Can Finance Save the World?

Measurement and Effects of Coal Divestment Policies by Banks*

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Abstract

We study whether divestment policies are an effective tool to address climate change, using coal lending bans by banks around the world as a laboratory. In contrast to theories arguing divestment is ineffective because capital is highly substitutable, we find large effects of these policies. We first develop a comprehensive measure of the strength of such bans, and document a large heterogeneity along this dimension. Using a shift-share instrument combining the lending ban strength measure and timing with borrower-bank relationships, we document that divestment affects the financing and operation of coal assets. We observe large effects of the policies on coal firm loan issuances, as well as on their outstanding debt and total assets. Substitution between divesting lenders and non-divesting ones, as well as with bond and equity issuances, appears to be limited. Coal power plants owned by firms exposed to bank divestment policies are more likely to be retired.

[PRELIMINARY & INCOMPLETE]

[PLEASE DO NOT CITE WITHOUT PERMISSION OF AUTHORS]

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1 Introduction

In the public debate on how to address climate change, business initiatives are often presented as a crucial ingredient, with potentially easier implementation or larger effects than regulatory and individual actions. Among private actors, financial institutions are often pointed out as disproportionately important, given their central role in allocating capital across economic activities.

Facing unprecedented pressure from activists, investors, and even regulators, a broad set of financial institutions have begun to enact fossil fuel “divestment policies”.[1] In these policies, institutions such as endowments, asset managers, banks, and insurance companies pledge to limit, phase out, or stop altogether intermediating or investing capital in producers and heavy users of fossil fuels. Given the growing adoption of divestment policies and public interest in business initiatives to combat climate change, it is important to understand whether divestment policies are achieving their goals. Do they affect the supply of capital to the fossil fuel industry? If so, to what extent does this decrease investment in carbon-intensive activities and reduce carbon emissions?

Theoretically, divestment policies should reduce the supply of capital to targeted projects and firms, increasing their cost of funding and/or rationing of their capital. However, material effects can only be realized if substitution to other sources of capital is limited. Further, the extent to which reductions in capital supply have real effects depends on the output sensitivity to funding cost and quantity for the industry. It is thus ultimately an empirical question whether these policies have financial and real impacts. However, despite the abundant public debate around these policies, to the best of our knowledge, there is not yet rigorous empirical evidence on this central question.

In this paper, we aim to fill this gap by studying the impact of bank divestment policies relating to the global coal industry. Coal is the most carbon-intensive fossil fuel and is

[1]The movement of divestment from fossil fuels can be traced to the 2006 ”Ditch Dirty Development” student campaign in the UK. The movement gained traction around 2011-2012 among student organizations and non-profits in the US, UK and Australia targeting governments and endowments, including Fossil Free ANU, 350.org, and Divest Harvard.

the main target of bank divestment policies. The coal industry also represents the ideal setting for divestment policies to have impacts because it mostly relies on bank debt and is highly capital intensive. A reliance on relationship-based bank lending, combined with the large amount of capital required for coal projects, should make it particularly hard for companies to find replacement capital when their relationship lenders enact divestment policies. If divestment can have any effects, they should be observable in the coal industry. Our results should bear external validity to the oil and gas industry, the largest source of carbon emission, as it is similarly capital intensive and reliant on relationship banking.

We implement the following research methodology. First, we develop a comprehensive algorithm to capture the rich heterogeneity and multi-dimensionality of the divestment policies announced by banks across the world. Equipped with this measure, we then construct a shift-share instrument that captures the heterogeneous exposure of coal firms to bank divestment policies. The variation in this instrument is driven by variation in bank-borrower historic relationships, measured before the 2015 Paris Climate Agreement, as well as by variation in the timing and strength of such policies. We use this instrument to estimate the causal effects of the divestment policies on borrower financial and real outcomes.[2]

Our results are as follows. We first document that, size weighted, most banks active in commercial bank lending have been implementing coal divestment policies. There is however substantial heterogeneity in the timing and strength of these policies. Second, turning to the financing effects of divestment policies, we find evidence consistent with a significant reduction in the bank borrowing of firms that are in a banking relationship with banks implementing a strong divestment policy. The magnitude of this effect is large: the average treatment conditional on treatment results in a reduction by 37% of annual loan issuances. Substitution between divesting lenders and non-divesting ones, and into bond and equity markets, an important concern over the effectiveness of such policy, appears to be limited. Consistently, such borrowers also reduce their overall long-term debt.

Finally, we find evidence that bank divestment policies are also affecting real economic

[2] This analysis raises an additional question, which matter for interpreting our results: what drives banks decisions to adopt divestment policies?

activity in the coal sector. First, at the firm level, borrowers more exposed to lending ban policies exhibit a contraction of their total assets. More strikingly, we show that in a large sample of coal-fired power plants, those with parent companies more exposed to bank divestment policies are more likely to be decommissioned in the years following the 2015 Paris Climate Agreement. Overall, our results show that the existence and strength of these policies matter, and that they result in material effects aligned with their intended purpose.

This paper connects to several strands of the literature. First, it contributes to the growing field studying climate finance, which explores the interaction between climate change and the financial system. Giglio et al. (2021) provides a comprehensive review of this literature. While the literature has so far mostly focused on how climate change is affecting financial markets and how they are adapting to it, our study focuses on how financial markets can be a tool to address or mitigate climate change. In that sense, our paper connects with studies analyzing the effect of another major tool to address climate change: regulatory actions, such as cap and trade policies (Ivanov et al., 2021, Colmer et al., 2022). Our study also relates to Adrian et al. (2022), who performs a cost-benefit analysis of a worldwide coal phase-out and estimates the amount of financing required to achieve it.

Second, our paper expands the limited set of studies assessing the effects of divestment policies for non-financial purposes. Teoh et al. (1999) thus documents a negligible effect for the South African financial boycott. We use a different empirical setting and methodology, and find by contrast large significant effects of such policies. More closely related, Garrett and Ivanov (2022) studies the effects of "Anti-ESG" laws that limit the ability of municipal governments to receive underwriting services from banks with ESG policies. They find that such laws increase borrowing costs for municipalities.

