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ESG Activities, Political Contributions, and Firm Performance

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Dedication

To my parents, my wife, and my daughter

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Abstract

This dissertation is comprised of two distinct empirical papers which I document in two separate chapters. In the first chapter, I empirically examine the impact of banks' environmental, social, and governance (ESG) practices on banking efficiency. Using a sample of 578 international banks over the years 2011-2019, I employ a data envelopment analysis (DEA) method to estimate banks' technical efficiency scores. My baseline Tobit regressions reveal that high ESG performance significantly reduces banks' efficiency. Further, I find that this relationship is non-linear at very high levels of ESG scores. These findings are consistent across the social (S) and governance (G) dimensions of ESG, across banks with different sizes and specializations, and across banks from America, Asia, and Oceania regions. I separately control for World Bank's country-wise governance indicators and find consistent results for each of them. My results survive a couple of robustness tests based on Simar and Wilson (2007) two-stage efficiency analysis and fractional probit regressions. For further robustness, I test for and subsequently obtain persistence of the diminishing efficiency. I use a two-step system Generalized Method of Moments (GMM) estimation to deal with potential endogeneity. My channel regressions suggest that the negative effect is mainly attributed to significant reductions in bank loans and other operating assets. With this novel evidence, this chapter imparts new direction for further research in the growing literature of ESG issues in banking and finance. In the second chapter, I empirically explore the impact of political connections of U.S. suppliers and buyers. Prior evidence, although mixed, suggest that firm performance is significantly associated with its own political contributions. However, the link between firms' performance and political connections of their suppliers and buyers is yet to be explored. I examine whether performance of U.S. firms is affected by the changes in political contributions of their supplier and buyers. Based on a large sample of U.S. nonfinancial firms and their politically connected suppliers and buyers from 1996 to 2018, my baseline findings reveal that firms' profitability, value, liquidity, and debt level reduce significantly in response to increases in lobbying expenditures of their suppliers, supporting the *bargaining power perspective* of political connections. Further, I find that firms exhibit stronger liquidity and increased internal investments following rises in lobbying expenditures of their buyers, suggesting the *cash-flow perspective* of political contributions. These findings survive a set of robustness tests based on change-on-change regressions and propensity score matching. This chapter provides the first evidence on the link between firm performance and political contributions of their suppliers and buyers. This study shall be of substantial interest to academics, business organizations, and investors who are concerned about the impact that political connections impose on U.S. corporations.

JEL classification: G21, G30, G39, M10, M14.

Keywords: ESG, banking efficiency, data envelopment analysis, political contribution, firm performance, lobbying expenditure, PAC contribution, suppliers, buyers.

Chapter 1: Does sustainability lead to efficiency? The role of ESG performance in banking efficiency

1. Introduction

This paper aims to empirically examine the impact of banks' environmental, social, and governance (ESG) performance on banking efficiency. Prior studies in the literature provide plenty evidence on the association between ESG and firm performance (e.g., Jensen and Berg, 2012; Steyn, 2014; Brown et al., 2009; Simnett et al., 2009; El Ghoul et al., 2011; Albuquerque et al., 2012; Sharfman and Fernando, 2008; Gillan et al., 2010; Kumar et al., 2016; Buchanan et al., 2018), and ESG and banking performance (e.g., Azmi et al., 2021; Buallay, 2019; Forgione et al., 2020; El Khoury et al., 2021; La Torre et al., 2021; Miralles-Quiros et al., 2019; Mure et al., 2021, among other). However, literature on ESG activities and banking performance exhibit mixed evidence. In fact, the impact of banks' ESG performance on their efficiency is still an empirical issue. In this paper, we use a data envelopment analysis (DEA) technique to estimate banks' efficiency scores using a defined set of banking inputs and outputs and examine the impact of banks' ESG performance (i.e., scores) on their level of technical efficiency.

