Interest Rate Caps, Corporate Lending, and Bank Market Power: Evidence from Bangladesh*

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Abstract

How does market power in the corporate banking sector influence the effects of interest rate cap policies on credit allocation? We study this question using credit registry data from Bangladesh, where the Central Bank capped rates on corporate loans in 2009. Using difference-in-differences designs with variation in pre-regulation, branch-level rates as exposure measures, we find that a one percentage point cap-induced drop in rates increased lending amounts by 30%. This increase in lending is not driven by costs of supplying credit. Our results point to substantial credit under-provision due to banks' market power, even in the presence of relationship lending.

Keywords: corporate banking, interest rate caps, relationship lending, market power, regulation, emerging markets finance

JEL classifications: D43, G21, G28, L51, O16

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1 Introduction

A well-functioning financial market spurs economic growth by reducing the costs of external finance to firms (Rajan and Zingales 1998, Levine 2005). At the same time, external financing costs for firms in countries with underdeveloped financial and legal systems are systemically high (Demirgüç-Kunt, Laeven, and Levine 2004, Beck, Demirgüç-Kunt, and Maksimovic 2005). To what extent is this driven by lenders' costs of supplying credit or risks associated with lending, and to what extent is this driven by market failures (e.g., imperfect competition, asymmetric information)? Is there scope for policy interventions to limit the influence of such market imperfections, and if so, under what conditions?

This paper provides an empirical assessment of this question in the context of interest rate cap policies. Imposing a ceiling on corporate lending rates is one of the most widely used tools by regulators in emerging markets to alleviate firms' financing constraints and spur corporate investment (Ferrari, Masetti, and Ren 2018). We use confidential credit registry microdata and a 2009 policy reform in Bangladesh, where the Central Bank imposed a maximum limit for interest rates on business term loans at 13 percent, under the stated objective of boosting industry investment in the aftermath of the Global Financial Crisis. Bangladesh Bank lifted the cap in 2011 after the International Monetary Fund (IMF) made the extension of a $1 billion credit line conditional on the removal of the cap, citing deteriorating financial sector conditions (Reuters 2012). We study how this interest rate cap regime affects equilibrium credit supply and credit allocation across segments of the borrower pool during the regulation period and after the cap is lifted. We then discuss the implications of our empirical results for the prospect of using rate caps to mitigate lending market power in the corporate banking sector.

From a theoretical perspective, whether interest rate caps increase or decrease equilibrium credit supply crucially depends on the nature of banking competition. If the lending market is competitive and banks are barely defraying their costs of supplying capital (net of default risk), imposing an interest rate cap may lead to contractions in credit supply. On the other hand, if banks are imperfectly competitive and earn strictly positive profit margins, such policies may actually increase credit supply. Furthermore, rate caps may have long-run implications for credit supply in the presence of relationship lending, or *ex post* market power. Over the course of their relationship with borrowers, lenders learn about borrowers' creditworthiness. This renders the dynamic screening problem easier to solve, enabling lenders to provide finance in the longrun by adjusting lending terms accordingly. The importance of such relationship lending – in both emerging markets and advanced economy settings – has received ample attention in the literature.[1]

We resolve this theoretical ambiguity by studying the causal effect of the introduction and removal of Bangladesh's 2009 interest rate cap policy. A key challenge to identifying the causal

[1] See, for example, Petersen and Rajan (1994) and Berger and Udell (1995) for early contributions to this literature. Boot and Thakor (2000) and Kysucky and Norden (2016) provide surveys of the literature. More recent evidence by Gertler, Higgins, Malmendier, and Ojeda (2024) indicates that lack of trust in financial institutions is the most important behavioral friction preventing firms from undertaking profitable projects, and that the length of a lending relationship helps proxy for the strength of this friction.

effects of this type of regulation is that rate caps are often endogenously enacted when credit market conditions and the macroeconomic outlook are less favorable. Hence, simply relying on time series variation comparing outcomes across pre-reform and post-reform periods would be inconclusive. To address this issue, we use pre-regulation interest rates at the bank branch level as a source of plausibly exogenous cross-sectional variation. In particular, we adopt a difference-in-differences research design in which we compare branches within the same parent bank which were more vs. less "exposed" to the 13% rate cap depending on average rates charged on short-term corporate loans in the lead up to the reform.

We show that bank branches charging high interest rates relative to the cap threshold prior to the regulation suddenly lower their interest rates after the policy's introduction, and then gradually increase interest rates once the policy is lifted. On the other hand, such patterns do not exist for infra-marginal bank branches whose interest rates were already lower than the cap prior to its implementation. We use our branch-level reform exposure measure and this strong first stage pass through of the cap to interest rates as an instrumental variable for post-reform interest rates to translate our estimates to a corporate lending semi-elasticity. In other words, we estimate percentage changes in lending outcomes relative to a one percentage point change in average branch-level interest rates.

We highlight two main empirical findings. First, we find that the interest rate cap significantly *increased* equilibrium credit supply. Furthermore, we observe an expansion of credit supply via an increased number of loans (extensive margin), as well as an increase in average loan dollar amounts (intensive margin). We show through the lens of simple extensions to a conceptual model à la Petersen and Rajan (1995) featuring both *ex ante* and *ex post* market power (i.e., relationship lending) that the observed expansion in credit supply is consistent with *ex ante* forms of market power dominating relationship lending channels. A one percentage point cap-induced drop in rates increased total outstanding loan amounts by 30%, and generated a 15% increase in the number of loans issued. Our second main finding is that this expansion in lending is not accompanied by any statistically significant changes in the risk profile of corporate borrowers, as proxied by the proportion of secured loans and delinquency rates, or in rates paid out on individual deposit accounts, indicating that the rate cap did not alter banks' marginal cost of originating loans. Our findings stand in sharp contrast to other studies that find negative impacts of interest rate caps on lending in consumer credit markets in advanced economies, especially for riskier borrowers for whom rate caps are more likely to bind.

We inspect our proposed theoretical mechanism by examining how branch lending outcomes and loan pricing respond to the local entry of close competitor banks' branches. Relying on simple measures of market concentration, like the popularly used Herfindahl-Hirschman Index (HHI), as a proxy for *ex ante* market power is problematic when firms compete on both prices and quantities (De Loecker and Eeckhout 2018, De Loecker, Eeckhout, and Unger 2020). Indeed, we uncover no heterogeneous responses to the interest rate cap according to a branch's local deposit or lending HHI, or the same HHIs defined at the parent bank level. To help isolate *ex ante* market power, we identify banks' closest competitors by nearest-neighbor matching on a

host of characteristics, including balance sheet size and industrial sector specialization. We then conduct an event study analysis where we define the event as a branch's nearest-neighbor parent bank's competitor opening a new branch within small administrative areas averaging one-sixth the size of the average U.S. county. The idea underlying this research design is that if the corporate lending sector is sufficiently imperfectly competitive prior to the enactment of the rate cap, then for branches operating within the same parent bank and quarter, local entry of a close competitor bank's branch should have no effect on the pricing and provision of credit at incumbent branches.

Consistent with this imperfect competition hypothesis, we find that local entry of a close competitor bank has no discernible impact on interest rates or extensive and intensive margin lending. We find such null effects regardless of whether we use OLS or modern difference-in-differences estimators which account for treatment effect heterogeneity, given that cohorts of branches experience entry at various times over the sample period. This null result also holds regardless of whether we define the control group as branches which have not-yet experienced entry (de Chaisemartin and D'Haultfœuille 2020), predominantly rural branches never experiencing competitor entry (Sun and Abraham 2021), or a combination of the two sets of counterfactuals (Borusyak, Jaravel, and Spiess 2024). One might be concerned that branch entry is endogenous to local economic conditions, and thereby endogenous to the performance of incumbents, because competing banks would not open a branch unless they expected the new branch to earn positive profits. Reassuringly, the null effect holds conditional on fine geography-by-time fixed effects, and there are no pre-trends in lending outcomes prior to competitors' local entry, suggesting that competitors' entry decisions are relatively divorced from incumbents' lending patterns.

Finally, we use our definition of close competitor branches to show that credit supply decisions in response to the cap are not driven by price or quantity competition, consistent with our conceptual framework. Our semi-elasticity estimates are almost quantitatively unchanged when we augment our baseline specification by conditioning on competing banks' interest rates, instrumented with the competing local branch's exposure to the reform. Competition on the margin of entry is also irrelevant for how branches respond to the cap; if we condition on the presence of competing banks in an area interacted with competing banks' interest rates, we estimate quantitatively similar lending semi-elasticities.

Our results point to two important market failures in the Bangladesh banking market prior to the regulation. The first is static market power distortions due to imperfect competition in the banking sector. The existence of this form of market power leads to interest rates set above break-even levels and depressed equilibrium credit supply below its optimal level. The second is under-experimentation with *ex post* profitable borrowers. The fact that credit provision on both the intensive and extensive margin did not decrease after the removal of the interest rate cap implies that banks found it optimal to supply credit to existing borrowers. These borrowers would not have been financed if the regulation had not induced lending relationships to form during the regulation period when demand for credit was high. Hence, the interest rate cap not only increased access to financing during the regulation period, but also reduced the influence of

imperfect competition in a persistent fashion after the regulation was lifted.

Still, it is difficult to conclude that the interest rate cap in Bangladesh was an effective policy from an overall aggregate welfare perspective. Because our empirical design relies on cross-sectional variation across bank branches to identify causal effects on equilibrium credit outcomes, we are unable to estimate economy-wide policy effects. There are other objectives besides increasing credit supply that policy makers should have in mind. For example, a chief concern raised by the IMF about the 2009 cap was the possibility that imposing caps might dampen the transmission of monetary policy (International Monetary Fund 2011). In light of these important caveats about the macroeconomic effects of rate caps, our main contribution is to offer new causal evidence on the quantitative importance of *ex ante* imperfect competition for corporate credit provision and highlight how rate caps can mitigate such market imperfections.