Our paper also contributes to the emerging literature on how financial investors can use their investment strategies to influence non-financial outcomes. This literature is broadly organized by the type of investment strategy considered, mainly activist strategies such as shareholder voting, and allocation strategies like divestment or deliberate investment in socially valuable firms. Broccardo et al. (2020) argue that divestment policies are relatively ineffective because capital is easily substitutable, while in contrast activism or voting strategies can be more effective. Green and Roth (2022) and Oehmke and Opp (2022) study the relationship between social preferences and the ability to have impact in the context of portfolio choice and activism strategies, respectively. Gupta et al. (2021) highlight dynamic considerations that limit the impact of allocation strategies. Our contribution here is to document empirically that divestment strategies can can in fact achieve impact in some scenarios. Last, our paper builds on the abundant literature studying the motives and effects of relationship banking, such as Petersen and Rajan (1994) or Bharath et al. (2011). Our results are reminiscent of the hold-up problem, except that in our setting the informational friction underlying lending relationships lead to capital rationing for the borrower, and not rent extraction.

The remainder of the paper is organized as follows. In Section 2, we provide some background on the divestment movement and develop hypotheses about its effects. In Section 3, we describe our data and the data collection process. In Section 4, we develop a comprehensive methodology to measure divestment policy strength. In Section 5, we use a shift-share instrument approach to provide causal evidence for the effects of divestment policies. Section 7 concludes.

2 Background

2.1 The Divestment Movement and the Coal Industry

The fossil fuel divestment movement started as a grassroots initiative attempting to address climate change by exerting social, political, and economic pressure on financial institutions to foster the divestment of assets, including stocks, bonds, loans and other financial instruments, connected to companies involved in extracting or disproportionately consuming fossil fuels. As of October 2021, 1,485 institutions representing close to $40 trillion in assets worldwide have begun or committed to divesting from fossil fuel-related assets.[3]

Within fossil fuels, coal has been the seminal target of such campaigns given the particularly high carbon-intensity of coal-related activities. The burning of coal represents an estimated 46% of CO2 emissions worldwide, and 72% of total greenhouse gas (GHG) emissions from the electricity sector.[4] A large number of NGOs, such as EndCoal and Reclaim Finance, specifically advocate for a general and immediate divestment of financial institutions from the coal industry. In turn, a large number of banks have implemented coal divestment policies, as shown in Figure 1, particularly so in the wake of the 2015 Paris Climate Agreement.

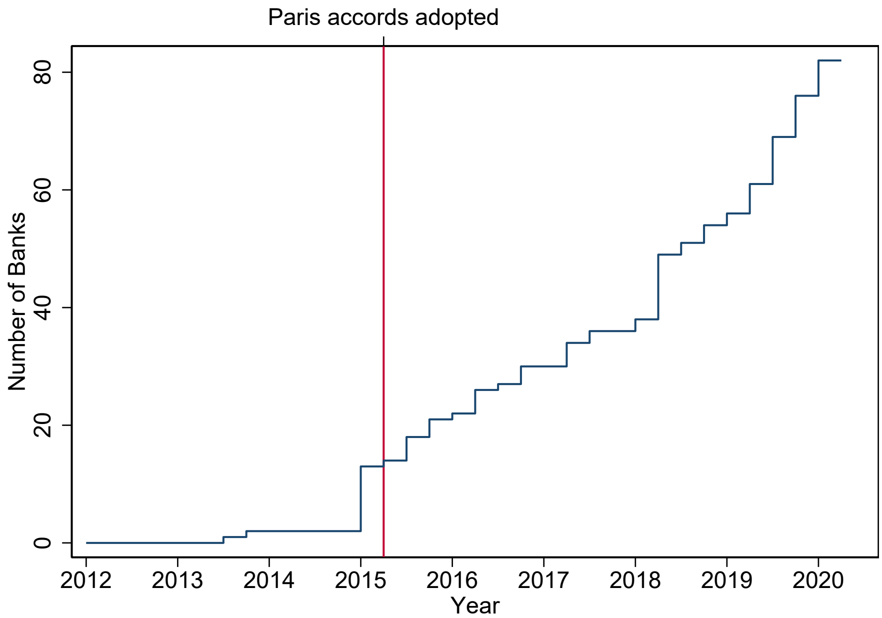

Figure 1: **Number of Banks with Active Coal Divestment Policies**

The focus on coal from the divestment movement, and for the purpose of our study, is also motivated by specific institutional details of this industry that make it more likely to achieve measurable effects, given the economic mechanism that underlies divestment.

[3]See https://www.stand.earth/sites/stand/files/divestinvestreport2021.pdf
[4]Source: International Energy Agency, www.iea.org.

2.2 Economic Framework for Divestment

The economic mechanism predicting financial and real effects from divestment policies is the following.[5] Capital providers intentionally restrict the supply of capital to firms or projects meeting certain criteria by declining to provide them with debt or equity financing. The goal of such policies is to increase the cost of funding or even ration capital for targeted firms or projects, thereby affecting their feasibility and viability. For this supply shock to materialize and be sufficiently acute to generate sizable real effects, such policies need to be widespread to affect a significant share of the capital available, or there should be important frictions in capital markets that prevent targeted firms from easily substituting to other providers or types of capital. Examples of such frictions are information asymmetry, which creates large switching costs for firms willing to change banks (Darmouni, 2020), or segmentations, either geographic or by types of capital providers (Becker, 2007, Mitchell et al., 2007), which limits the pool of capital providers that can replace divesting ones. If sufficiently large, such policies should therefore negatively affect investments and operations of the targeted firms.

This economic rationale applies well to the coal industry, given that it is a highly capitalistic industry, and is mostly reliant on bank debt, which is a geographically segmented market with famously large informational frictions. A coal firm prevented from freely accessing capital might reduce its capital expenditures as it struggles to finance them, or reduce its asset utilization if it requires working capital financing. By changing the cost of capital, such policies should also affect what mining and powerplant projects are NPV-positive, or can even be financed, leading to the cancellation of planned facilities, as well as facility sale or decommissioning.

We should further expect the strength of these mechanisms to vary within the coal industry. Smaller companies may have less access to alternative financing and thus be more impacted by exposure to divesting banks. Firms with a large share of their activity

[5] Providing a framework for whether financial institutions should implement such policies is outside of the scope of this study.

related to coal will also suffer more from the divestment policies. We might also expect less profitable firms, with lower retained earnings, to be more affected by bank divestment. We explore each of these hypotheses in detail in Section 5.

