)	3,778
(15) Bank type and time fixed effects	0.0455***	(0.0058)	3,778
(16) Controlling for loan interest rates	0.0387***	(0.0056)	3,778
(17) Controlling for loan spreads	0.0389***	(0.0056)	3,778
(18) Entropy balancing	0.0298***	(0.0059)	3,778
(19) Propensity score matching	0.0296***	(0.0065)	2,592

Notes: This table shows the robustness checks to the baseline model provided in the column (4) of Table 3. For each exercise, the coefficients assigned to $Post\ x\ State$ term, standard errors and number of observations are provided in the form of rows for the sake of brevity. Rows (1), (2) and (3) restricts the post-treatment period to 4, 6 and 8 quarter intervals, respectively. Row (4) excludes three provinces with the largest average loan balances throughout the sample period, while row (5) excludes five provinces with the smallest average loan balances. In row (6), we implement the analysis with the sample collapsed in the pre- and post-treatment periods to account for potential serial correlation problems. Row (7) adds one quarter lagged values of the control variables to the specification. Row (8) deals with alternative $Post$ variable taking the value of one starting from 2009Q1 instead of 2008Q4. Row (9) analyzes variables in percentage change forms instead of logarithmic change. Row (10) repeats the baseline estimations with non-winsorized data, while row (11) employs data winsorized at 2% level. Row (12) clusters the standard errors at the region level (26 regions in accordance with EU's NUTS-2 classification). Row (13) performs two-way clustering through province and year dimensions. Row (14) adjusts the standard errors for spatial autocorrelation with the procedure developed by Colella et al. (2019) by using the Stata command "acreg". Correction procedure is implemented by forming arbitrary clusters defined by distance cutoff thresholds beyond which spatial autocorrelation is assumed to decay to zero, which is taken as 500 km. This analysis augments province and quarter fixed effects separately together with province-level control variables. In untabulated results, the correction procedure is repeated with cutoff thresholds of 100, 200, 300 and 400 km. Row (15) disposes individual $Post$ and $State$ terms for the empirical model and incorporates bank type and time fixed

effects. Rows (16) and (17) add bank type-level loan interest rates and loan interest spreads to the specification, respectively. Row (18) presents the estimation results for the analysis performed to remedy endogeneity concerns via the entropy balancing approach. In this context, we obtain entropy-balanced samples by applying a re-weighting scheme to observations in the control group in line with the method of Hainmueller (2012) and Hainmueller and Xu (2013). We use the Stata command "ebalance" to implement the analysis. entropy balancing is performed to balance the first, second and third moments, concurrently, of province-level covariates between the treatment and control groups. Row (19) presents the estimation results using matched samples derived from propensity score matching analysis. In this context, we utilize 1-to-1 matching without replacement including first-step probit regression estimated to produce propensity scores (which employs province-level control variables). We use the Stata command "psmatch2" to implement the analysis. Unless otherwise stated, all empirical models include province-by-quarter fixed effects and other province-level control variables $Deposit\ Growth$, $Branch$ and $Population$. The main independent variable is $Post\ x\ State$ interaction term. Unless otherwise stated, for the estimations presented in all rows, we include $Post$ and $State$ terms individually in DiD estimations, but they are omitted from the table for the sake of brevity. Unless otherwise stated, to alleviate the impact of outliers, we winsorize all province-level continuous variables at 1st and 99th percentiles. Detailed variable definitions are available in Table 1. Unless otherwise stated, standard errors clustered at the province level are reported in parentheses. ***, **, and * denote statistical significance at 1%, 5%, and 10% levels, respectively.

Figure A1: Sensitivity analysis



Notes: This figure displays the sensitivity analysis excluding 81 provinces incrementally from the sample and repeating baseline estimation specified in column (4) of Table 3. Blue dots represent the coefficient estimates related to $Post\ x\ State$ interaction term and solid black lines demonstrate 95% confidence intervals.

Table A3: Moran's I test of spatial autocorrelation

	I	E(I)	sd(I)	z
Loan Growth	0.104	-0.013	0.015	7.492*** [0.000]

Notes: This table presents the estimation results for Moran's I test of spatial autocorrelation. We use the Stata commands "spatwmat" and "spatgsa" developed by Pisati (2001) to implement the analysis. P-values are provided in square brackets. The null hypothesis posits no spatial autocorrelation.