We contribute to several strands of literature. First, this paper contributes to a literature examining the impacts of interest rate caps by focusing on caps targeting corporate industrial loans in an emerging markets environment. As documented by Maimbo and Henriques Gallegos (2014), interest rate caps are a common policy in both developing and developed countries. However, in advanced economies, interest rate ceilings are usually framed as anti-usury laws imposed on payday loans or other types of unsecured consumer credit featuring high origination fees (Asian Development Bank 2016).[2]

The extant empirical evidence on rate caps is mostly limited to consumer credit markets in developed countries (Alessie, Hochguertel, and Weber 2005, Benmelech and Moskowitz 2010, Rigbi 2013, Melzer and Schroeder 2017). A common theme among recent studies is that banks ration credit to *ex ante* riskier borrowers to limit losses (Cuesta and Sepulveda 2021, Burga, Nivin, and Yamunaqué 2022, Cherry 2024). In contrast, we uncover positive impacts on credit supply, with no evidence of banks shifting credit away from riskier borrowers. Our findings are consistent with evidence that banks in settings with weaker financial infrastructure may earn higher profit margins (Demirgüç-Kunt, Laeven, and Levine 2004). Another important distinction of our work relative to the rate cap literature is that our setting features the unanticipated enactment of a rate cap, rather than continuous tweaking of the policy regime at high frequency, allowing us to both purge our estimates of seasonality and examine asymmetries in the sign of regulated changes in loan pricing.

Second, this paper offers empirical guidance to a long-standing literature on market imperfections in external financing by highlighting that the comparative statics of equilibrium lending with respect to a rate cap depends on whether *ex ante* (i.e., before any borrower-creditor relationship is formed) or *ex post* market power is a more dominant driver of credit provision. We therefore build on the literature's traditional focus on lenders' competition after a borrower-creditor relationship develops (Petersen and Rajan 1995, McMillan and Woodruff 1999, Fisman and Raturi 2004). Recent papers in this literature highlight the role of policy and regulation

[2] To our knowledge, the only other study examining a rate cap on commercial bank loans to firms in a developing country context is Safavian and Zia (2018), who examine a 2016 reform in Kenya that simultaneously imposed a floor on deposit rates. Although their analysis is not causal in nature, those authors provide suggestive evidence that the reform resulted in lower credit provision and bank substitution away from SMEs towards corporate borrowers.

in removing lending market imperfections (Corbae and D'Erasmo 2019, 2020, Joaquim, Townsend, and Zhorin 2019) We study how the presence of market power a ects the role of interest rate caps, a common form of regulation in emerging markets where central banks have mandates to promote well-functioning markets which provide loans to the tradables sector.

Third, we contribute to the literature documenting barriers to obtaining nancing faced by rms in developing countries by o ering evidence for the existence of large interest rate markups charged on industrial corporate loans. There is ample support for the notion that rms in developing countries face more severe credit constraints (De Mel, McKenzie, and Woodru 2008, Hsieh and Klenow 2009, Kaboski and Townsend 2011, Banerjee and Du o 2014). We present causal micro-evidence pointing to ex ante market power as a key driver of equilibrium credit outcomes in emerging markets where interest rate caps are predominantly used as a form of countercyclical macroprudential policy, with the hope of stimulating investment.

The rest of the paper is organized as follows. In Section 2, we explain institutional details about the corporate banking market and interest rate cap introduced in Bangladesh. Section 3 presents a conceptual framework that admits predictions for the e ects of the interest rate cap on equilibrium credit supply. Section 4 describes the credit registry data and introduces our empirical strategy. Section 5 presents our main empirical results of the e ects of interest rate caps on loan provision and performance. We o er further evidence of ex ante market power in Section 6 using competitor banks' branch entry decisions. Section Section 7 concludes.

2 Banking in Bangladesh and Interest Rate Cap Regulation

Commercial banks in Bangladesh operate under the supervision of Bangladesh Bank, the central bank of Bangladesh. There are broadly four types of banks in Bangladesh: State-Owned Commercial Banks (SCBs), State-Owned Development Financial Institutions (DFIs), Private Commercial Banks (PCBs), and Foreign Commercial Banks (FCBs). As of December 2013, there are 4 SCBs, 4 DFIs, 39 PCBs, and 9 FCBs, totaling 56 banks. In our main analysis, we focus on private banks, which include the 39 PCBs and 9 FCBs.[3]

On April 19, 2009, Bangladesh Bank imposed a maximum annualized interest rate of 13 percent on most types of business loans.[4] Prior to this change, there was no direct regulation of the interest rate on bank loans, except for trade credit loans, which were capped at 7 percent. There is no indication from the Bangladesh press that the interest rate cap announcement was anticipated by market actors or policy analysts. According to Unnayan Onneshan (2011), the cap was introduced to boost investment." The 2009 cap incurred severe criticism from the International Monetary

[3] In the Appendix, we replicate our main results when we either (i) include the 7 state-owned banks (SCBs and DFIs) active during the cap regime; or (ii) exclude the 8 PCBs which adhere to Islamic nance principles.

[4] More speci cally, the circular issued by Bangladesh Bank states that the cap applied to working capital and term loans to large and medium scale industrial rms, agriculture, housing sector loans, and trade nancing. In the data, this corresponds to loans originated to all sectors except government, other public sector entities, and individuals. We also exclude the agricultural sector from our analysis, since interest rates to rms in that sector are lower than the cap throughout the sample period. We compare prevailing loan interest rates across sectors in the Appendix.

Fund (IMF) amidst concerns about in ation and devaluation of the currency (taka) against the U.S. dollar.[5] Under external pressure, on March 9, 2011, Bangladesh Bank withdrew the cap for all previously regulated categories except for industrial term loans, pre-shipment credits, and agricultural sector loans.[6]

Figure 1 shows that the 2009 cap e ectively bound the interest rates of bank loans originated during the regulation period. Panel A plots the transition of the proportion of loans whose annualized interest rates are equal to or below 13 percent. When the cap was introduced in 2009Q2, this proportion suddenly jumped from 20 percent to 50 percent, and continued to increase to 90 percent by the end of 2010. Active loans charging over 13 percent continue to exist during the regulation period due to loans originated prior to the regulation. In other words, the interest cap did not apply retroactively to loans with a maturity period extending beyond 2009Q2. Right after the cap was lifted in 2011Q1, the proportion of loans previously subject to the cap suddenly dropped to about 60 percent, and declined to 30 percent by the fourth quarter of 2011, again driven by new loan contracts. Panel B shows that these patterns arise due to loans whose annualized interest rates bunch at exactly 13 percent.

Despite visual evidence that the regulation introduced a sharp bound on corporate loan interest rates, making conclusions about the causal e ect of the regulation by relying solely on time series variation would not be credible. One issue is that the regulation was introduced to stimulate the economy following the global macroeconomic downturn in 2009. In particular, if the objective of the policy was truly to encourage industry investment, the timing of the policy implementation is likely correlated with aggregate credit demand. The reduction of export to developed countries was especially of concern to policymakers.[7]

To address this issue, we use bank branch-level interest rates prior to the regulation as a source of quasi-exogenous variation in branch exposure to the regulation. Bank branches accustomed to charging higher average interest rates above the cap before the regulation incurred larger reductions in their average interest rates during the regulation period. More formally, our research design is a di erence-in-di erences strategy with pre-regulation branch-level interest rates as a source of additional cross-sectional variation. The identifying assumption underlying this research design is that, conditional on any time-varying bank-speci c shocks, outcomes tied to branches charging ex ante higher or lower interest rates would have evolved similarly in the absence of the interest rate cap we study.

[5] Reuters (2012) reported that the IMF made a new $1 billion credit disbursement conditional on Bangladesh Bank's withdrawal of the 13% interest rate cap.

[6] The cap on interest charged on term loans for industries was also lifted on January 4, 2012. However, on January 22, 2012, Bangladesh Bank introduced another regulation to cap the spread between lending and deposit rates to 100 basis points. In our analysis, we focus on the two-year period of the direct 13% cap on loan interest to avoid contamination e ects resulting from the 2012 cap. In the Appendix, we present results from the extended time period which includes the removal of the cap.

[7] Bangladesh Bank implemented a similar interest rate cap policy during the COVID-19 crisis from April 2020 and removed the cap in June 2023, replacing it with a market-based rate formed by taking an average of six-month Treasury rates. The 2020 policy imposed a percent cap on loans originated to by 9 percent, and a 6 percent cap on deposit rates (Bangladesh Bank 2022). We study the earlier interest rate cap policy regime in 2009 2011 given that it represented a cap on only business loans without restrictions on deposits, and did not occur contemporaneously with a major public health crisis in the country.

Figure 1: Interest Rates for Industrial Loans around the Cap Period

(a) Proportion of Outstanding Loans with Interest Rates below 13% Cap

(b) Distribution of Outstanding Loans by Interest Rate (%)

Notes: The gures show the evolution of branch-level, outstanding loan amount share-weighted average interest rates, computed using the SBS-3 credit registry data obtained from Bangladesh Bank (see Section 4.1). Panel (a) shows the quarterly proportion of loans with average annualized interest rates equal to or below the 13 percent statutory cap. Panel (b) shows the distribution of loans relative to the 13 percent cap right before its passage (2009Q1), immediately after its passage (2009Q2), and right before its repeal by Bangladesh Bank (2010Q4). We restrict the same to bank branches with at least one outstanding industry loan in the rst quarter of 2008.

Figure 2: Time Path of Branch-Level Interest Rates

(a) Average Branch-Level Interest Rates (b) Average Rates by Cap Exposure

Notes: The gure plots the path of average interest rates charged by branches for industrial loans in Bangladesh. To compute average branch-level interest rates we take a share-weighted average using outstanding loan amount shares of total industrial lending. Panel (a) shows the path pooling all bank branches, while in Panel (b), we divide bank branches into three strata according to the average interest rate charged prior to the regulation relative to the 13 percent cap. We compute rates from the SBS-3 microdata obtained from Bangladesh Bank (see Section 4.1). We restrict the same to bank branches with at least one outstanding industry loan in the rst quarter of 2008..