3 Data

Our dataset combines information on bank coal divestment policies, coal firm financing transactions and financial statements, as well as coal facilities (coal mines and coal-fired powerplants). Its scope is global and covers the period 2009 to 2021.

3.1 Bank Divestment Policies

We obtain the initial list of bank divestment policies from the NGO Reclaim Finance, which tracks the release of such bank policies. This list comprises all the banks that have released a divestment policy as of March 2021, as well as a timeline of when the initial policies were released and if there were any updates to the existing policies. We use this list to identify divesting banks and manually check for large banks not appearing on this list, that they do not have such a policy. We obtain both initial policy announcements and their updates from company websites. In total, we identify 82 banks that have released 126 policy statements specifically covering the coal industry between 2014 and 2021.

3.2 Coal producers and users: Firm-level data

The Global Coal Exit List (or GCEL) serves as the basis for our sample of coal companies. This list, which was created by the NGO Urgewald, is a comprehensive list of companies that plays a significant role in the coal sector and is the one used by the United Nations Principles for Responsible Investments (PRI). The companies in the GCEL have to meet one of the three criteria: i) The companys coal share of revenue or power production should be at least 20%, ii) The companys annual thermal coal production should be at least 10 metric tones or generation capacity should be at least 5 GW, iii) The company is involved in expansion or development of new coal infrastructure. This broad cutoff ensures all the major players in the coal industry are covered and thus, are included in our sample. There are 935 parent companies covered in the GCEL as of 2021, with an additional 1849 subsidiary companies. Further, the GCEL also provides us with firm-level information such as capacity (power), output (mining), fraction of revenue from coal and the share of power generated that is through coal. This sample of firms accounts for 84% of estimated worldwide annual coal production and 81% of installed coal power capacity. To observe the firms loan borrowing activity, we use DealScan, the standard syndicated loan dataset, and IJGlobal, a dataset focused on project finance. We match firms from the GCEL to both the datasets to form a subsample of 410 out of the 935 parent companies in the GCEL. This sample of firms accounts for 61% of estimated worldwide annual coal production and 67% of installed coal power capacity.

We remove duplicates between the two transaction datasets, and define them as any transaction between a bank and a firm which are at most 100 days apart and the difference in the amounts between the two dataset is less than 10 million USD. The final borrowing dataset consists of 8,971 loan facilities across 410 borrowers and their subsidiaries. We complement this loan dataset with bond and equity issuances, which we obtain from SDC Platinum. We also use Orbis to obtain financial statements for the companies in our sample. We obtain annual statements from 2012 to 2020 for 818 parent companies on the GCEL. Combining data sources, we have both loan transaction and financial data for 333 parent companies, representing 56% and 65% of worldwide coal production and installed coal power capacity, respectively.

Table 1 provides some summary statistics for our firm sample.

INSERT TABLE 1 HERE

3.3 Mine and Powerplant data

We use the Global Coal Plant Tracker and the Global Coal Mine Tracker from Global Energy Monitor to obtain facility-level information on coal-fired power plants and coal mines. These datasets covers 4,633 power plants and 1,514 coal mines globally, and contain information on production, capacity, facility characteristics, geographic location, and current ownership. We complement this data with two main sources: IJGlobal asset level data, and data from the US Environmental Protection Agency (EPA). We thus use the facility (plant units) level dataset from the Greenhouse Gas Reporting Program (GHGRP) initiated by EPA. This dataset provides for more comprehensive coverage of the coal plants in the United States. It covers 486 coal plants and contains detailed annual data on the emissions and the ownership of each plant.

4 Measuring the strength of divestment policies

While a large number of financial institutions have announced a divestment policy for coal, a crucial question is whether and how binding such policies actually are. For example, despite despite having a comprehensive coal divestment policy in place since 2019, in March 2022 Goldman Sachs made a bilateral loan of $150m to Peabody, one of the largest coal mining company, despite having a coal divestment policy in place.[6] This episode, and broader accusations of "greenwashing" by banks, calls for a robust measure of divestment strength, to be related to actual changes in lending standards.

4.1 Methodology

We therefore develop a novel methodology for assessing the strength of a bank divestment policy. We first define a series of variables that, when combined, allow to comprehensively describe the divestment policy criteria for all the banks in our sample. The variables are listed and defined in Table 2.

Any combination of these variables definites a hypothetical financing activity that is either allowed or disallowed. We manually code each bank policy as boolean logical statements that describe the set of hypothetical financing activities that is allowed by a given bank in a given year.

For example, the divestment policy of Deutsche Bank, in the 2016-2019 period, pro-

[6] https://www.ft.com/content/21031a45-c47b-453e-b5bb-fd9da80367dc

hibits the bank from engaging in project finance related to the construction or expansion of coal-fired power plants. Starting in 2020 the policy expands in three dimensions. It further prohibits project finance of mountain top mining in the United States, it prohibits project financing of new thermal mining projects, and prohibits corporate financing of power companies that derive more than 50 percent of their revenue from coal-fired plants outside of Asia that lack a decarbonization strategy. Such financing is banned in Asia starting in 2022. This policy is coded as:

```
ban = 1 if
    (year > 2016 & isPowerProj & (isNew | isExpansion)) |
    (year > 2020 & isMountaintopProj & CountryParent = "USA") |
    (year > 2020 & isMiningProj & isThermal & isNew) |
    (year > 2020 & isPowerCo & CoalFracRevParent > 0.5 & !hasDecarbonStrat
                & (ContinentParent != "Asia" | year > 2022))
```

We encode each bank policy in the same fashion and derive several proxies of divestment strength from this coding.

Our central measure of policy strength is the equally-weighted share of possible financing scenarios captured by these variables that a bank bans in a given year. Banks that ban a larger share of the scenarios described by this coding have stronger divestment policies. We also use an indicator variable capturing if a bank has *any* active policy in a given year as a parsimonious alternative measure. Together these measures can capture the intensive and extensive margins of bank divestment policies.

4.2 Outcomes

Figure 2 plots the share over time of banks banning a few economically relevant scenarios. This figure illustrates how divestment policies disproportionately target new projects vs existing ones or expansions, project finance vs. corporate finance, and power generation vs. mining.