We focus on two broad theories of ESG: stakeholder theory (Freeman, 1984) and trade-off theory (Friedman, 1970; Devinney, 2009; Aupperle et al., 1985). The *stakeholder theory* suggests that firms, being obligated by their goal to maximize stakeholder value, are more likely to engage in ESG activities to meet stakeholder demands and to avoid costs associated with non-compliance to growing regulatory concerns for ESG friendly business practices (Azmi et al., 2021). On the other hand, the *trade-off theory* argues that ESG initiatives lead firms to inefficient use of resources as the funds invested on ESG could have been utilized for better profitability of the firm. Firms with high social consciousness are subject to higher costs and lower profitability as compared with

socially unconscious firms (Aupperle et al., 1985). We hypothesize that ESG has a significant and non-linear influence on banks' efficiency. In addition, we predict that the role of ESG in banking efficiency is consistent across all three dimensions (E, S, and G) of ESG and numerous bank characteristics.

We use an extensive sample of international banks over the years from 2011 to 2019. We collect bank-related ESG data from Thomson Reuters Data Stream. Our bank-level data is obtained from Orbis Bank Focus (formerly, Bankscope) database of global banks and financial institutions. We obtain World Bank's (WB hereafter) country-wise macroeconomic and governance indicators to control for macroeconomic factors and institutional quality. Our final sample consists of 5,202 bank-year observations, representing 578 unique banks from 57 countries around the world.

We employ a DEA technique to estimate banks' efficiency score (*Efficiency*), which is our predicted variable. Use of DEA to derive efficiency scores is well-established in the literature (e.g., Davies et al., 2010; Bush et al., 2014; Burrows et al., 2015, among others). Following Ahamed et al. (2021), we use deposits, staff or personnel expenses, and fixed assets as bank inputs, and loans, other earning assets, and other operating income as bank outputs in our DEA analysis. Our primary explanatory variable is ESG score (*ESGS*), representing overall ESG performance of our sample banks. We also include $ESGS^2$ in our analyses to examine whether the ESG-efficiency relationship is non-linear. We control for a range of bank-specific characteristics such as natural log of bank total assets (*Size*), equity ratio (*equity/TA*), deposit ratio (*deposit/TA*), loan to deposit ratio (*loan/deposit*), return on average assets (*ROA*), return on average equity (*ROE*), total capital adequacy ratio (*total CAR*) and net interest margin (*NIM*). Our macro-level controls include growth rate of gross domestic product (*GDP*), annual percent change in consumer price index (*inflation*), real rate of interest (*interest*), and percentage of unemployed labor force (*unemployment*). To

control for country-wise institutional quality, we use WB's six governance indicators: voice and accountability estimate (*VAE*), political stability and absence of violence estimate (*PVE*), government effectiveness estimate (*GEE*), regulatory quality estimate (*RQE*), rule of law estimate (*RLE*), and control of corruption estimate (*CCE*).

For our baseline analyses, we run Tobit regressions as our predicted variable (*Efficiency*) is censored by a limit from 0 to 1. Tobit models are used when the independent variable is observable, but the latent variable cannot always be observed. Controlling for a range of bank- and macro-level factors, we find a significantly negative relationship between ESG performance and banking efficiency. Further, we find that the impact of ESG on banking efficiency is non-linear, i.e., banks with very high ESG scores tend to be the efficient ones. We examine the relationship between ESG and banking efficiency from different perspectives. First, we examine how ESG affects banking efficiency across all three dimensions (E, S, and G) of ESG. Here, we use environmental pillar score (*EPS*), social pillar score (*SPS*), and governance pillar score (*GPS*) as our main regressors. We find that the social (S) and governance (G) dimensions have significantly negative influence on banking efficiency. In addition, the non-linear impact holds for all three dimensions of ESG.