Figure 2 illustrates our identi cation strategy. The gure plots the loan share-weighted average annualized interest rate charged on corporate loans subject to the cap by di erent branches in Bangladesh. As shown in Panel (a), before the cap implementation, average interest rates charged across bank branches are stable and show no clear time trend. Within the same quarter the interest rate cap was introduced, average interest rates suddenly decreased. Panel (b) of Figure 2 decomposes average annualized interest rates on loans according to three strata. Interest rates charged by branches with pre-regulation average interest rates above 13 percent (treatment branches") suddenly declined. At the same time, rates on loans originated by bank branches that used to charge below 13 percent prior to the regulation (control branches") show no signi cant trend break. Consequently, the gap in interest rates between the treatment and control branches suddenly narrowed.

Figure 2 con rms that the interest rate cap a ected branches di erently based on prevailing pre-regulation interest rates charged on industrial loans. This compression in interest rate di erentials across loans o ered by di erent branches may a ect both the demand and supply of credit. First, demand for credit should increase due to lower interest rates prevailing in the market. Second, lenders will not nd it pro table to supply credit if the capped rate is below their break-even interest rate. Note that break-even rates may also increase if banks rely on relationship lending and supply credit under the presumption of extracting surpluses in future periods when the cap may no longer be in place. We present a two-period model which formalizes these theoretical predictions in Section 3. In Section 5, we present the results from applying our di erence-in-di erences approach to document e ects of the interest rate cap on credit provision and loan performance. Our empirical ndings are consistent with ex ante imperfect competition exhibiting a strong in uence on corporate credit markets.

In Table 1 we investigate how branches determine interest rates on loans originated before

Table 1: Determinants of Pre-Cap Branch-Level Interest Rates

	Pre-Cap Interest Rate		
	(1)	(2)	(3)
District-Bank Category-Bank Market Share	0.186		
	(0.031)		
log Number of Banks by Bank Category in District		-0.115	
		(0.007)	
District-Bank Category-Bank Level HHI			0.634
			(0.032)
Deposit Interest Rate	0.039	0.039	0.036
	(0.003)	(0.003)	(0.003)
Without Collateral Dummy	2.312	2.313	2.312
	(0.048)	(0.048)	(0.048)
Population Density	0.286	0.096	0.074
	(0.024)	(0.027)	(0.025)
Upper Poverty Ratio	-0.279	-0.282	-0.314
	(0.034)	(0.034)	(0.034)
Speci cation	OLS	OLS	OLS
Bank FE	X	X	X
Sector FE	X	X	X
Number of Banks	39	39	39
Number of Branches	2121	2121	2121
Observations	331374	331374	331374
Adj. R-squared	0.305	0.306	0.306

Notes: Each column in the table reports results from estimating a predictive regression of pre-cap branch-level average corporate loan interest rates on branch characteristics. The largest administrative unit in Bangladesh is a district (zila). Each division (akin to a census region) is comprised of districts, and further subdivided into subdistricts (upazilas). In total, Bangladesh has 8 divisions, 64 districts, and 495 upazilas. District-Bank Category-Bank Market Share is the market share of the outstanding loan amount lent by a parent bank within the same bank category and district prior to the regulation. Number of Banks by Bank Category is the number of banks within the same bank category and district. District-Bank Category-Bank Level HHI is the Her ndahl-Hirschman Index calculated based on the market share of the outstanding loan amount lent by a parent bank within the same bank category in a district prior to the regulation. To calculate District-Bank Category-Bank Market Share and District-Bank Category-Bank Level HHI, we exclude loans with greater than 9 months of delinquent payments. We compute population density by dividing population by the total land area in a district. Upper poverty ratio is the proportion of the population living below the upper poverty line in a district. The upper poverty line is set at the cost of consuming 2,122 calories per person per day, along with an allowance for non-food expenditures (World Bank 2023).

the regulation. To eliminate the role of heterogeneity at the bank and sector levels, we control for bank and sector fixed effects in all columns. This is important to the extent that features of lending contracts may be specific to certain types of firms or the pricing strategy of multi-branch banks which form the basis of our sample.

We observe three interesting factors explaining dispersion in branch-level interest rates within industrial sectors. First, branches attached to a parent bank with a higher market share within the same bank category within a district set higher interest rates (column 1). This result is robust to using alternative measures of geographic loan market concentration such as the (log) number of other banks by bank category operating in a district, or district-bank category-level HHI based on outstanding loans (columns 2 and 3, respectively). Second, branches paying higher interest rates on deposits and issuing loans without physical collateral set higher interest rates. This makes intuitive sense given that deposits help banks obtain capital to lend out and that losses given default will be higher on unsecured, non-recourse loan contracts. Lastly, interest rates are higher in more population dense areas and in districts where a large fraction of the population is above the upper poverty line. Hence, selection into our measure of treatment exposure based on pre-reform interest rates is based on a combination of proxies for non-relationship, static notions of market power, marginal costs of supplying credit, and local demand-side factors all of which we account for in our main specifications.

3 Conceptual Framework

In this section, we use a simple model of the credit market with imperfectly competitive banks to analytically discuss possible impacts of interest rate caps on corporate lending. The model is a simple extension of Petersen and Rajan (1995), a canonical model of credit supply under relationship lending and imperfect competition by lenders. We extend this model to incorporate *ex ante* market power by banks, in addition to *ex post* market power (i.e. relationship lending) already featured in this framework.

Banks face potential borrowers with investment opportunities over two periods. If the borrower invests and succeeds in the project, the bank can lock in a fraction of borrowers and extract rents in the next period. At the same time, the market is imperfectly competitive, and the bank charges an interest rate above the marginal cost net of default risk. Hence, depending on the degree of imperfect competition in the first and second periods, interest rate caps may increase or decrease the equilibrium credit supply.

3.1 Model Setup

There is a continuum of entrepreneurs with measure one seeking financing for projects. At date 1, each borrower has a project that requires one unit of consumption goods as an investment. Hereafter, we take the consumption good as a numéraire. If invested, the project succeeds and returns R_1 with probability p, and fails and returns zero with probability $1-p$ at the end of date 1.

Furthermore, if the project is successful in date 1, the entrepreneur will access another project at the beginning of date 2. This project requires one unit of the consumption good as an investment at the beginning of date 2 and returns R_2 with probability one at the end of period 2. If the project is not nanced on date 1, the borrower does not have an investment opportunity in date 2.

There is no storage technology in this economy, and hence, borrowers need to nance their projects through banks on both dates. We assume that there is a representative risk-neutral bank that operates under imperfect competition. The bank's cost of raising one unit of funding is a constant c in both periods.

In date 1, the bank posts the interest rate on new loans r_1. Based on this interest rate, each entrepreneur determines whether to borrow from the bank and invest in the project. To borrow from the bank, each entrepreneur i incurs a xed cost u_i to go to the bank. u_i is distributed following the cumulative distribution function $F(\ )$, which has full support and is twice continuously di erentiable.

At the beginning of date 2, the bank observes which entrepreneurs succeeded with their date 1 projects and thus have an investment opportunity in date 2. We assume that the bank can lock in such borrowers with probability g. In this event, the bank can fully extract rents from these borrowers by charging an interest rate R_2. With remaining probability $(1 \quad g)$, borrowers leave the bank and seek funding through other means at an interest rate R_2. Therefore, the parameter g proxies for banks' *ex post* market power after establishing a relationship with the borrower.[8]

On date 1, the bank sets interest rates r_1 to maximize their expected pro t. Given that the bank extracts all rents on date 2, the entrepreneur's decision to borrow depends solely on the surplus on date 1. Hence, an entrepreneur i with cost u_i borrows from the bank if and only if

$$R_1 \quad r_1 \quad u_i > 0. \tag{1}$$

By integrating over u_i, the demand function is given by $D(r_1) = 1 \quad F(R_1 \quad r_1)$. We denote the elasticity of demand by $e(r_1) \quad \frac{r_1}{D(r_1)} \frac{\P D(r_1)}{\P r_1}$.

To de ne the equilibrium interest rate, we rst consider the break-even interest rate for the bank in date 1. For each entrepreneur, the cost of funding on both dates is c. The bank breaks even if this cost equals the expected bene t in date 1, r_1, plus the expected pro t in date 2, $pg(R_2 \quad c)$. Hence, the break-even interest rate for the bank is $c/p \quad g(R_2 \quad c)$. Following the approach of Weyl and Fabinger (2013), we introduce imperfect competition to this setting using a conduct parameter. Namely, we assume that the bank charges interest rates as follows:

$$r_1 = \frac{c/p \quad g(R_2 \quad c)}{1 \quad q/e(r_1)}, \tag{2}$$

where q is the conduct parameter that governs the degree of imperfect competition. If $q = 1$, the

[8] Petersen and Rajan (1995) interpret g as the degree of competition of banks after the relationship is built. This parameter is generically di erent from the degree of competition in date 1. Also note that, for our purpose, it does not matter whether the borrower seeks funding from other banks or non-bank entities in the economy if the bank cannot lock in the borrower.

bank operates as a monopoly, and when $q = 0$, the market is under perfect competition.

3.2 Predicted E ects of an Interest Rate Cap on Lending

We now analyze the impacts of an interest rate cap policy in this lending market with imperfect competition. Consider the interest rate cap in dates 1 and 2 at dr_1, where $0 < d < 1$. To focus on a nontrivial case, assume that $R_2 > \bar{r}$, so that the interest rate cap also binds in date 2. Because the bank's surplus goes down in date 2, the bank's break-even interest rate on date 1 goes up to

$$c/p \quad g(\bar{r} \quad c) \tag{3}$$

If this break-even rate is still below the interest rate cap, banks keep supplying credit at interest rate $\bar{r}$. In this case, lower interest rates attract credit demand and increase equilibrium credit supply. If the break-even rate is above the cap, the bank is unwilling to supply credit because expected pro t is zero. We summarize this result in the following proposition:

Proposition 1 Consider the policy to cap the interest rate at dr_1 in dates 1 and 2, where $0 < d < 1$ and $R_2 > \bar{r}$. Equilibrium credit supply in date 1 strictly increases if and only if

$$d > \frac{1 \quad q/e(r_1)}{c/p \quad g(R_2 \quad c)} (c/p \quad g(\bar{r} \quad c)) .$$

Proposition 1 clari es under what conditions the interest rate cap leads to increases or decreases in credit supply. In particular, it clari es how ex antemarket power (proxied by q) and ex postmarket power (proxied by g) shape the cap's impacts. First, this condition is more likely to be satis ed if ex antemarket power, or q, is greater. In particular, if $q = 0$ (i.e., perfect competition), the equilibrium interest rate coincides with the break-even interest rate (equation 2) even without regulation. In this case, any binding $\bar{r}$ results in a decrease in credit supply. Second, this condition is less likely to be satis ed if g is larger. Intuitively, if banks supply credit in date 1 under the assumption that they can extract more surplus in date 2 (a higher g), the binding interest rate in date 2 limits the scope for surplus extraction and decreases expected pro t.