Appendix 3. Parallel Trends Assumption

The essential identifying condition in our research design is the parallel trends assumption, which asserts that, in the absence of treatment, the DiD estimator should be inconsequential (Roberts and Whited, 2013). The validity of this assumption also implies that the lending behavior of Turkish state and non-state bank groups should evolve in a similar way before the occurrence of the global financial crisis.

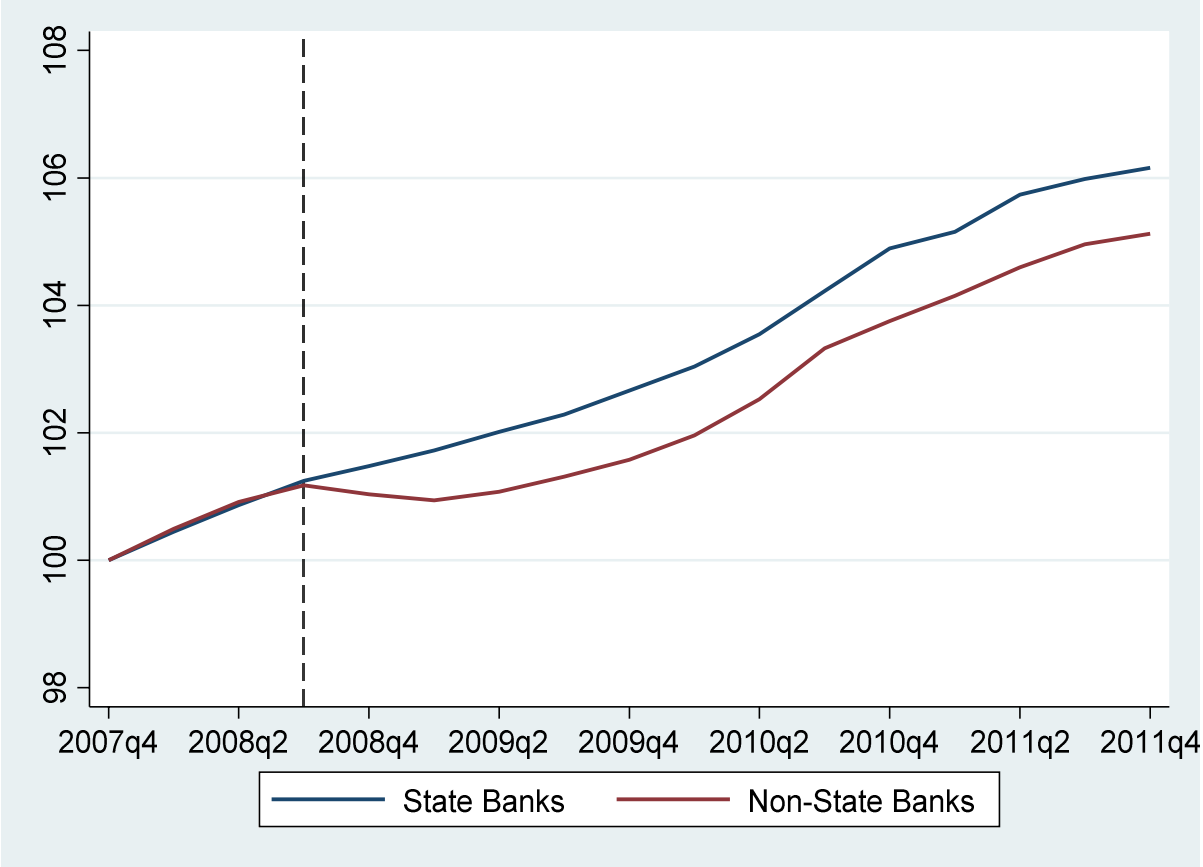
We initially conduct a visual examination of the logarithm of total loans extended by state and non-state bank groups over time. The evolution of loan balances scattered in Figure A2 (normalized to 2007Q4 values) lends support to the argument that state and non-state bank lending follows an overlapping path in the pre-treatment period, prior to diverging after 2008Q3 when the treatment period commences. We then undertake a formal univariate analysis to further motivate the applicability of parallel trends to our research design. Specifically, at a disaggregated level, we generate a momentum indicator for the variable of interest ($Loan\ Growth$) by taking first differences. We then implement a univariate t-test of mean equality (concerning the aforementioned momentum proxy) between the treated (state banks) and control (non-state banks) group during the pre-treatment period. The results presented in Table A4 suggest that the parallel trends assumption is unlikely to be violated.