We divide our sample into size terciles (e.g., large, medium, and small) to examine whether our baseline findings hold for banks of all sizes. We find that high ESG scores negatively and significantly affect efficiency of banks from all three size classes. However, the non-linear impact is insignificant for medium banks. Next, we use dummy variables for banks with different specializations such as bank holding companies (BHCs), commercial banks (CBs), and others. Our results indicate that high ESG performance leads to a reduced efficiency for banks with all specialties. In addition, the non-linear effect holds and appears to be highly significant in all three models. We run similar tests for banks from different geographic regions. In particular, we

generate a numeric variable taking values from 1 through 5 for Africa, America, Asia, Europe, and Oceania regions, respectively. We find consistent results across banks from all regions except Africa and Europe.

To determine how country institutional quality influences the ESG-efficiency relationship for banks, we separately control for WB's six governance indicators to run separate regressions for each of them. In each case, we find significantly negative (positive) coefficients for *ESGS* (*ESGS*^{2}). Further, we develop a weighted-index (*INQ*) for country-wise governance/ institutional quality and examine whether banks originating from countries with above-median index scores exhibit different results than banks from countries with below-median scores. Results remain consistent in both specifications.

Primarily, our results survive a couple of robustness checks based on Simar and Wilson (2007) two-stage efficiency analysis and fractional probit regressions. For further robustness, we check for the persistence of our baseline finding. In particular, we examine whether the diminishing efficiency persists in time periods t+1, t+2, and t+3. Our results remain robust in all three specifications. We employ two-step system GMM to deal with potential endogeneity and find that our baseline results remain unchanged.

We run additional tests to identify potential channels. Our findings indicate that the diminishing efficiency stemming from ESG investments are mostly attribute to significant reductions in bank loans and other operating assets. We do not find any significant result for other operating income. Further, we report that the reductions in bank loans and other operating assets remain persistent for a period of three years following the ESG investments.

This paper contributes to the literature in several ways. First, it's an original study investigating the effect of ESG activities on banks' efficiency, not performance or value. Prior studies focus on

the effect of ESG on various aspects of firm (and bank) performance, but the ESG-efficiency relationship has been an empirical issue. Second, the paper uses an extensive sample of banks from 57 countries all over the world, contributing to the growing literature of ESG issues in banking. Third, the paper investigates the relationship between ESG performance and banks' efficiency from various perspectives, i.e, ESG dimensions/pillars and numerous bank-specific characteristics such as bank size, specialization, country/region of origin, and country governance quality. With this novel evidence, the paper renders research and policy implications to the academics and experts in the banking industry.

The paper proceeds as follows: Section 2 provides a brief review of relevant literature and identifies the testable hypotheses. Section 3 describes the data and variables. Section 4 simultaneously presents the methodology and empirical results. Finally, Section 5 concludes.

2. Literature review and hypotheses development

2. 1 ESG activities and firm performance

The role of ESG in firm performance gained research attention in the early 21st century. Numerous studies highlight the significance of ESG reporting in firms' reputation and performance. Advocators of sustainability reporting believe that promotion of ESG disclosure benefits firms and their stakeholders through superior decision-making, high transparency, and increased financial stability. Eccles et al. (2015) suggest that companies with high sustainability policies exhibit more stakeholder engagement and disclosure of nonfinancial information and hence outperform their competitors in the long run. Krzus (2011) emphasizes on integrated reporting, which he defines as a single report integrating a firm's financial performance and nonfinancial information, such as issues related to the firm's environmental, social, and governance activities. He argues that

integrated reporting reduces firms' reputation risk through greater transparency and improved decision-making. Eccles et al. (2011) conduct a comparative analysis of U.S. and European investors based on their preference for ESG data. They find that ESG reporting is more important for U.S. equity investors, who exhibit high interest for firms' environmental and governance information. The authors also report that pension funds and hedge funds are more interested about nonfinancial reporting, as compared with insurance companies.