It immediately follows that the socially optimal interest rate cap in this model is the bank's break-even interest rate. Therefore, if the condition in Proposition 1 is satis ed, the interest cap is welfare-improving. This welfare improvement arises because of the expansion of credit supply in both date 1 and date 2. As mentioned above, this condition is more likely to be satis ed if ex antemarket power (q) is stronger and ex postmarket power (g) is weaker. The following sections of the paper empirically assess this prediction.

4 Data and Empirical Speci cation

In this section we describe the credit registry and bank balance sheet data we use to explore how interest rate cap policies in uence business lending outcomes.

4.1 Data

Central Bank credit registry data.The main dataset we use in this paper consists of con dential loan microdata from the Scheduled Bank Statistics (SBS-3) provided to us by Bangladesh Bank. We merge SBS-3 to bank balance sheets, which are contained in a related regulatory dataset called SBS-1. In Bangladesh, all banks must submit detailed information about advances from all of their branches to Bangladesh Bank at the end of each quarter. The information reported includes the number of outstanding loan accounts and total outstanding amount, the interest rate charged within each loan or deposit account type, the presence and types of collateral (e.g., real estate-secured vs. cash- ow secured), borrowers' industrial sector, and the economic purpose of the loans.[9]

While we lack data on individual loans from the interest rate cap period, the SBS-3 data are su ciently disaggregated that we can distinguish segments of the lending market subject to the policy, document how lending ows to di erent sectors of the economy respond, and identify the location of bank branches up to the subdistrict (upazila) level. For the analysis in Section 6 in which we examine bank competition using a nearest-neighbor design, we de ne banks' closest direct competitors by matching on branch characteristics within the same subdistrict, including size and the industry composition of corporate lending. We tabulate sectoral shares of lending at the branch level in the Appendix (see Figure A.1); about two-thirds of branches in our sample conduct the largest share of their corporate lending to rms in the commerce and trade sector (export rms), with domestic manufacturing as the second-most common sector for corporate lending specialization. Bangladesh is administratively subdivided into 495 subdistricts, each with an average area of 300 square kilometers. For comparison, the average area is roughly one-sixth the size of the average U.S. county.

The SBS data also contain information about individual and corporate deposits and interest paid on those accounts. We use these line items to assess whether banks wield market power in the corporate lending market by keeping rates paid on deposits low despite movements in benchmark policy rates sometimes referred to as the deposit franchise" as has been argued for the banking sector in the U.S. (e.g., Drechsler, Savov, and Schnabl 2017, 2021). Although Table 1 shows that branches paying greater deposit rates charge higher interest rates on corporate loans, we nd only mixed evidence of heterogeneous branch lending responses with respect to proxies for the marginal cost of capital, including deposit rates.[10]

[9]Since the SBS-3 data available to researchers are collapsed to the account type-by-sector level, interest rates are calculated as total annual interest charged divided by the outstanding dollar value of the account and rounded up to the nearest basis point. More detailed descriptions about the SBS-3 data set can be found in Bangladesh Bank (2013), accessed at https://www.bangladesh-bank.org/aboutus/draftguinoti cation/guideline/draftsbs.pdf. Note that there were some changes in the speci cation of the SBS-3 data entry in 2013, and this paper uses the data set before this revision.

[10]Part of the reason we do not nd strong evidence of a deposit franchise form of market power in this setting is that Bangladesh Bank encouraged banks to raise deposit rates in their announcement of the interest rate cap. Bangladesh Bank subsequently capped the rate spread between corporate loans and deposits after the corporate loan cap regime we study. The more recent round of interest rate cap policy implemented in April 2020 also included a cap on the rate spread between corporate lending and deposit interest rates of 100 basis points, indicating that this potential form of static market power is of concern to regulators.

For our main analysis, we use data from the rst quarter of 2008 to the fourth quarter of 2010 to study the interest rate cap regime. The full span of our data covers the period from 2008Q1 to 2014Q3, which is divided into the pre-cap period (2008Q1 2009Q1), the cap regime period (2009Q2 2010Q4), and the post-cap period (2011Q1 2014Q3). Note that since we have a full calendar year of data prior to the introduction of the cap, seasonal trends in lending do not play a role in our analysis. Further, we exclude loans to the agricultural sector which has highly cyclical output within a given year due to the monsoon season.

The 2009 interest rate cap applied to working capital and term loans to large and medium-scale industrial rms, agriculture, housing sector loans, and trade nancing. To select the relevant category of loans subject to the regulation, we omit loans whose borrowers' sectors fall into the category of fuel, government, other public sectors, and individuals. We then aggregate the dataset to the bank-branch level. To obtain the interest rate at each branch in each quarter, we take averages share-weighted by the outstanding loan amount, excluding from the calculation loans that were ever past due over the preceding nine months. In the Appendix, we show virtually identical results when we instead use equal-weighted averages to measure branch-level interest rates (see Appendix Tables A.5, A.6, and A.7).

World Bank Enterprise Survey data. Since the SBS data lack information about individual loans, we use rm responses to the Bangladesh World Bank Enterprise Survey (WBES) to examine how the 2009 interest rate cap in uenced individual rm outcomes.[11] Firms in the WBES provide information on their output, use of labor and capital inputs, and their capital structure (internal vs. external nancing), including contract features such as the interest rate, collateral, and term length of any loans received in the last three years prior to the survey. Firm panel responses are available for the 2007 (pre-cap) and 2011 (post-cap) survey waves. Target respondents in the WBES waves include small and medium-sized enterprises (SMEs) as well as larger enterprises, meaning the WBES panel data includes rms which are both subject and not subject to rate caps.

The panel structure of WBES allows us to estimate static di erence-in-di erences (DiD) speci cations comparing lending and real outcomes for regulated vs. unregulated rms before vs. after the implementation of the cap. We can also estimate versions of our main empirical speci cation, described below for the SBS data, but using the WBES data. Because this involves comparing rms within regulated sectors who were previously receiving loans above vs. below the rate cap, we run into statistical power issues given the relatively small number of rms who appear in both survey waves ($N = 488$) before imposing any sample restrictions. We construct pseudo-panels of observably similar enterprises and re-estimate our static DiD speci cations to overcome concerns about sample attrition bias between survey waves.

[11] The WBES is a standard resource to the development economics literature; see Hallward-Driemeier and Pritchett (2015) for an overview of the survey construction and its limitations. Publicly available, anonymized microdata for each country can be downloaded here: https://www.enterprisesurveys.org/en/data.

4.2 Main Empirical Speci cations

Our main identi cation strategy is a DiD design using branch-level variation in pre-regulation interest rates. As discussed in Section 2, the introduction and removal of the interest rate cap is associated with a sudden decrease and then increase of interest rates for bank branches, particularly for branches whose interest rates are above 13 percent prior to the regulation. On the other hand, those that charge below 13 percent ex ante do not exhibit any signi cant change in interest rates charged on loans. Motivated by this observation, we estimate the following regression speci cation:

$$Y_{i,t} = \sum_{s=-m,s\neq -1}^{s=n} b_s \; TrtIntensity_i \; 1\{t = s\} + \sum_{s=-m,s\neq -1}^{s=n} g_s \; PreRateGrowth_i \; 1\{t = s\}$$

$$+ g^0 X_{Bank(i),t-1} + h_i + n_{Bank(i),t} + e_{i,t} \qquad (4)$$

where i is the bank branch, t is the quarter, $Bank(i)$ is the bank that branch i belongs to, and $Y_{i,t}$ is the outcome variable (e.g., interest rates, amount and number of outstanding loans, delinquency status). $TrtIntensity_i$ captures how much branch i is exposed to the interest rate cap regulation, à la Panel (b) of Figure 2, and it is constructed as follows: we rst take an average of annualized interest rates on outstanding loans originated by bank branch i during the pre-cap period of our data, spanning 2008Q1 to 2009Q1. If that average is above 13 percent, we then take the di erence between the branch-level average interest rate and the 13 percent cap. If it is below 13 percent, we assign $TrtIntensity_i = 0$ to the branch. Hence, b_s captures the marginal increase in the outcome variable in quarter t if the pre-regulation interest rate increases by one percentage point.