We also conduct placebo tests. In this context, we use a specification predicting loan growth with $Post\ x\ State$ interaction term together with baseline controls, bank ownership type and time fixed effects. In the first test, we randomize the treatment assignment over bank ownership types by keeping the same treatment time-dimension to retrieve pseudo estimates of the coefficient on $Post\ x\ State$.[21] We repeat this procedure 2000 times, and record the empirical distribution of placebo coefficients. In a second test, we generate different permutations of the treatment assignment over sample period by preserving the treatment across bank type-dimension intact. This exercise is replicated 2000 times. Figure A3 presents the actual coefficient estimate combined with the histograms of placebo coefficients. The results suggest that the positive loan growth differential of state banks is not obtained randomly and is most likely to be derived from the treatment itself.[22]

[21] We utilize the "ritest" command developed by Heß (2017) to make this analysis.

[22] As an alternative statistical test to determine whether prior trends are similar for state and non-state bank ownership types, we drop all the post-crisis observations and define a new variable $Trend$ taking linearly increasing values for each time point in the pre-treatment interval. In the later stage, by using only pre-crisis sample, we estimate the model predicting $Loan\ Growth$ with independent variables $Trend$, $State$ and interaction

Figure A2: Evolution of total loans based on bank ownership type



Notes: This figure displays the visual evaluation of the parallel trends assumption. The graph depicts the natural logarithm of total loans extended by state and non-state bank ownership types aggregated over provinces and normalized to 2007Q4. The solid blue line represents the loan extension of the treatment (state banks) group, while the red solid line shows the loan extension of the control (non-state banks) group. Vertical dashed black line marks the beginning of the post-crisis period.

Table A4: Test of parallel trends assumption

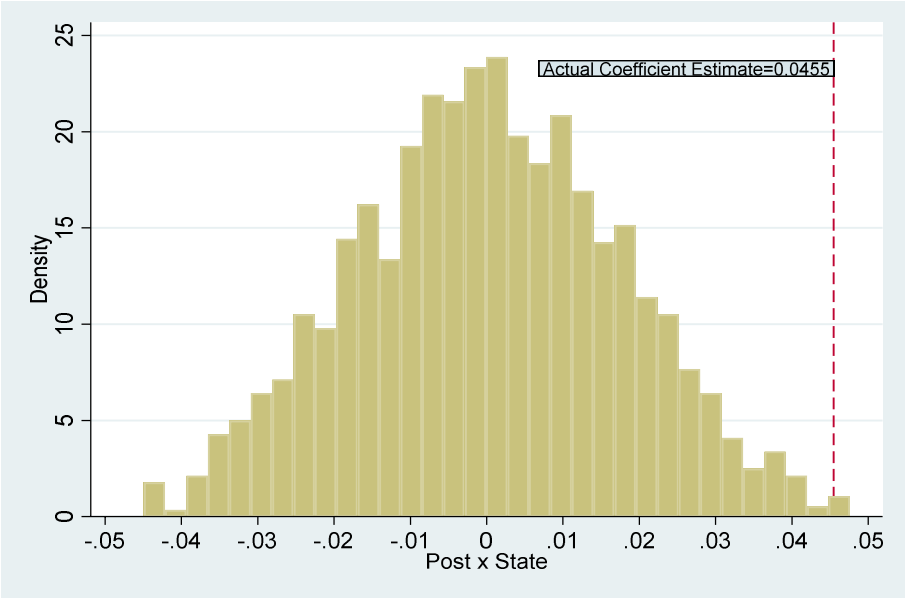
	Average Change in Treatment Group (N=162)	Average Change in Control Group (N=293)	t-test	Wilcoxon Rank Sum Test
Loan Growth	-0.0264	-0.0389	-0.9091 [0.3638]	-0.2410 [0.8094]

Notes: This table analyzes the validity of parallel trends assumption by conducting univariate tests. In the first step, we drop the post-treatment period from the sample and calculate the change in loan growth at the province level for bank ownership types. In the second step, we compare the average change in loan growth in treatment (state banks) and control (non-state banks) groups with a simple t-test and non-parametric Wilcoxon rank-sum test. P-values are provided in the square brackets. The null hypothesis posits the equality of mean values for the treatment and control groups.