Figure 3 then displays the share of banks having an active divestment policy (Panel A), and the average strength of such policies, conditional on having a policy (Panel B), both broken down by region. Overall, the heterogeneity across banks in terms of strength of coal lending bans appears to be substantial, which motivates the importannce of accounting for ban strength when studying the effects of such policies.

The final column of Table 2 shows how many banks in our dataset have policies that are *sensitive* to the given attribute. This measure of sensitivity picks up if the policy is ever, all else equal, sensitive to a given characteristic of a potential financing. This captures the extent to which policies make explicit bans (or carveouts) along a particular dimension. For example, 18 banks have polices which depend on whether or not the financing is for an existing bank customer. In practice, each of these banks is making a carveout to its policy to allow for continued financing to existing customers. Similarly, 22 banks allow for exceptions to their policies for borrowers with a "decarbonization strategy." These are not often well defined in the publicly available bank policy documents and could represent greenwashing.

INSERT FIGURE 2 AND 3 HERE

To validate our measure of strength, and assess whether banks are following through on their policies, we plot in Figure 4 the evolution of the aggregate coal lending for three groups of banks: banks with no divestment policy (526 banks), banks with a middle tercile strength policy (37 banks), and banks with a top tercile strength policy (37 banks). The figure documents that coal lending shrinks the most for the latter group, which is consistent with the strongest bans being binding.

INSERT FIGURE 4 HERE

5 Effects of the Divestment Policies

5.1 Shift-Share instrument

We construct a shift-share instrument capturing a borrower's exposure to divesting banks based on the banks with whom it had a lending relationship for the period 2009-2014.

The intensity of a ban is measured as the unweighted fraction of scenarios banned by bank b in year t, which we label $B_{b,t}$. Let $w_{i,b}$ be the share of borrower i lending volume with bank b. Our main instrument is defined as:

$$Active\ Ban\ Intensity_{i,t} = \sum_b w_{i,b} \times B_{b,t} \tag{5.1}$$

For robustness purpose, we also define

$$Any\ Active\ Ban_{i,t} = \max_b \mathbb{1}\{w_{i,b} > 0\} \times \mathbb{1}\{B_{b,t} > 0\} \tag{5.2}$$

and

$$Active\ Ban\ _{i,t} = \sum_b w_{i,b} \times \mathbb{1}\{B_{b,t} > 0\} \tag{5.3}$$

as alternative measures of treatment.

5.2 On financing

We plot the evolution of loan borrowing for firms with a high vs. low exposure to divestment policy in Figure 5. High treatment firms appear to have reduced more their borrowing through loans than low treatment firms.

INSERT FIGURE 5

We then precisely measure the effects of being exposed to divestment policies on firm borrowing by running the following specification:

$$Log(1 + IssuedAmount_{i,t}) = \beta Treatment_{i,t} + \delta_i + \mu_{c,t} + \epsilon_{i,t} \tag{5.4}$$

where $Treatment_{i,t}$ can be either $BanExposureIntensity_{i,t}$, $AnyExposure_{i,t}$ or $BanShare_{i,t}$. $IssuedAmount_{i,t}$ is the total amount of bank loans issued by firm i in year t, δ_i are firm fixed effects, and $\mu_{c,t}$ are country-year fixed effects. The country-year fixed effects aim at absorbing possible confounding factors such as local demand and regulation. Regression coefficients are displayed in Table 3. The first column shows that any prior borrowing from a lender that subsequently adopts a divestment policy predicts subsequent declines in loan issuance. We observe a large negative effect of being exposed to bans on the amount of loans that firms borrow.

INSERT TABLE 3

We also explore whether these effects are similar when explaining the combined issuance of loans and bonds.

5.3 Adjustment Margin

To study whether firms that face exposure to banks implementing a divestment policy substitute away from these lenders, we breakdown the amount of loan issues between loans obtained from banks with which the firm had a lending relationship during the period 2009-2014, and loans obtained from new lenders. We replace the dependent variable in equation 5.4 by these quantities, and report the regression coefficients in Table 5.

Column 1 presents the baseline as in Table 3, column 2 uses the loan issuance amount from banks with whom the borrower had a relationship as the dependent variable, and column 3 uses the loan issuance amount from banks with whom the firm had no prior relationship. The estimates in column 2 is larger and more pricesely estimated to the baseline coefficient in column 1. This suggests that the observable contraction in borrowing is happening through reduced borrowing from existing relationship lenders. The positive but not statistically significant coefficient in column 3 suggests these tests are not well powered to directly detect limited substitution to non-relationship lenders. Columns 4 and 5 show that there is no detectible substitution into bond or equity financing.

INSERT TABLE 5

5.4 On balance sheet

We then run similar specifications as in equation 5.4, using the log of long term debt, and the log of total assets, as dependent variables. Regression coefficients are displayed in Table 6. Exposure to divestment policies translate into a lower amount of long term debt, and a reduction in total assets.

INSERT TABLE 6

6 Effects on Plant Operations

Having documented that bank divestment policies do seem to reduce the external financing used by affected firms, we now turn to exploring whether these effects translate into investment policy and operations. In theory, facing limited access to finance, affected coal firms may choose not to invest in existing assets. They may also decide to change the operation of existing assets, for example by selling assets, closing plants, and reducing output quantity or quality. On the other hand, they may react by acquiring new assets, or start new projects, either to maximize short-term profitability, or to pivot towards less carbon-intensive activities.

We study the potential real impacts of coal divestment policies by focusing on coal-fired power plants, for which we have more granular data than coal mines. In particular, we are able to observe the age and capacity of each plant and track its operating status over time, including its retirement. We hypothesize that owners of coal plants with limited access to finance may choose to retire plants earlier than otherwise expected, in line with the divestment policies' objective. To explore this hypothesis we estimate a Cox Proportional Hazard model at the plant level, estimating determinants of the hazard rate of plant retirement. We depart from our previous time-varying measure of ban strength and instead interact a cross-sectional measure of borrower exposure to coal bans with a post-2015 indicator in certain specifications. We adopt this formulation because plant closure decisions are unlikely to line up exactly with the timing of coal financing bans at a borrower's relationship banks.