$PreRateGrowth_i$ controls for the time trend of any branch-speci c pre-regulation changes in interest rates. This is the growth rate of the average interest rate in 2009Q1 relative to 2008Q1. Controlling for the pre-reform path of interest rates is potentially important for the validity of our research design for two reasons. First, some loans included in our average interest rate calculation may be oating rate debt contracts indexed to a market rate like the repo rate, which is directly controlled through central bank monetary policy. We verify using rm-level data from the World Bank Enterprise Survey (WBES) which o ers details on individual loan contracts that most rms who borrow receive short-term xed rate loans, with maturities under one year. The typically short, less than 2-year maturity o ered on loans in Bangladesh is consistent with our Figure 1, which shows that almost 90% of outstanding loans abide by the 13% cap within seven quarters of the policy regime; in other words, new term loans to repeat borrowers reset" below the cap once any previous loans mature. Second, even if the vast majority of corporate loans in our sample are xed rate contracts, there may be branch-speci c monetary policy pass-through to loan interest rates. This would be the case if, for instance, branches to a greater or lesser extent rely on deposits to fund loan originations. Reassuringly, we do not uncover any clear di erences

in deposit rates or deposit amounts across branches along the dimension of $TrtIntensity_i$.[12]

Depending on the speci cation, we de ne $e_{Bank(i),t}$ as either bank quarter xed e ects or bank category quarter xed e ects. Bank category dummies distinguish between private domestic vs. foreign commercial banks. These xed a ects allow us to account for time-varying shocks to banks, including any bank-speci c fallout from the Global Financial Crisis or bank-speci c changes to capital requirements accompanying the adoption of Basel II regulations in Bangladesh in 2010 (Bangladesh Bank 2008). To assess the validity of the parallel trends identifying assumption, we test whether b_s is insigni cant and close to zero before the regulation starts. As is standard practice, we omit the quarter before the reform, b_s, for $s = 2009Q1$, which serves as the reference period for the event study coe cients. Finally, in speci cations with bank category quarter xed e ects, the vector $X_{Bank(i),t-1}$ includes lagged bank balance sheet controls: the log of cash holdings, deposit liabilities, total assets, and total liabilities. We lag the bank balance sheet measures to account for the bad control" problem; that is, variables such as pro tability may themselves be outcome variables in uenced by the interest rate cap.[13]

Our estimation sample includes all privately-owned bank branches with a strictly positive amount of outstanding business loans in all quarters from the rst quarter of 2008 to the fourth quarter of 2011. This corresponds to a balanced panel of 1,855 bank branches that belong to 39 parent banks. To incorporate the possibility that outcome variables are correlated within each branch and over time, we cluster standard errors at the branch level; however, we also report standard errors at the bank-time level in the Appendix (see Tables A.11 A.15), which generally results in less conservative standard errors. Using the full timespan of our data prior to the removal of the interest cap results in a time window of $h = -5$ quarters prior to the cap and $h = +7$ quarters during which the cap was in place.

While regression equation (4) is informative about di erential impacts of the interest rate cap regulation across banks, it is also useful to provide elasticity estimates of how the outcome variables (e.g., credit supply measures) respond to a one percentage point change in charged interest rates. To empirically estimate this policy parameter, we execute the following IV regression:

$$Y_{i,d,t} = a \; InterestRate_{i,t} + g^0 \; X_{Bank(i),t-1} + h_i + n_{Bank(i),t} + y_{d,t} + e_{i,d,t} \qquad (5)$$

where we instrument $InterestRate_{i,t}$ with $TrtIntensity_i \; 1\{t \geq 2009Q2\}$. This instrument extrapolates the impacts of the decrease in interest rates on outcome variables using the change in interest rates induced by the introduction of the cap. For log outcomes $Y_{i,t}$, the resulting IV

[12] We show in the Appendix that over half of deposits come from individual accounts, while the next highest share (18%) comes from commerce and trade accounts. We plot the repo market policy rate against deposit rates o ered by banks for individual deposit accounts in Figure X. Indeed, deposit rates closely track movements in the policy rate.

[13] $X_{Bank(i),t-1}$ is absorbed by bank quarter xed e ects, and therefore we can only include lagged balance sheet controls in speci cations where we include $e_{Bank(i),t}$ as bank category time xed e ects.

Figure 3: First Stage E ect of Rate Cap on Interest Rates Charged on Corporate Loans

Notes: The gure plots the estimated coe cients of treatment intensity interacted with quarter dummies from event study equation (4) with the share-weighted average branch-level interest rate charged on corporate loans as the outcome. We omit the quarter before the cap reform (2009Q1) as the reference category. Bangladesh Bank announced the interest rate cap on April 19, 2009 (2009Q2), with the cap e ective immediately. 95% con dence interval bars obtained from clustering standard errors at the branch level.

estimate of δ thus results in an interest rate semi-elasticity.[14] We account for time-varying shocks to the parent bank via bank-by-quarter xed e ects $\eta_{Bank(i),t}$, and to the geographic market via branch district-by-quarter xed e ects $\gamma_{d,t}$. Importantly, estimating (5) via OLS would result in elasticities contaminated by reverse causality, since outward shifts in credit demand can push up interest rates, and the central bank may respond to an expanding economy by raising the policy rate to rein in in ation.[15]

5 Main Results

This section presents our headline results showing that banks which previously charged rates above the interest rate cap responded to the policy by expanding equilibrium credit provision, consistent with ex ante market power dominating a relationship lending channel in determining credit supply.

5.1 E ects of Interest Rate Caps on Interest Rates and Credit Supply

Figure 3 shows the rst stage e ect of the interest rate cap on average interest rates, plotting the estimated θ_s from regression (4). As predicted from the discussion in Section 2, there are

[14] In the Appendix, we report estimates from (5) including a longer time sample which allows us to study the remove of the interest rate cap in 2012Q1. With the extended time sample, we augment 5 to accommodate asymmetric e ects of the introduction of the cap (δ_1) and the lifting of the cap (δ_2). Interest rates partially revert to pre-cap levels after the removal of the cap. This is due, in part, to the fact that the Central Bank increased the policy repo rate as the Global Financial Crisis receded.

[15] Indeed, OLS regressions yield $\delta > 0$, indicating a positive correlation between interest rates and loan demand, when the outcome variable is de ned as extensive margin lending.

strong and sudden negative e ects on branch-level interest rates. Before the regulation, there is no discernible pre-trend. Right after the cap is introduced, interest rates immediately decline, indicating that bank branches with high treatment intensity (i.e., those that antecharged rates above 13%) decrease their interest rates by relatively more. Average interest rates respond gradually to the introduction of the cap, likely because some outstanding loans were disbursed before the cap was introduced, and the loans were not re nanced but instead held to maturity. In response to a 1 p.p. increase in treatment intensity that is, a 100 basis point spread between pre-reform interest rates and the 13% cap average interest rates decline by 30 basis points in 2009Q2, and the e ect grows to a 50 basis point decline by 2010Q4. The immediate pass through of the cap to lower interest rates is slightly more pronounced for non-tradable rms; within a quarter of the reform, interest rates on loans charged to that sector decline by 45 basis points, compared to a 30 basis point decline for loans to tradable sector rms (Figure A.3).

How does credit supply respond to this decrease in interest rates? Figure 4 shows the e ects on branch-level log total outstanding loan amounts, the number of total outstanding loans, and the average outstanding amount per loan account (excluding loans whose repayment is past due over nine months).[16] There are no statistically signi cant pre-trends prior to the regulation, bolstering the validity of our di erence-in-di erences design.

The gure reveals a striking nding. The introduction of the cap leads to increases in corporate credit provision, with the e ect growing over the course of the cap regime. The e ect on total outstanding loan amounts gradually increases from 5.1% (5 log points) in the second quarter of 2009 to 22.1% (20 log points) by the fourth quarter of 2010, while the number of the total outstanding loans gradually increases from 2.0% (2 log points) in the second quarter of 2009 to 9.4% (9 log points) by the fourth quarter of 2010. Since the e ect of the cap on the total outstanding loan amount is larger than the e ect on the number of total outstanding loans, there is also a statistically signi cant impact on the average outstanding amount per loan account.

Table 2 summarizes these results in a regression table format where we pool coe cients across quarters and additionally control for lagged bank balance sheet characteristics. Columns (1) and (2) show the coe cients for the rst stage e ect on interest rates, while the remaining columns of the table use loan measures as the outcome. Mirroring Figure 4, our results indicate that banks respond to the cap by expanding their lending on both the intensive and extensive margins. Our results hold regardless of whether we include the bank-by-quarter xed e ects (odd columns) or zoom out to bank category-by-quarter xed e ects (even columns), indicating that our source of variation is not simply driven by di erences in loan pricing across parent banks. Indeed, the standard deviation of cap exposure measure TrtIntensity across branches is roughly 101 basis points in our sample; the within-bank standard deviation of TrtIntensity is 59 basis points. Hence, in contrast to other sectors such as retail in the U.S. where the same products are sold across many locations DellaVigna and Gentzkow (2019), banks in Bangladesh do not engage in uniform loan pricing across branches.

[16] Note that since we restrict our sample to a balanced panel of branches issuing loans in each quarter, using log outcomes does not result in dropped observations.

Figure 4: Event Study Analysis of the Interest Rate Cap on Corporate Lending

Notes: The gure plots the estimated coe cients of treatment intensity interacted with quarter dummies from event study equation (4) with corporate lending measures as the outcome. We consider three measures of equilibrium branch-level credit supply: the log of total outstanding loan dollars, the log number of outstanding loans (extensive margin), and the log average outstanding amount, computed as total lending dollars divided by the number of loans. We omit the quarter before the cap reform (2009Q1) as the reference category. Bangladesh Bank announced the interest rate cap on April 19, 2009 (2009Q2), with the cap e ective immediately. 95% con dence interval bars obtained from clustering standard errors at the branch level.

Table 3 presents results from estimating the instrumental variable (IV) regression in (5). Recasting our research design as a di erence-in-di erences instrument variables (DiD-IV) speci cation helps translate the estimates in Table 2 into a lending semi-elasticity. After the Central Bank introduces the interest rate cap, a one percentage point decrease in average interest rates increases branch-level total outstanding loan dollars by 31 percentage points, the number of outstanding loans by 14 percentage points, and the average outstanding amount per loan account by 17 percentage points, respectively. In all speci cations, we exclude public-sector banks which are subject to separate regulations which keep average pre-reform interest rates below the eventual 13% cap; such publicly-owned banks are therefore infra-marginal to the reform. This indicates that the increase in branch-level credit supply is driven by both the extensive and intensive margin for private-sector banks[17].

For each speci cation in Table 3, we report the (Montiel Olea and P ueger 2013) F-stat for the excluded rst stage instruments of TrtIntensity Quarter, which is robust to clustering by bank branch and to heteroskedasticity (Andrews, Stock, and Sun 2019). Across all regressions, and even when we include district quarter xed e ects and lagged bank balance sheet controls, the F-Stat exceeds the 2SLS estimator thresholds for 5% worst case bias relative to OLS at the 5% con dence level. Hence, our analysis is not subject to a weak IV problem, despite the use of

[17] Our results are directionally the same, albeit attenuated, when we include public-sector banks in the estimation sample. For instance, Table A.4 the estimated IV e ect on log total outstanding loan dollars is 0.17 log points, compared to 0.31 log points in our baseline speci cation in Table 3 excluding public banks.