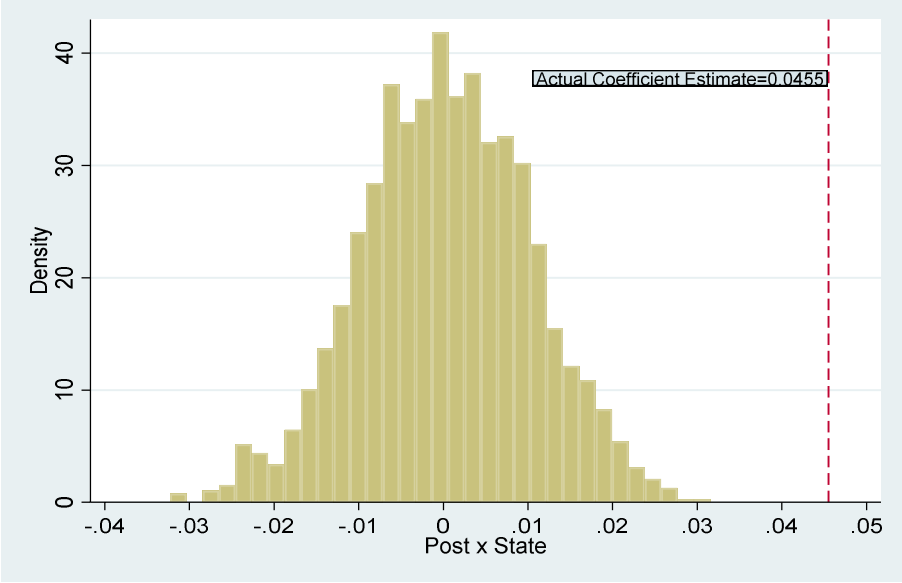
term $Trend\ x\ State$ in company with other province-level controls. The estimation results show that the coefficient of the interaction term is insignificant informing us about the synchronization of prior trends.

Figure A3: Placebo tests

Panel A. Randomization over bank type



Panel B. Randomization over treatment date



Notes: These figures plot the results of placebo estimations. To perform placebo tests, we use the specification presented in row (15) of Table A2 predicting *Loan Growth* with *Post x State* interaction term together with bank type and time fixed effects. In panel A, we randomize the assignment of treatment over bank type by keeping the time dimension intact. We repeat this re-shuffling procedure 2000 times to record the coefficient estimates for the DiD variable *Post x State*. In panel B, we randomize the assignment of treatment over date by keeping the bank type dimension intact. We repeat this re-shuffling procedure 2000 times to record the coefficient estimates for the DiD variable *Post x State*. The histograms display the distributions of placebo estimates. Vertical dashed red lines represent the actual coefficient estimate obtained from the empirical model including the set of control variables *Deposit Growth*, *Branch* and *Population*. Detailed variable definitions are available in Table 1. We utilize the Stata command "ritest" to perform the assignment of pseudo-events.

Appendix 4. External Validity Analysis

Thus far, our approach assumes that the global financial crisis was an exogenous shock to local economic activity and the banking sector, and induced a severe business cycle downturn. Nevertheless, focusing on a single event episode could restrict the scope of interpretation concerning the role of state banks. Given the unique features of the global financial crisis (including global financial conditions, investor risk appetite, capital flows and accompanying depression in domestic economic growth as well as loan market conditions of emerging countries), a potential criticism of our research design would be the diminishing predictive ability beyond the sample period of the original experiment (Angrist and Pischke, 2010). In turn, this may undermine the external validity of outcomes respecting the treatment assignment (McDermott, 2011; Peters et al., 2016).[23] A way to corroborate external validity is to: replicate a similar empirical model with other exogenous events; or use data excluded from (or not covered by) the original study (Morton and Williams, 2008). Therefore, to illustrate the external validity of our findings, we utilize exogenous variation in economic growth outlook caused by the recent unanticipated Covid-19 pandemic.