Table 7 shows that coal-fired power plants owned by firms more exposed to coal finance bans are more likely to face early retirement than plants owned by less exposed firms. The first column uses the same time-varying exposure instrument used in the previous analysis. The second and third columns show that the within-borrower time series variation in plant strength is not a predictor of plant closure, but the cross-sectional measure is. In fact, all of the effect is coming from the period starting in 2015, when coal divestment policies start. All else equal, a plant with a one standard deviation higher exposure to coal lending bans is 48% more likely to be retired in a given year. Column 4 shows that the magnitude of the effect does not differ for plants owned by large and small firms. Column 5 shows that plants owned by borrowers with a low share of coal activity are more likely to close because of coal lending bans. This is consistent with the notion that more diversified firms are better able to substitute into different investment opportunities. Column 6 shows that while small and medium capacity plants are more likely to accelerate retirment in response to coal ban exposure, the opposite is true for large plants.

INSERT TABLE 7

7 Conclusion and Next Steps

We study whether divestment policies are an effective tool to address climate change, using coal lending bans by banks around the world as a laboratory. We first develop a comprehensive measure of policy strength, and document a large heterogeneity along this dimension. Using a shift-share instrument combining the lending ban strength measure and timing with borrower-bank relationships, we document large effects of the policies on coal firm loan issuances, outstanding debt and total assets, and the operating status of coal power plants. Substitution between divesting lenders and non-divesting ones appears to be limited.

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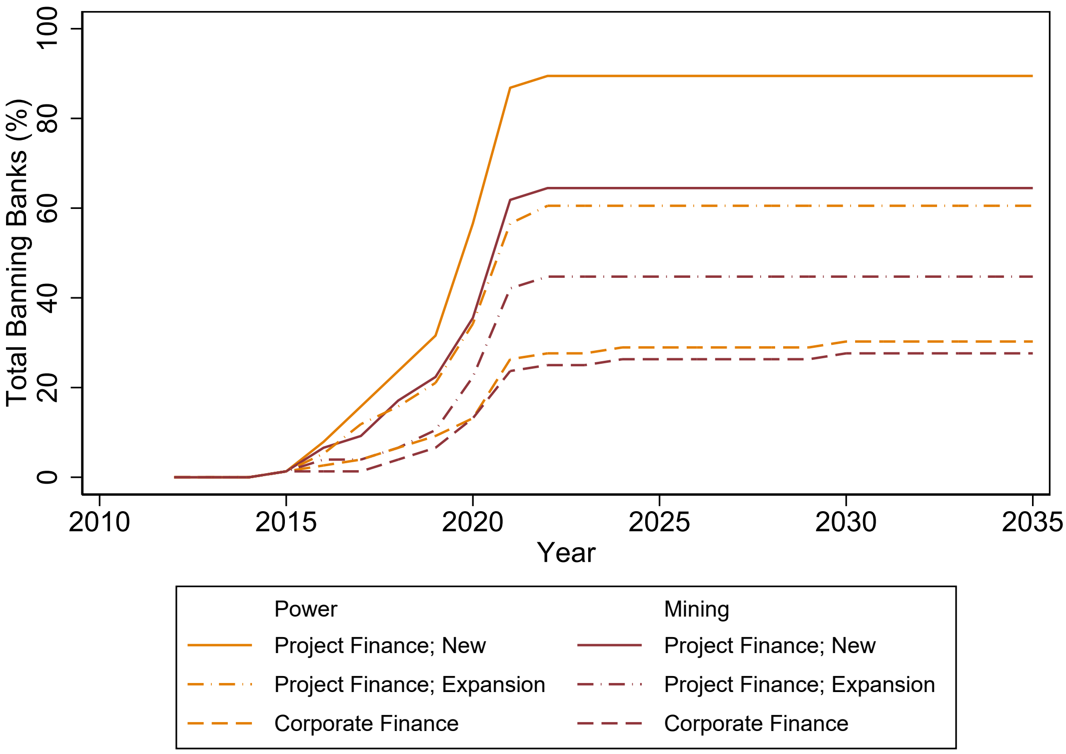
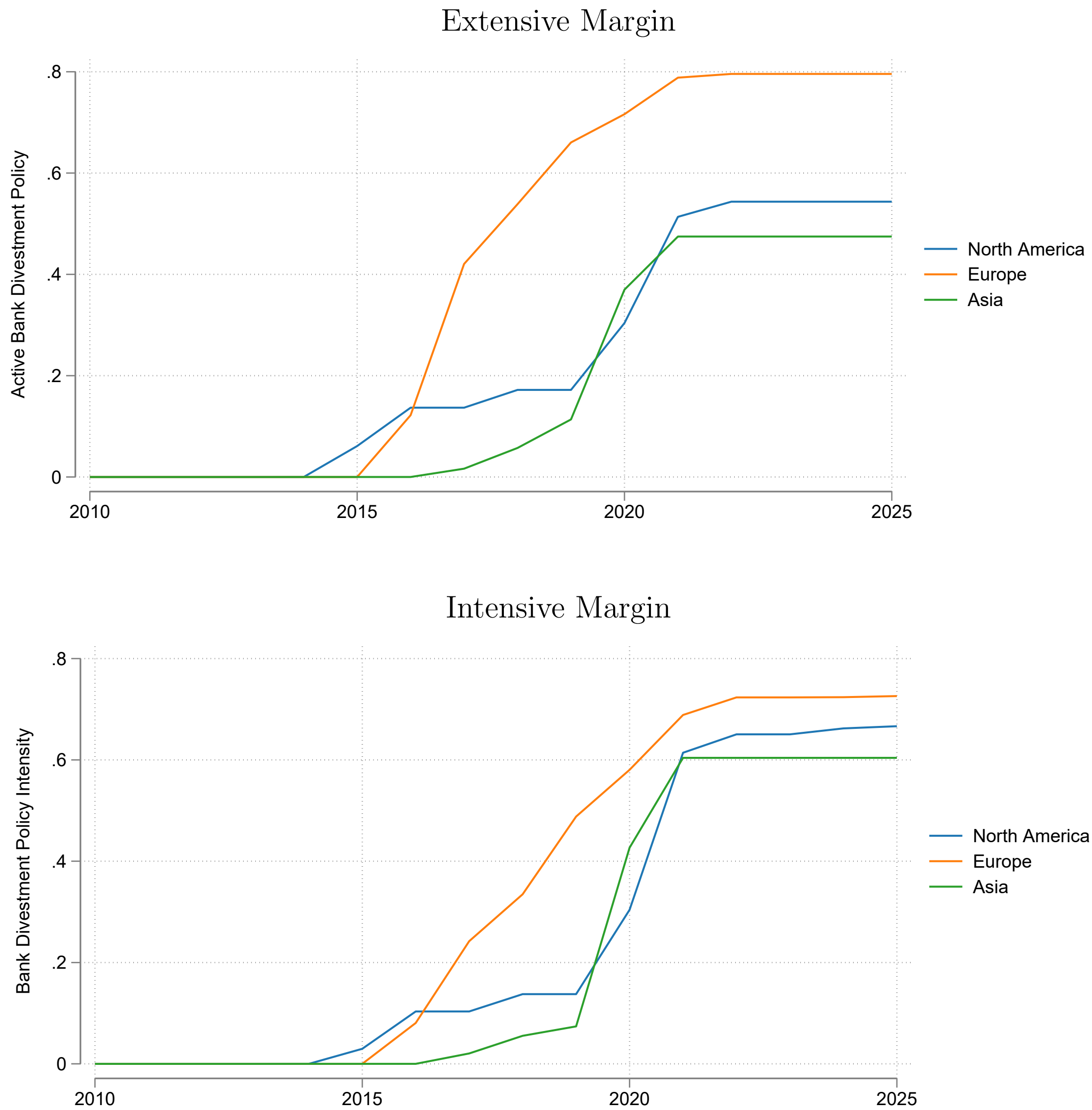
Figures