According to Jensen and Berg (2012), ESG reporting provides a complete picture of firm performance by disclosing firms' financial and nonfinancial information, resulting in increased transparency. Steyn (2014) suggests that ESG reporting improves firms' financial performance. Brown et al. (2009) investigate firms' environmental and social performance through global reporting initiative (GRI) and document the significance of GRI as a successful reporting standard. Based on a large sample of more than 2,000 global companies, Simnett et al. (2009) find that firms that have assurance of sustainability reports exhibit enhanced credibility and stronger corporate reputation.

Numerous studies investigate the *channels* through which ESG activities affect firm performance. A strand of literature suggests the "cost of capital" channel, arguing that ESG increases firms' performance by reducing their cost of capital. El Ghoul et al. (2011) find a negative association between ESG score and cost of capital. Albuquerque et al. (2012) measure firms' CSR performance using ESG scores and find that firms with high CSR exhibit low systematic risk and expected return, and high corporate profits. Sharfman and Fernando (2008) study the environmental – economic performance relationship in U.S. firms and report that firms with better environmental risk management are likely to benefit from lower cost of equity capital,

higher tax benefits from increased debt, lower business risk, and hence, better economic performance.

Gillan et al. (2010) empirically explore the impact of firms' ESG performance on their valuation through the channels of operational efficiency, managerial compensation, and number of institutional investors. They also investigate the motivation of the strong ESG firms and the role of their ESG initiatives in their stock trading. They find that strong ESG performance increases operating efficiency and firm value but reduces CEO compensation. However, they find no evidence of institutional investors affecting the relationship between ESG performance and firm valuation. Kumar et al. (2016) develops the ESG risk-premium model in which they analyze the stock return – volatility channel. Based on a sample of 966 listed firms, they document that ESG firms exhibit higher stock return and lower volatility in stock performance, as compared with their industry peers. Cao et al. (2019) analyze the influence of firms' ESG preferences on their performance through the channel of market efficiency and provide evidence from institutional trading and asset mispricing. Their findings indicate that firms with underpriced (overpriced) stocks and poor (good) ESG performance exhibit high (low) risk-adjusted return.

In a recent study, Azmi et al. (2021) identify five *theories* underlying the impact of ESG on firm performance. The "stakeholder theory", introduced by Freeman (1984), suggest that firms involve in ESG activities because of their ethical obligation to maximize value of their stakeholders. The "trade-off theory" of Friedman (1970) argues that firms (i.e., managers) adopt ESG initiatives at the direct cost of shareholders and there's a trade-off between ESG investing and shareholder value maximization. The "agency theory", which is based on the foundations of Jensen and Meckling (1976), suggests that firms' ESG activities are one of several ways through which managers maximize their non-pecuniary benefits at the cost of owners. The "resource-based

theory" implies that firms' adopt ESG practices as a part of their strategic investment, allowing firms to achieve competitive advantage over their rivals. Finally, the "stewardship theory" suggests the role of managers as stewards to their firms who commit to maximize the value of their firms in the long run through their engagement in ESG investing.

A number of studies examine other theories. For example, Porter (1991) suggests that firms that pioneer in sustainability reporting benefit from early mover advantage and low-cost future regulations, supporting the anticipation theory. Garriga and Mele (2004) analyze four major CSR theories, i.e., instrumental, political, integrative, and value theories, and argue that sustainable firms exhibit innovative strategy, operations, and product design, and hence, superior performance, as compared with their counterparts.

2.2 The role of ESG activities in banking performance

The importance of ESG initiatives and disclosure in the performance of banks and financial institutions increased dramatically since the 2007-2008 global financial crisis. Azmi et al. (2021) suggest that ESG activities may indicate good governance and add value to banks' stakeholders. Based on a sample of 251 banks from emerging economies, they empirically examine the role of ESG in bank performance. They find evidence of a non-linear association between ESG and bank value, i.e., high levels of ESG have smaller impact on bank value, as compared with low levels of ESG. Furthermore, the authors document that environmental component of ESG has the greatest effect on bank performance. They argue that ESG positively influences bank performance through the channels of cash flow and operational efficiency, whereas their results indicate that the relationship between ESG and banks' cost of equity is negative. They find no significant impact of ESG on banks' cost of debt.