Following the widespread emergence of Covid-19 infections on a global scale, individual countries suffered from the unprecedented numbers of hospitalizations and deaths compared to other pandemic waves in the modern era. Governments were forced to implement social distancing, quarantine and lockdown measures. The restrictions relevant to the virus outbreak led to heightened economic uncertainty, disrupted supply chains and downward pressure on global economic activity, inter-country trade and household incomes (Baker et al., 2020; Vidya and Prabheesh, 2020; Miroudot, 2020; Almeida et al., 2021). The outbreak also brought impediments to fiscal deficits (Makin and Layton, 2021), labor markets (Kong and Prinz, 2020; Brada et al., 2021), monetary policy transmission (Wei and Han, 2021), corporate sector performance (Hu and Zhang, 2021) and income inequality (Wildman, 2021). The pandemic created elevated risk, investor losses, and volatilities in financial markets (Guo et al., 2021; Kinateder et al., 2021). After the initial shock, the eventual recovery in financial markets

[23] In a general sense, the concept of external validity corresponds to the applicability of local average treatment effect estimates to the whole population of policy interest including different units, settings and time intervals since, in most cases, quasi-experimental studies adopt a narrower focus (Krupnikov and Levine, 2014; Athey and Imbens, 2017; Kowalski, 2018; Handley et al., 2018). Even though we employ the data belonging to all active banks in the Turkish industry in this paper, given that we approach the role of state banks through the lens of a shorter sample period, external validity issues might still be material for our empirical design.

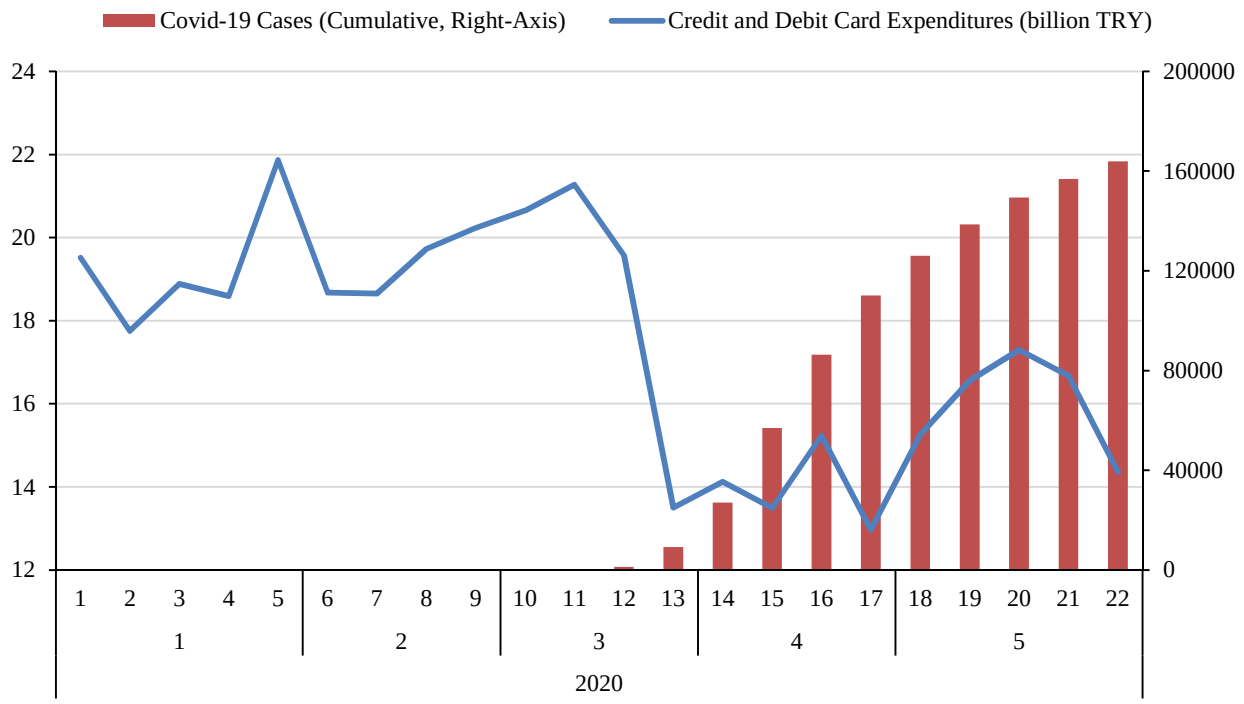
was not uniform across countries, and depended upon monetary and fiscal stimuli, healthcare infrastructures and local economic dynamics.[24]

In order to examine the state bank lending behavior in Turkey during the Covid-19 pandemic, we collect quarterly banking and branching data on bank ownership types over provinces for the period between 2019Q1 and 2020Q4 from the FinTurk database. We then construct the same set of province-level variables specified in equation (1). Given the shorter time period under consideration, we winsorize the generated series at 0.5^{th} percent level on both sides of the distributions. The event time is chosen by analyzing the number of confirmed Covid-19 cases and weekly balances of credit and debit card expenditures. Since we see (in Figure A4) that both virus outbreak and coincident slowdown in financial transactions began in March 2020, we define the post-treatment period starting from 2020Q1. Thus, the variable $Post$ in equation (1) takes a value of one through all quarters of 2020 for the DiD specification of this exercise, otherwise zero.