Table 2: E ects of the Rate Cap on Interest Rates and Credit Provision

	Interest Rate		log Total Outstanding Amount		log Number of Outstanding Loans		log Average Outstanding Amount	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Trt Intensity x 08Q1-Q4	-0.009		-0.002		-0.013		0.011	
	(0.007)		(0.021)		(0.026)		(0.018)	
Trt Intensity x 08Q2-Q4		0.007		0.050		0.061		-0.011
		(0.009)		(0.020)		(0.020)		(0.017)
Trt Intensity x 09Q2-Q4	-0.353	-0.156	0.090	0.099	0.032	0.030	0.058	0.069
	(0.037)	(0.035)	(0.017)	(0.015)	(0.015)	(0.015)	(0.016)	(0.014)
Trt Intensity x 10Q1-Q4	-0.471	-0.349	0.166	0.171	0.059	0.078	0.107	0.093
	(0.044)	(0.042)	(0.028)	(0.024)	(0.024)	(0.022)	(0.022)	(0.019)
Speci cation	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS
Branch FE	X	X	X	X	X	X	X	X
Bank X Quarter FE	X		X		X		X	
Bank Category X Quarter FE		X		X		X		X
Lagged Balance Sheet Controls		X		X		X		X
Number of Banks	39	30	39	30	39	30	39	30
Number of Branches	1855	1137	1855	1137	1855	1137	1855	1137
Observations	22260	12507	22260	12507	22260	12507	22260	12507
Adj. R-squared	0.879	0.799	0.955	0.961	0.906	0.870	0.921	0.907

Notes: The table reports results from estimating event study regression (4) with e ects pooled across several quarters. Trt Intensity_i captures how much branch i is exposed to the interest rate cap regulation, and it is constructed as follows: we rst take average annualized interest rates of outstanding loans by bank branch i from the rst quarter of 2008 to the rst quarter of 2009. If this number is above 13 percent, we take the di erence between the average interest rate and the 13 percent cap threshold. If the di erence is below 13 percent, we assign $\text{Trt Intensity}_i = 0$ indicating that the branch is, on average, infra-marginal to the reform. All estimates are relative to the quarter before the reform, and we therefore omit $\text{Trt Intensity} \quad 09Q1$. We de ne the interest rate outcome in columns (1) and (2) as the share-weighted average branch-level interest rate on corporate loans. Odd columns correspond to our baseline speci cation in which we include bank-by-quarter xed e ects; in even columns, we replace the bank-by-quarter xed e ects with bank category-by-quarter xed e ects and add lagged balance sheet controls, including log cash holdings, deposit liabilities, and total assets. Robust standard errors clustered at the branch level in parentheses. *p<0.1; **p<0.05; ***p<0.01.

several instruments when we estimate dynamic policy e ects by quarter.[18]

Bangladesh Bank imposed a ceiling on corporate interest rates in the wake of the Global Financial Crisis in an e ort to help prop up corporate investment. One concern is that rms may have responded to the crisis by seeking more credit to smooth out negative shocks to their product demand even in the absence of lower cap-induced rates. While Figure 3 and Figure 4 exhibit no clear visual evidence of violations of the parallel trends assumption, we test the robustness of our estimated treatment e ects for interest rates and lending when we relax the parallel trends assumption and allow for the possibility that our treatment e ects are only partially identi ed by branch-level variation in exposure to the cap. Speci cally, we conduct Rambachan and Roth (2023) tests in which we vary the M parameter representing the multiple by which the post-treatment violations of parallel trends can deviate from the pre-treatment di erences in

[18] In subsequent tables, we also report test statistics from the more commonly used Kleibergen-Paap rk Wald F-test, which is only robust to clustering. With the exception of some speci cations in which we examine heterogeneous responses to the reform by branch location characteristics, our rst stage still reaches the rule-of-thumb F-stat threshold of 10.

Table 3: IV Estimates of Cap-Induced Change in Interest Rates on Credit Provision

	log Total Outstanding Amount		log Number of Outstanding Loans		log Average Outstanding Amount	
	(1)	(2)	(3)	(4)	(5)	(6)
Interest Rate	-0.310	-0.408	-0.139	-0.058	-0.172	-0.351
	(0.056)	(0.085)	(0.055)	(0.078)	(0.049)	(0.079)
Speci cation	IV	IV	IV	IV	IV	IV
Montiel Olea and P ueger F-Statistics	496.45	61.26	496.45	61.26	496.45	61.26
Branch FE	X	X	X	X	X	X
Bank X Quarter FE	X		X		X	
Bank Category X Quarter FE		X		X		X
Lagged Balance Sheet Controls		X		X		X
District X Quarter FE	X	X	X	X	X	X
Number of Banks	39	30	39	30	39	30
Number of Branches	1855	1137	1855	1137	1855	1137
Observations	22260	12507	22260	12507	22260	12507

Notes: The table reports results from estimating the IV speci cation in (5) via 2SLS. We instrument the endogenous variable, the branch-level average interest rate, with $TrtIntensity_i 1[t \quad 2009Q2]$, which captures how much branch i is exposed to the interest rate cap regulation. See text for how we de ne $TrtIntensity_i$. Odd columns correspond to our baseline speci cation in which we include bank-by-quarter xed e ects; in even columns, we replace the bank-by-quarter xed e ects with bank category-by-quarter xed e ects and add lagged balance sheet controls, including log cash holdings, deposit liabilities, and total assets. Robust standard errors clustered at the branch level in parentheses. For each speci cation, we report the rst-stage F-statistic for the excluded instrument from Montiel Olea and P ueger (2013), which is robust to clustering by bank branch and to heteroskedasticity. *p<0.1; **p<0.05; ***p<0.01.

trends. The estimated rst stage e ect on interest rates remains statistically signi cant even if we impose a relatively extreme value of $M = 2$. The positive branch-level outstanding loan response remains signi cant at the 90% level for $M = 2$ and signi cant at the 95% level for $M < 2$. We provide the full results of our parallel trends tests in Figure A.4.

As a placebo check, we show in the Appendix that there is no discernible impact of the interest rate cap on segments of the lending market not directly regulated by the policy. Event study gure Figure A.5 and Table A.19 show results from re-estimating (4), where the outcome variables are now de ned using loans to individuals, which includes both sole-proprietorships or entrepreneurs and consumer installment loans. The treatment intensity measure is de ned in the same way as in Table 2 but now computed over the segment of loans to individuals instead of corporate industrial loans. We nd no statistically signi cant rst stage e ects on interest rates or reduced-form e ects on the supply of credit to individuals. This further indicates that the estimated increase in lending to the corporate sector is unlikely to simply be due to secular, expansionary trends in the overall banking sector during the recovery from the Global Financial Crisis.[19]

We also examine in the Appendix the e ects of the cap on lending outcomes by ex ante interest rate bins. Figure A.6 reports the event study graphs and Table A.1 summarizes the results in a pooled regression format. After the regulation, shares of outstanding loan amounts and the

[19] The null e ect on individual loan interest rates and lending volumes also means there is no average cross-loan segment pricing response within bank branches.

number of loans with interest rates below 13% increase while the share of the lending market with interest rates above 13% symmetrically declines. Based on the ndings in Tables 2 and A.1, we also estimate changes in the total outstanding amount and the number of loans within each 100 basis point interest rate bin. Figure A.6 shows that the estimated e ects are driven by interest rate bins farther above 13%. Our analysis is therefore robust to using more non-parametric versions of our treatment intensity measure to identify e ects of the rate cap.

Finally, we show in the Appendix that interest rates fall and lending expands even when we include publicly-owned banks or exclude the eight Islamic nance banks from the sample. Pass through of the rate cap into lower average branch-level interest rates is stronger for publicly-owned banks, and lending responses are more muted (see Tables A.2, A.3, and A.4). Through the lens of Proposition 1 of the model, this would suggest that relationship lending forces may be stronger than ex ante markups among bank-borrower pairs in the public banking segment of the market. However, the point estimates for both the pricing and quantity responses are virtually identical even when we drop the Islamic nance banks (see Tables A.8, A.9, and A.10).

Taking stock, our lending semi-elasticity estimates are at the upper end of estimates produced from other policy experiments in the literature on loan markets. Studies using bunching below thresholds in interest rate schedules for mortgages (DeFusco and Paciorek 2017) and unsecured ntech loans (Cespedes 2024) nd semi-elasticities of around 2, meaning that for every 100 basis point increase in interest rates, loan demand falls by 2%. However, these estimates combine the extensive and intensive margins. Bhutta and Ringo (2021) exploit a drop in interest rates via insurance premia charged on FHA mortgages and uncover a similar 2 semi-elasticity, but also show that the semi-elasticity is closer to 20 on the extensive margin of mortgage demand. We estimate an extensive margin corporate lending semi-elasticity of 15 (14 log points). The extensive margin response is lower than the overall response in our setting, in part, due to the presence of relationship lending in corporate loans, whereas this type of market power is less pronounced for consumer loans.

Our study is among the rst to estimate a lending semi-elasticity with respect to interest rate regulation in a corporate loan market. An exception is Altavilla, Boucinha, and Bouscasse (2022), who decompose credit supply and demand determinants of equilibrium lending in the euro area around the COVID-19 crisis. Those authors estimate a semi-elasticity of credit demand in the range of 7 to 23 more in line with our estimates, especially when we include publicly-owned banks in our sample (Table A.4). Our analysis still deviates in two major ways: (i) we identify lending responses via variation across branches within the same domestic bank, as opposed to shocks across banks spanning multiple countries; and (ii) we focus on a developing country where ex ante bank market power is likely stronger due to weaker nancial institutions.

5.2 E ects on Loan Performance and Lenders' Costs of Capital

One criticism of interest rate caps is that they may result in the rationing of credit to ex ante riskier borrowers, as other studies nd when rate caps are imposed in consumer lending markets

(Cuesta and Sepulveda 2021, Burga, Nivin, and Yamunaqué 2022, Cherry 2024). Intuitively, if banks are unable to charge higher interest rates for riskier borrowers, then they might prioritize loans to borrowers infra-marginal to the reform, who would have been charged rates below the 13% cap even in its absence. Given that most corporate loans in Bangladesh have a term of one or two years, such changes in the borrower risk pool should be re ected in delinquency rates during the two-year cap period and the extent to which loans are secured by collateral. At the same time, our results in the preceding section document that equilibrium credit supply increased on both the extensive and intensive margins. Hence, banks likely responded to the reform by broadening the pool of borrowers beyond existing customers during the cap period when short-term credit demand was high.