Studying a sample of 235 European banks from 2007-2016, Buallay (2019) investigates the impact of ESG activities on banks' operational, financial, and market performance. She finds a significantly positive relationship between ESG and bank performance and argues that environmental disclosure has the largest impact. She also reports that social and governance disclosures negatively affect banks' ROA and ROE.

Forgione et al. (2020) examine the effects of CSR on banking efficiency. Applying a stochastic frontier analysis to estimate profit efficiency of global banks, they find that environmental and social dimensions of CSR have negative impact on banks' efficiency, whereas the governance dimension seem to exhibit no influence. However, they argue that the impact of CSR on banks' efficiency varies across regions. In fact, CSR has a positive influence on banking efficiency in countries having common low and with high stakeholder protection. Overall, their findings suggest that banks' sustainable behavior results in an increased efficiency.

El Khoury et al. (2021) investigate the effect of ESG activities on bank performance in the Middle East, North Africa, and Turkey. Studying a sample of 46 listed banks over the period from 2007 – 2019, they find a nonlinear relationship between ESG and bank performance. In particular, they report that marginal bank performance decreases with incremental ESG investments after a certain level. However, they argue that the environmental component of ESG exhibits a convex relationship with banks' market return. La Torre et al. (2021) analyze the relationship between banks' ESG performance and their accounting-based and market-based financial performance. Accounting-based performance is measured by ROA and ROE, whereas market-based performance is measured by capitalization-to-book value and Tobin's Q. Using a value-based metrics (VBM) approach, they find that banks' ESG initiatives are less likely to be driven by

profitability incentives. Moreover, their findings justify the current approach of banking authorities concentrating on bank ESG risk.

Studying the shareholder value creation channel, Miralles-Quiros et al. (2019) evaluate the ESG performance of an international sample of 166 banks over the period 2010 – 2015. They argue that banks' environmental and governance performance positively affect their Tobin's Q and hence, shareholder value creation, whereas banks' social performance exhibits an adverse impact on the same. Mure et al. (2021) examine the motive of Italian banks to adopt ESG initiatives. In particular, they investigate whether banks get involved in ESG activities to minimize their reputation risks and whether ESG performance has an influence on banks' likelihood of receiving financial penalties. Based on a sample of 13 Italian banks between 2008 and 2018, their results suggest that banks with a high probability of receiving sanctions are more likely to adopt ESG practices; hence, they exhibit high ESG scores.

Using a data envelopment analysis (DEA) technique, Ouenniche and Carrales (2018) empirically assess the efficiency of U.K. commercial banks. Getting motivated by the lack of relevant research on U.K. commercial banking industry, their study finds that, on average, U.K. commercial banks fail to meet acceptable levels of technical and scale efficiency. Based on a novel DEA-based analysis framework with a linear regression-based feedback mechanism, their study largely contributes to the empirical literature on ESG performance and banking efficiency.

While most of the studies in the literature investigate the role of ESG in banks performance, Houston and Shan (2021) examine whether there exists a reverse relationship. They study the influence of banks on the ESG performance of their borrowers. Their findings suggest that banks are more likely to issue loans to borrowers with better ESG profiles and banking relationship has a positive influence on borrowers' ESG performance. They also report that this relationship is

stronger for banks with better ESG ratings and for borrowers who are highly dependent on their banks. Overall, their study highlights the significance of banking relationship as an effective transmission mechanism for promoting corporate ESG policies.