The results are presented in Table A5. In column (1), we add province and quarter fixed effects separately to the regression, whereas column (2) involves other province-level control variables. Column (3) integrates higher degree province-by-quarter fixed effects in addition to other controls. In order to alleviate serial correlation concerns, we present results in column (4) derived from collapsed data. Overall, we find that relative to domestic private and foreign-owned banks, Turkish state-owned banks sustain lending during the Covid-19 outbreak. This finding is robust to a variety of model specifications. The effect is also economically significant corresponding to 4.4% (=4x1.1%) additional annual loan growth. Overall, these findings support the countercyclical role of state-owned banks in absorbing the detrimental impacts of business cycle downturns and external shocks.

[24] Berger and Demirgüç-Kunt (2021) argue that the Covid-19 outbreak serves as a plausibly exogenous shock in banking research settings. This episode was characterized by tightened lending conditions, worsened borrower creditworthiness, declining collateral values and inflated borrowing costs. Li et al. (2020) identify the increasing liquidity demand of firms directed to bank financing onset the beginning of the crisis. Beck and Keil (2022) find that loan loss provisions and non-performing loans of US banks escalated when the geographical exposure of banks to the virus outbreak and lockdown policies are higher. Working with a cross-country sample, Elnahass et al. (2021) document that the asset quality of banks deteriorated following the Covid-19 outbreak illuminating the financial stability concerns. Demirgüç-Kunt et al. (2021) present that bank stock returns displayed a weaker performance compared to non-financial companies, particularly the banks with a lower level of capital buffers and banks operating in countries with deteriorated fiscal positions. By using bank-level data from 125 countries and considering virus outbreak as a quasi-experimental setting, Çolak and Öztekin (2021) demonstrate the evidence for subdued lending behavior of banks located in countries with higher infection rates.

Figure A4: Credit and debit card expenditures during the covid-19 pandemic in Turkey



Notes: This figure displays high frequency indicators used to determine the timing of exogenous shock in external validity analysis. The left-axis shows the weekly volume of credit and debit card expenditures made in Turkey which is retrieved from CBRT online data dissemination system. The right-axis presents the number of weekly Covid-19 cases observed in Turkey which is taken from European Center for Disease Prevention and Control.

Table A5: External validity analysis

	(1) Loan Growth	(2) Loan Growth	(3) Loan Growth	(4) Loan Growth
Post x State	0.0229*** (0.0034)	0.0129*** (0.0036)	0.0115*** (0.0038)	0.0197*** (0.0041)
Other Controls	No	Yes	Yes	Yes
Province FE	Yes	Yes	No	Yes
Quarter FE	Yes	Yes	No	No
Province x Quarter FE	No	No	Yes	No
Obs.	1,701	1,701	1,701	324
Adjusted R^2	0.182	0.252	0.228	0.759

Notes: This table presents the estimation results for the external validity analysis. The sample period covers the interval between 2019Q1 and 2020Q4. The variable $Post$ takes the value of one from 2020Q1 onwards. In all columns, the dependent variable is the quarterly logarithmic growth of total loans. Column (1) includes separate province and quarter fixed effects, while column (2) adds other covariates $Deposit\ Growth$, $Branch$ and $Population$. Column (3) employs higher degree province-by-quarter fixed effects. In column (4), estimations are performed with sample data collapsed in the pre- and post-treatment periods. The main independent variable is $Post\ x\ State$ interaction term. For the estimations presented in all columns, we include $Post$ and $State$ terms individually in DiD estimations, but they are omitted from the table for the sake of brevity. To alleviate the impact of outliers, we winsorize all province-level continuous variables at 0.5th and 99.5th percentiles. Detailed variable definitions are available in Table 1. Standard errors clustered at the province level are reported in parentheses. ***, **, and * denote statistical significance at 1%, 5%, and 10% levels, respectively.

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