We resolve this tension in Table 4 by examining the e ects of interest rate caps on proxies for banks' marginal cost of supplying funds. Banks may nd it easier to make up losses from the reduction in interest rates by reducing deposit rates on individual accounts, thus widening the spread on deposits relative to rates charged on corporate loans otherwise known as the deposit franchise channel of market power (Drechsler, Savov, and Schnabl 2021). Column (1) with bank time xed e ects shows no clear evidence of a reaction in deposit rates to the cap, although the sign of the immediate post-period coe cient is negative. However, in column (2) where we include lagged bank balance sheet controls and bank type-time xed e ects, we nd banks decrease deposit rates within three quarters after the reform by an average of 9.1 basis points for every 100 basis points greater exposure to the cap, with no observed e ect in the second year of the cap regime. Part of the reason we do not nd strong evidence of a deposit franchise form of market power is that Bangladesh Bank relied on moral suasion to keep deposit rates elevated and tightened maximum credit-to-deposit ratios towards the end of the industrial loan rate cap regime (International Monetary Fund 2011, pg. 12).[20]

Banks in the SBS credit registry data report loans as bad" or a loss" if the payment is past due for over nine months. Similarly, we observe ags for the proportion of loans which are delinquent for at least 3 months or at least 6 months. We nd null e ects for more persistent 9-month and 6-month delinquency rates, but some evidence of an uptick in 3-month delinquency rates in column (8) in the speci cation with lagged bank balance sheet controls and bank type-by-time xed e ects. Towards the end of the cap regime, 3-month delinquency rates increase by 0.8 percentage points (a 14% increase relative to the pre-cap baseline), re ecting that a portion of the extensive margin response of lending involves the provision of new loans to ex-post riskier borrowers.[21]

In the nal two columns of Table 4, we investigate whether bank branches shift lending towards contracts secured by physical collateral to mitigate lost pro ts from the cap. Such contracts feature lower loss given default, since the asset backing the loan can be liquidated in

[20] Consistent with the Central Bank encouraging banks to raise their deposit rates, we nd that corporate deposit rates increase by 20.3 basis points within the year of the reform for every 100 basis points greater exposure to the cap based on pre-reform branch lending patterns. Average pre-cap corporate deposit rates are almost 300 basis points lower than rates paid out on individual deposit accounts.

[21] The average pre-cap 9, 6, and 3-month delinquency rates are 4.4%, 4.9%, and 5.6%, respectively.

Table 4: E ects of the Rate Cap on Lenders' Costs of Supplying Credit

	Deposit Rate for Individual Accounts		Delinquency Rate: 9 Months or More Overdue		Delinquency Rate: 6 Months or More Overdue		Delinquency Rate: 3 Months or More Overdue		Proportion of Secured Loans	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Trt Intensity x 08Q1-Q4	0.011		-0.000		-0.002		-0.002		0.008	
	(0.040)		(0.002)		(0.002)		(0.002)		(0.007)	
Trt Intensity x 08Q2-Q4		0.076		-0.001		-0.002		0.002		-0.016
		(0.036)		(0.002)		(0.002)		(0.003)		(0.006)
Trt Intensity x 09Q2-Q4	-0.048	-0.091	0.000	0.002	0.000	0.003	0.000	0.006	0.006	0.002
	(0.035)	(0.036)	(0.002)	(0.002)	(0.002)	(0.002)	(0.004)	(0.003)	(0.004)	(0.004)
Trt Intensity x 10Q1-Q4	0.012	-0.031	-0.001	0.004	-0.001	0.004	0.001	0.008	0.010	0.007
	(0.047)	(0.049)	(0.003)	(0.002)	(0.003)	(0.003)	(0.004)	(0.003)	(0.006)	(0.005)
Speci cation	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS
Branch FE	X	X	X	X	X	X	X	X	X	X
Bank X Quarter FE	X		X		X		X		X	
Bank Category X Quarter FE		X		X		X		X		X
Lagged Balance Sheet Controls		X		X		X		X		X
Number of Banks	0		0		0		0		0	
Number of Branches	0		0		0		0		0	
Observations	0		0		0		0		0	
Adj. R-squared	0.799	0.767	0.757	0.797	0.746	0.795	0.737	0.778	0.734	0.571

Notes: The table reports results from estimating event study regression (4) with e ects pooled across several quarters. For outcome variables, we consider several proxies for lenders' costs of supplying corporate credit, including: annualized deposit rates on individual accounts, delinquency rates, and the proportion of loans secured by physical collateral. Trt Intensity captures how much branch is exposed to the interest rate cap regulation, and it is constructed as follows: we rst take average annualized interest rates of outstanding loans by bank branch from the rst quarter of 2008 to the rst quarter of 2009. If this number is above 13 percent, we take the di erence between the average interest rate and the 13 percent cap threshold. If the di erence is below 13 percent, we assign Trt Intensity = 0, indicating that the branch is, on average, infra-marginal to the reform. All estimates are relative to the quarter before the reform, and we therefore omit Trt Intensity 09Q1. Odd columns correspond to our baseline speci cation in which we include bank-by-quarter xed e ects; in even columns, we replace the bank-by-quarter xed e ects with bank category-by-quarter xed e ects and add lagged balance sheet controls, including log cash holdings, deposit liabilities, and total assets. Robust standard errors clustered at the branch level in parentheses. *p<0.1; **p<0.05; ***p<0.01.

the event of severe non-payment spells. We find no clear effect of the cap on the proportion of collateralized loans; in column (9), there is marginally statistically significant one percentage point increase in the probability of secured lending. In Figure A.2 we show null dynamic effects across all outcomes considered in Table 4. In sum, our findings belie the notion that the interest rate cap led to systematic rationing of credit to riskier borrowers.

5.3 Heterogeneous Effects on Credit Supply

Through the lens of the model in Section 3, the magnitudes by which equilibrium credit supply responds to the interest rate cap may depend on the degree of local competition faced by banks. In Table 5 and Table 6, we empirically investigate what bank and local bank market characteristics induce heterogeneous credit provision responses using different combinations of ex ante measures. We repeat our IV analysis based on equation (5) by including interactions of the loan interest rate with such characteristics. As before, each coefficient in the two tables represents the effect of a one percentage point increase in interest rates. We therefore amend the excluded instruments to now be $TrtIntensity_i \cdot 1\{t \geq 2009Q2\} \cdot X_i$, where X_i consists of a vector of ex ante bank branch or market characteristics in the district where branch i resides.

Two clear dimensions of heterogeneous responses emerge. Bank branches operating in more population dense areas and those offering larger loan amounts (i.e., above the median in the cross-section of branches) respond more strongly to the rate cap by increasing their credit supply. For instance, based on the point estimates in column (2) of Table 5, in response to a one percentage point decrease in the interest rate, and within the same parent bank, branches in an above-median population density area increase total outstanding loan dollars by 42% (35 log points) more than a branch in a below-median population density area. Column (1) of Table 6 shows that branches within the same bank which offer above-median loan sizes, on average, drive the entire credit supply response in the sample.

We fail to uncover any statistically significant differential responses of branches according to whether they are located in high poverty areas, whether they pay higher interest rates on individual deposits, and the risk profile of their borrowers, as again proxied by delinquency rates and the fraction of unsecured loans. These patterns hold across different combinations of interaction terms with X_i included as regressors, with the caveat that in some specifications the first stage F-stat is attenuated by the inclusion of several weak instruments. Our analysis of heterogeneous responses points to greater pass through of interest rate caps to more capitalized banks in urban areas. We further examine the extent to which these findings are due to ex ante market power in local markets in the next section.

6 Testing the Mechanisms

We discuss in this section policy implications and possible alternative explanations for the observed increase in equilibrium corporate credit supply in response to the 2009 Bangladesh

Table 5: IV Estimates of Heterogeneous E ects on Credit Provision by Branch Characteristics

	log Total Outstanding Amount			log Number of Outstanding Loans			log Average Outstanding Amount		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Interest Rate	-0.364	-0.165	-0.253	-0.231	-0.085	-0.177	-0.133	-0.080	-0.075
	(0.110)	(0.099)	(0.140)	(0.098)	(0.092)	(0.118)	(0.088)	(0.080)	(0.110)
Interest Rate X Above Median (Deposit Rate)	0.094		0.145	0.097		0.105	-0.004		0.040
	(0.118)		(0.127)	(0.118)		(0.123)	(0.105)		(0.110)
Interest Rate X Above Median (Delinquency Rate: 9 Months or More Overdue)	0.117		0.121	0.143		0.147	-0.027		-0.025
	(0.117)		(0.118)	(0.114)		(0.109)	(0.104)		(0.104)
Interest Rate X Branch Lending Unsecured Loans Dummy	-0.012		-0.002	0.008		0.011	-0.020		-0.013
	(0.025)		(0.025)	(0.026)		(0.027)	(0.023)		(0.023)
Interest Rate X Above Median (Population Density)		-0.348	-0.335		-0.155	-0.162		-0.192	-0.173
		(0.121)	(0.124)		(0.110)	(0.111)		(0.104)	(0.103)
Interest Rate X Above Median (Upper Poverty Ratio)		0.152	0.167		0.048	0.079		0.104	0.088
		(0.108)	(0.108)		(0.102)	(0.099)		(0.094)	(0.098)
Speci cation	IV	IV	IV	IV	IV	IV	IV	IV	IV
Kleibergen-Paap rk Wald F-Statistics	8.76	20.35	5.14	8.76	20.35	5.14	8.76	20.35	5.14
Branch FE	X	X	X	X	X	X	X	X	X
Above Median Dummy X Bank X Quarter FE	X	X	X	X	X	X	X	X	X
Above Median Dummy X District X Quarter FE	X	X	X	X	X	X	X	X	X
Number of Banks	39	39	39	39	39	39	39	39	39
Number of Branches	1855	1855	1855	1855	1855	1855	1855	1855	1855
Observations	22260	22260	22260	22260	22260	22260	22260	22260	22260

Notes: The table reports results from estimating the IV speci cation in (5) via 2SLS with additional terms interacting the endogenous variable, the branch-level average interest rate, with branch-level characteristics. We instrument the endogenous variable with $TrtIntensity_i \times f\ t \quad 2009Q2g$, which captures how much branch is exposed to the interest rate cap regulation. Likewise, we instrument each interaction term with $TrtIntensity_i \times f\ t \quad 2009Q2g$ interacted with the branch characteristic variable. See text for how we de ne Trt Intensity$_i$. We de ne population density and the upper poverty ratio as in Table 1. Robust standard errors clustered at the branch level in parentheses. We include in each speci cation branch, above-median characteristics-by-bank-by-quarter xed e ects, and above-median characteristics-by-district-by-quarter xed e ects. For each speci cation, we report the Kleibergen-Paap cluster-robust rst-stage F-statistic for the excluded instruments. *p<0.1; **p<0.05; ***p<0.01.