Figure 2: **Divestment Policies: Simulation Outcomes**



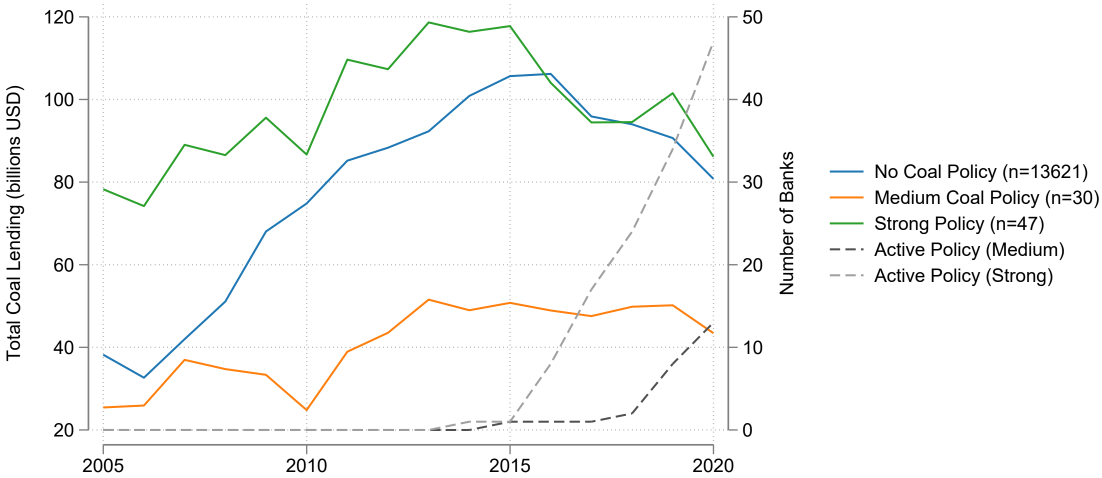
Notes: This figure plots the proportion of banks that will ban each of six labelled scenarios, and how the intensity of policies change over time. The scenarios are split in two sectors within the coal industry; coal power and coal mining and divided further into three types of lending activities;(i) Lending as project finance for a new project, (ii) Lending as project finance for an existing project, or (iii) Corporate Finance.The simulation also points out to a higher proportion of the banks, targeting power projects over the mining projects in their policies.

Figure 3: **Policy Strength by Region**



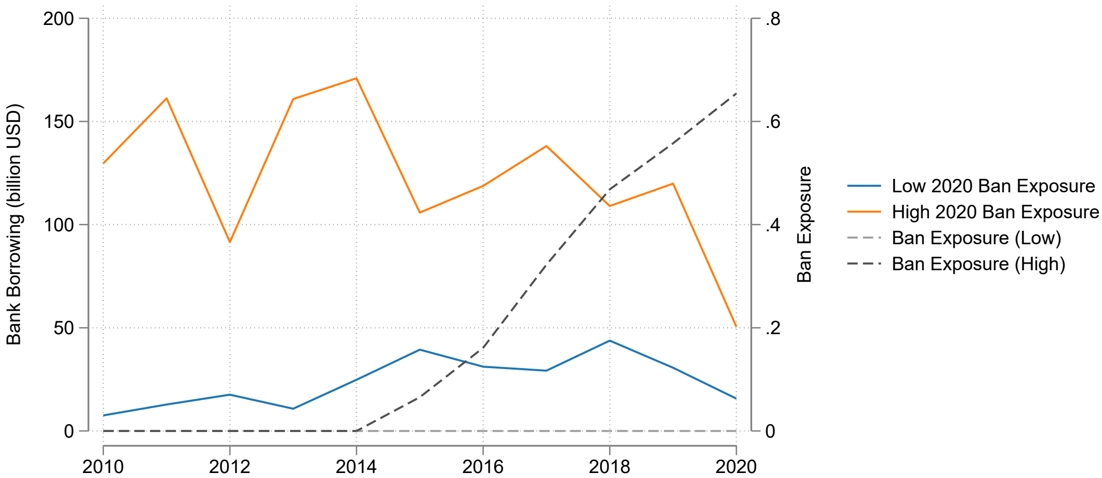
Notes: This figure shows the geographic breakdown and itensity of bank divestment policies over time. The upper graph shows the fraction of banks with any active policy in a given year, regardless of policy strength, weighted by the banks' fraction of aggregate syndicated loan origination in the 2009-2014 period. This captures the "extensive margin" of borrower exposure to coal divestment policies. The lower graph captures the "intensive margin" by showing, conditional on the bank having released a divestment policy, the average intensity of these policies over time. This is also weighted by the banks' fraction of aggregate syndicated loan origination in the 2009-2014 period.

Figure 4: **Coal Lending by Policy Intensity**



Notes: The graph above plots the aggregate lending activity of banks to the coal industry, dividing banks' into three groups according to the strength of their coal divestment policies as of 2020. The banks are divided into above and below median ban strength measured in 2020, the construction of this strength measure is described in Section 4. The dashed lines plot the average policy strength of these two groups over time. The figure shows the banks with ex-post strong policies were earlier to enact policies and ramp them up more substantially over time.

Figure 5: **Effects on Firm Borrowing**



Notes: The figure above plots the aggregate bank borrowing of coal companies in the sample based on their exposure to bank coal divestment policies. Companies are defined as having high or low exposure if they are in the top or bottom quartile of $BanExposureIntensity$ as of 2020 that are exposed to divestment policies as of 2020. The construction of this measure is described in Section 5.1. The dashed lines represent the average of $BanExposureIntensity$ in each group over time.

8 Tables

Table 1: **Summary Statistics: Coal Industry Firms**

Panel A: Main Sample from GCEL list, Dealscan & IJGlobal ***(N=410)***				
	Count	Share (in %)		
Active in:				
Mining	213	52		
Power Generation	298	73		
Services	166	40		
Geography:				
North America	79	19%		
Europe	55	13		
Asia	222	54		
Others	54	14		
Panel B: Financials from Orbis available ***(N=333)***				
	Mean	Median	p10	p90
Assets	27,431	5,352	273	62,534
Debt	6,428	1,270	3	18,686
Net Income	508	76	-118	1606
ROA	0.2%	1.8%	-6.5%	6.6%

Notes: This table provides summary statistics for the sample of firms resulting from the merge of the GCEL list with Dealscan and IJGlobal financing transactions (Panel A). Panel B summarizes coal firms' main financial characteristics, obtained from Orbis.

Table 2: **Divestment Policy Variables**

Variable Name	**Definition**	**# Banks Sensitive to**
isProjFin:	= 1 for project finance	13
isCorpFin:	= 1 for corporate finance	1
CoalFracRevParent:	= fraction of revenue from coal of parent company	31
CoalSharePowerParent:	= coal share of power production of parent company	11
isMiningCo:	= 1 if company a mining company	34
isPowerCo:	= 1 if company a power company	31
isMiningProj:	= 1 if project a mining project	38
isPowerProj:	= 1 if project a power project	57
isNewCustomer	= 1 if the borrower a new customer	18
isLignite:	= 1 if the project uses lignite coal	0
isThermal:	= 1 the project uses thermal coal	26
isExpansion:	= 1 if proceeds used for expansion of capacity/life of coal assets	30
isNew:	= 1 if proceeds used for new coal assets/project	61
isLowCarbonProj:	= 1 if proceeds used for carbon transition / low carbon project	15
isMountaintopProj:	= 1 if proceeds used for mountaintop mining	5
isMountaintopComp:	= 1 if company is doing mountaintop mining	19
hasDecarbonStrat:	= 1 if Company has plan to decarbonize/diversify from carbon	22
year:	When is the financing happening	
CountryGroup	Group of countries, eg: OECD	
ContinentParent:	Africa, Asia, Europe, North America, South America, Australia	
CountryParent:	Any country name	

Table 3: **Effects on Loan Issuance**

	Loan Issuance (log)							
					Share of Coal Revenue		Size	
					High	Low	Small	Large
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Any Active Ban	-0.373*							
	(0.221)							
Active Ban		-0.417						
		(0.486)						
Active Ban Intensity			-0.988		-3.458**	0.301	-1.405	2.198
			(0.814)		(1.418)	(1.213)	(1.061)	(1.753)
Asia × Active Ban Intensity				-2.211*				
				(1.158)				
Europe × Active Ban Intensity				-0.223				
				(1.556)				
North America × Active Ban Intensity				-0.142				
				(2.954)				
Borrower FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country x Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3,228	3,228	3,228	2,868	1,416	1,404	710	1,041
Adj-R^2	0.407	0.406	0.406	0.422	0.368	0.424	0.313	0.384

Notes: The table above reports the coefficients of the OLS regressions in which the dependent variable is the log of 1 + loan issuance. The explanatory variables are the three instruments developed in this study, described in detail using Equations 5.1, 5.2, and 5.3. We also present the regression coefficients from the geographic interaction with our main instrument. Standard errors are clustered at the borrower level and are reported in the parentheses. *, **, and *** represent statistical significance at the 10%, 5%, and 1% confidence levels, respectively.

Table 4: **Effects on Loan & Bond Issuance**

	Loan and Bond Issuance (log)							
					Share of Coal Revenue		Size	
					High	Low	Small	Large
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Any Active Ban	-0.454**							
	(0.208)							
Active Ban		-0.823*						
		(0.491)						
Active Ban Intensity			-1.530*		-3.543**	-0.651	-1.428	0.167
			(0.797)		(1.549)	(1.440)	(1.175)	(1.214)
Asia × Active Ban Intensity				-3.518***				
				(1.166)				
Europe × Active Ban Intensity				-0.956				
				(1.105)				
North America × Active Ban Intensity				3.149				
				(2.310)				
Borrower FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country x Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3,564	3,564	3,564	3,204	1,596	1,536	751	1,154
Adj-R^2	0.575	0.575	0.575	0.590	0.504	0.601	0.384	0.541

Notes: The table above reports the coefficients of the OLS regressions in which the dependent variable is the log of 1 + loan and bond issuance. The explanatory variables are the three instruments developed in this study, described in detail using Equations 5.1, 5.2, and 5.3. We also present the regression coefficients from the geographic interaction with our main instrument. Standard errors are clustered at the borrower level and are reported in the parentheses. *, **, and *** represent statistical significance at the 10%, 5%, and 1% confidence levels, respectively.

Table 5: **Adjustment Margin**

	Loan Issuance (log)			Other Financing (log)	
	(1) Total	(2) Prior Relationship	(3) No Relationship	(4) Bond Issuance	(5) Equity Issuance
Active Ban Intensity	-0.988	-1.434**	0.519	-0.899	-0.051
	(0.814)	(0.625)	(0.796)	(0.730)	(0.608)
Constant	2.970***	2.799***	0.826***	2.599***	1.363***
	(0.037)	(0.028)	(0.036)	(0.033)	(0.028)
Borrower FE	Yes	Yes	Yes	Yes	Yes
Country x Year FE	Yes	Yes	Yes	Yes	Yes
Observations	3,228	3,228	3,228	3,228	3,228
Adj-R^2	0.406	0.440	0.340	0.653	0.298

Notes: The table above reports the regression results from equation 5.4, where the dependent variable is changed to study whether firms facing a ban from banks implementing a divestment policy substitute away from these lenders. Column 1 is the exactly as stated in Equation 5.4. In column 2, we change the dependent variable to the loans recieved from relationship banks, as of 2009-2014. Column 3 changes the dependent variable to banks with which the firm had no prior relationship. Standard errors are clustered at the borrower level are reported in the parentheses. *, **, and *** represent statistical significance at the 10%, 5%, and 1% confidence levels, respectively.