Table 6: IV Estimates of Heterogeneous E ects on Credit Provision: Additional Results

	log Total Outstanding Amount			log Number of Outstanding Loans			log Average Outstanding Amount		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Interest Rate	-0.037	0.008	-0.175	-0.101	-0.143	-0.174	0.064	0.151	-0.001
	(0.070)	(0.124)	(0.104)	(0.094)	(0.141)	(0.108)	(0.072)	(0.113)	(0.086)
Interest Rate X Above Median (Average Outstanding Amount)	-0.290	-0.193	-0.310	-0.084	0.021	-0.112	-0.206	-0.215	-0.198
	(0.102)	(0.116)	(0.123)	(0.111)	(0.136)	(0.119)	(0.095)	(0.116)	(0.116)
Interest Rate X Above Median (Deposit Rate)			0.170			0.041			0.129
			(0.118)			(0.119)			(0.106)
Interest Rate X Above Median (Population Density)		-0.253			-0.133			-0.120	
		(0.113)			(0.112)			(0.100)	
Interest Rate X Above Median (Upper Poverty Ratio)		0.063			0.099			-0.037	
		(0.112)			(0.122)			(0.105)	
Interest Rate X Above Median (Delinquency Rate: 9 Months or More Overdue)			0.142			0.113			0.029
			(0.129)			(0.121)			(0.118)
Interest Rate X Branch Lending Unsecured Loans Dummy			0.012			0.017			-0.005
			(0.025)			(0.027)			(0.023)
Speci cation	IV	IV	IV	IV	IV	IV	IV	IV	IV
Kleibergen-Paap rk Wald F-Statistics	27.51	9.67	6.81	27.51	9.67	6.81	27.51	9.67	6.81
Branch FE	X	X	X	X	X	X	X	X	X
Above Median Dummy X Bank X Quarter FE	X	X	X	X	X	X	X	X	X
Above Median Dummy X District X Quarter FE	X	X	X	X	X	X	X	X	X
Number of Banks	39	39	39	39	39	39	39	39	39
Number of Branches	1855	1855	1855	1855	1855	1855	1855	1855	1855
Observations	22260	22260	22260	22260	22260	22260	22260	22260	22260

Notes: The table reports results from estimating the IV speci cation in (5) via 2SLS with additional terms interacting the endogenous variable, the branch-level average interest rate, with branch-level characteristics. We instrument the endogenous variable with $TrtIntensity_i \times f\ t\ \ 2009Q2g$, which captures how much branch is exposed to the interest rate cap regulation. Likewise, we instrument each interaction term with $TrtIntensity_i \times f\ t\ \ 2009Q2g$ interacted with the branch characteristic variable. See text for how we de ne $Trt\ Intensity_i$. We de ne population density and the upper poverty ratio as in Table 1. Robust standard errors clustered at the branch level in parentheses. We include in each speci cation branch, above-median characteristics-by-bank-by-quarter xed e ects, and above-median characteristics-by-district-by-quarter xed e ects. For each speci cation, we report the Kleibergen-Paap cluster-robust rst-stage F-statistic for the excluded instruments. *p<0.1; **p<0.05; ***p<0.01.

interest rate cap. To highlight the role of ex ante market power, we examine how incumbent banks react to competitors' local branch entry, but find no effects on loan pricing or provision, indicating that banks wield significant market power in the corporate loan market on the eve of the rate ceiling.

6.1 Evidence of Market Power from Local Entry of Close Competitors

We rationalize our finding of an increase in corporate credit supply via a conceptual framework in which static market power is sufficiently strong to overcome the influence of relationship lending. However, we fail to uncover any evidence of heterogeneous branch responses to the interest rate cap by local branch deposit or lending HHI quantiles, or by analogous HHIs defined at the parent bank level. According to HHI-based measures, bank branches in more concentrated districts by lending (Figure A.6) or deposit amounts (Figure A.7) do not differentially respond to the cap in a statistically significant way.[22] De Loecker, Eeckhout, and Unger (2020) show that HHI is divorced from markups and argue that HHI is a problematic measure of market power in contexts where the definition of the market is dynamic and firms engage in non-Cournot competition. Moreover, even if HHI were a good measure of ex ante market power in the corporate banking sector, we may still fail to isolate heterogeneous responses to the interest rate ceiling by HHI, because our branch-level DiD specifications identify slope rather than level shifts in the credit supply curve.

To help overcome these issues, we examine how banks react when a close competitor opens a new branch nearby their pre-existing branch in a small geographic area. We hypothesize that if banks are subject to a substantial degree of imperfect competition prior to the imposition of a cap, then entry of a close competitor bank's branch into a geographic area should have no effect on the pricing and provision of credit at incumbent branches. To test this hypothesis, we estimate staggered event study regressions of the following form:

$$Y_{i,d,t} = \sum_{t=m,t\neq -1}^{t=n} \xi_t \; Entry_{i,Bank(i,j),t} + \eta_i + \nu_{Bank(i),t} + \gamma_{d,t} + \varepsilon_{i,d,t} \qquad (6)$$

where the dummy $Entry_{i,Bank(i,j),t}$ is a dummy equal to unity if branch i in quarter t experiences entry into the same district of a new branch j belonging to its parent bank's closest competitor bank $Bank(i,j)$.[23] As before, we include branch fixed effects and parent bank quarter fixed effects $\nu_{Bank(i),t}$ to soak up any time-varying shocks to particular banks. Using the full timespan of our data, we consider a time window of $m = -5$ quarters prior to entry and $n = +10$ quarters

[22] If anything, the sign of the coefficient goes in the opposite direction one would expect if HHI were a reasonable proxy for ex ante market power, pointing to lower rather than greater markups for high-HHI branches on the eve of the cap (see the IV estimates of Table A.20).

[23] We do not observe any instances in which a bank has multiple close competitor's branches opening up within the same district in the same quarter. Therefore, this parameterization of $Entry_{i,Bank(i,j),t}$ is not the result of an econometric choice we make.

after branch entry to investigate pre-trends and trace out dynamic e ects.[24]

To code $Entry_{i,Bank(i,j),t}$, we rst collect a panel of bank branch entry events by scraping information on branch openings from bank websites and then matching each branch to a zila. We then identify close competitors at the bank level using a nearest-neighbor approach. The idea underlying this design is that the banking pair $Bank(i,j)$ represents two parent banks of a similar balance sheet size and sectoral specialization, which are hence most likely to be in direct competition for new loan contracts.[25] Each bank i matches to a single nearest neighbor, in a Mahalanobis distance sense, but the pair (i,j) may not be bilateral. For instance, j may be bank i's closest competitor, but i may be j's closest competitor. We match on pre-cap regulation bank characteristics to avoid any possible in uence of the cap on the market structure.

Based on our de nition of close competitors, 17% of bank branches experience competing branch entry during our sample period, or $\max_t \{ Entry_{i,Bank(i,j),t} \} = 1$. We stack up treatment events within each branch, meaning that $Entry_{i,Bank(i,j),t}$ assigns treatment timing according to the rst instance of the competitor bank's entry. We model treatment as an absorbing state because very few branches experience multiple local competitor entry events, and branch closures are uncommon.[26]

The never-treated group of branches those which never experience the entry of a competitor branch within the same district during our sample period are predominantly located in very rural parts of the country. This would lead to clear selection into treatment status if we used the never-treated branches as a control group. It is not obvious which direction this urban vs. rural selection goes as it pertains to the existence of imperfect competition. For instance, rural areas may possess fewer bank branches in general, meaning that any incumbent branch will have a natural monopoly. At the same time, Bangladesh is among the most tra c-congested countries in the world, with average kilometer per hour speeds over the course of a typical day being longer in Dhaka (the capital of Bangladesh) than in any other major city worldwide (Akbar, Couture, Duranton, and Storeygard 2023). Commuting costs and the preponderance of in-person banking may therefore blunt the impact of branch entry on competition. Such urban congestion may contribute to the greater pass through of the reform we observe for the most population dense districts in Table 5 and Table 6, even conditional on other sources of potential factors contributing to banks' static market power, such as their ability to pay out lower deposit rates.

In light of this evidence, we view it more appropriate to use the not-yet treated group of branches as our baseline counterfactual via the estimator proposed by de Chaisemartin and D'Haultf÷uille (2020), in contrast to other widely used estimators which include never-treated

[24] Our research design is similar in spirit to the one adopted by Kuehn (2020), who instruments for the number of competing branches in an area using historical characteristics of markets where the parent bank $Bank(i)$ in our setup, has no pre-existing branches. Kuehn (2020) studies strategic complementarity in banks' branching decisions, whereas our objective is to use de novo entry of direct competitors to test the existence of lending market power.

[25] Figure A.1 shows that over 90% of banks lend to at least two sectors, and two-thirds of banks do the largest share of their lending to export rms (commerce and trade); hence, there is some degree of sectoral specialization in corporate lending in Bangladesh.

[26] Only 62 out of the 2,723 branches in our sample experience multiple competitor entry events during the sample period. We obtain similar null e ects for all our outcomes of interest when we re-estimate (6) while simply dropping these branches from the sample.