Table 6: **Balance Sheet Effects**

	Long-Term Debt (log)				Total Assets (log)			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Any Active Ban	-0.230**				-0.046			
	(0.110)				(0.042)			
Active Ban		-1.414***				-0.415***		
		(0.412)				(0.125)		
Active Ban Intensity			-2.363***				-0.623***	
			(0.659)				(0.207)	
Asia × Active Ban Intensity				-2.386**				-0.694***
				(0.976)				(0.256)
Europe × Active Ban Intensity				-5.175***				-0.588**
				(1.474)				(0.260)
North America × Active Ban Intensity				-0.371				-0.124
				(0.818)				(0.517)
Borrower FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country x Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,729	1,729	1,729	1,561	1,845	1,845	1,845	1,659
Adj-R^2	0.883	0.886	0.886	0.890	0.979	0.980	0.979	0.980

Notes: The table above reports the coefficients from the OLS regression where the dependent variables are the balance sheet items log of long term debt and log of total assets. The dependent variables are the instruments developed in this study, described in detail using equations 5.1, 5.2, and 5.3. Standard errors are clustered at the borrower level are reported in the parentheses. *, **, and *** represent statistical significance at the 10%, 5%, and 1% confidence levels, respectively.

Table 7: **Effects on Coal-fired Power Plant Closures**

	Plant Closure					
	(1)	(2)	(3)	(4)	(5)	(6)
Active Ban Intensity	0.869	0.825				
	(-0.654)	(-0.773)				
Ban Exposure		1.252*				
		(1.869)				
Ban Exposure × $\mathbb{1}\{Year \geq 2015\}$			1.482***	1.419***	1.346***	
			(5.560)	(5.592)	(5.346)	
Large Firm				0.913		
				(-0.521)		
Ban Exposure × $\mathbb{1}\{Year \geq 2015\}$ × Large Firm				1.092		
				(1.157)		
Low Coal Share					0.751*	
					(-1.690)	
Ban Exposure × $\mathbb{1}\{Year \geq 2015\}$ × Low Coal Share					1.149***	
					(2.719)	
<500MW × Ban Exposure × $\mathbb{1}\{Year \geq 2015\}$						1.472***
						(6.229)
500-1000MW × Ban Exposure × $\mathbb{1}\{Year \geq 2015\}$						1.984**
						(2.570)
>1000MW × Ban Exposure × $\mathbb{1}\{Year \geq 2015\}$						0.538***
						(-2.944)
Country Strata	Yes	Yes	Yes	Yes	Yes	Yes
Time Trend						
Observations	Yes	Yes	Yes	Yes	Yes	Yes
N	28,269	28,269	28,269	25,967	27,542	28,269

Notes: The table above reports the coefficients from a Cox proportional hazard model of the survival of a sample of coal-fired power plants. Standard errors are clustered at the country level are reported in the parentheses. *, **, and *** represent statistical significance at the 10%, 5%, and 1% confidence levels, respectively.

9 Appendix

Table 8: **Effects on Loan Issuance: Poisson Regression**

	Loan Issuance (millions)							
					Share of Coal Revenue		Size	
					High	Low	Small	Large
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Any Active Ban	-0.346*							
	(0.186)							
Active Ban		-1.003*						
		(0.565)						
Active Ban Intensity			-2.126*		-4.000*	-1.419	-5.177**	-0.299
			(1.121)		(2.150)	(1.712)	(2.033)	(1.403)
Asia × Active Ban Intensity				-4.757***				
				(1.815)				
Europe × Active Ban Intensity				0.776				
				(2.278)				
North America × Active Ban Intensity				0.573				
				(1.554)				
Borrower FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country x Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3,069	3,069	3,069	2,759	1,334	1,291	557	977
Adj-R^2								

Notes: This table shows the robustness of the main specifications presented in Table 3 to Poisson regression on the dollar amount of borrowing instead of OLS regression on the log of one plus the dollar amount of borrowing. Standard errors are clustered at the borrower level and are reported in the parentheses. *, **, and *** represent statistical significance at the 10%, 5%, and 1% confidence levels, respectively.

Table 9: **Effects on Loan Issuance on Sample After Matching**

	Loan Issuance (log)							
					Share of Coal Revenue		Size	
					High	Low	Small	Large
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Any Active Ban	-0.859***							
	(0.260)							
Active Ban		-1.614**						
		(0.640)						
Active Ban Intensity			-2.888***		-3.439***	-1.789	-1.401	1.718
			(1.092)		(1.223)	(1.713)	(1.353)	(1.533)
Asia × Active Ban Intensity				-2.572**				
				(1.167)				
Europe × Active Ban Intensity				0.294				
				(0.996)				
North America × Active Ban Intensity				-7.413***				
				(2.666)				
Borrower FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country x Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2,436	2,436	2,436	2,388	1,128	912	526	723
Adj-R^2	0.444	0.442	0.443	0.439	0.489	0.367	0.517	0.489

Notes: Exact matching of borrowers that have a Ban Exposure Intensity¿0 at some point with borrowers that always have Ban Exposure Intensity=0 based on whether they belong to the same industry, continent and pre-period (09-14) loan issuance tercile. The cross-sectional match generates 145 treated vs 145 control firms out of 410 total firms. As panel data, this corresponds to 1764 treated vs 1716 controls (out of 4920 firm-years). The table above reports the coefficients of the OLS regressions in which the dependent variable is the log of loan issuance. The explanatory variables are the three instruments developed in this study, described in detail using Equations 5.1, 5.2, and 5.3. We also present the regression coefficients from the geographic interaction with our main instrument, suggesting that the ban exosure intensity is associated with the largest decrease in lending amounts in Asia. Standard errors are clustered at the borrower level and are reported in the parantheses. *, **, and *** represent statistical significance at the 10%, 5%, and 1% confidence levels, respectively.