There are plenty of evidence on the impact of ESG on various aspects of bank performance. Several studies analyzed the channel(s) through which ESG affects banks. However, existing literature fails to offer any evidence on the role of banks' ESG initiatives on their overall efficiency. In this paper, we attempt to fill the gap in the literature by analyzing a large sample of 578 international banks. In addition, we examine the role of three ESG dimensions separately and evaluate the influence of various bank characteristics to check for consistency.

2.3 Testable hypotheses

We separate our ex-ante predictions into multiple segments: overall ESG performance and banking efficiency; individual ESG dimension and banking efficiency; and the channels through which ESG activities affect banks' efficiency. First, we hypothesize on the overall impact of banks' ESG activities on their efficiency level. As indicated a large body of the literature (e.g., El Khoury et al., 2021; Azmi et al., 2021), we predict that ESG has a significant and non-linear impact on banks' efficiency. In this regard, we focus on the overall technical efficiency of banks that we derive from using a set of inputs and outputs in a DEA model. Our first set of testable hypotheses are as follows:

Hypothesis 1a: Banks with *high* ESG performance are *more* efficient

Hypothesis 1b: Banks with *high* ESG performance are *less* efficient

Hypothesis 1c: The relationship between ESG and banking efficiency in *non-linear*.

Next, we further analyze whether and how the impact of banks' ESG performance on their efficiency vary across different ESG dimensions. Prior studies document that ESG components, i.e., environmental, social, and governance aspects exhibit different degrees of influence on firm performance and efficiency (e.g., Azmi et al., 2021; Buallay, 2019; Forgione et al., 2020; El Khoury et al., 2021; Miralles-Quiros et al., 2019). Based on prior literature, we develop the following hypothesis regarding individual ESG factors:

Hypothesis 2a: Banks with *high* performance in the environmental/social/governance dimension exhibit *increased* efficiency

Hypothesis 2b: Banks with *high* performance in the environmental/social/governance dimension exhibit *reduced* efficiency

Hypothesis 2c: The effect of banks' environmental/social/governance activities on banking efficiency is *non-linear*.

We also examine the relation between ESG performance and banks' efficiency from different perspectives. As suggested by numerous studies in the literature, ESG effect on banks' performance and efficiency may be influenced by several bank-specific properties, such as, size, specialization, and geographic location of the bank, quality of governance in the country of bank's headquarter, and so forth. We run separate tests to examine these influences. Our ex-ante predictions are such that the relationship between ESG activities and banks' efficiency is consistent, i.e., significant and non-linear, across banks with varying characteristics.

3. Data and variables

3.1 Data

We collect bank-related ESG data from Thomson Reuters (Refinitiv) Data Stream. Data Stream provides a wide range of overall and dimension-wise ESG scores. We obtain bank-level variables from Orbis Bank Focus (formerly known as Bankscope) database of global banks and financial institutions. Our sample includes all global banks having ESG scores published by Data Stream. To control for macroeconomic factors, we collect WB's country-wise macroeconomic indicators. To ensure that the effect of ESG activities on banks' efficiency is not influenced by the governance or institutional quality of a bank's country of origin, we control for WB's six country-wise governance indicators.

First, we merge the Data Stream ESG data set with WB macro and governance databases by using unique bank identifiers. We then merge this data with the Orbis Bank Focus data set based on ISIN codes. We check for consistency of bank names and country names in all data sets. Our final sample spans from 2011 to 2019 and consists of 5,202 bank-year observations, including 578 banks and 57 countries around the globe. All variables are winsorized at 5% to get rid of any unwanted outlier effect.

3.2 Variables

3.2.1 Banking efficiency

Our main dependent variable is bank efficiency score (*Efficiency*), which is calculated using an input-oriented DEA approach. DEA is a non-parametric method that measures efficiency within a group of homogeneous decision-making units (DMUs) with a specified set of input(s) and output(s). The DMUs represent business entities, which are the banks in our sample. We select

loans, *other earning assets*, and *other operating income* as bank **outputs**, whereas *deposits and short-term funding*, *staff expenses*, and *fixed assets* as bank **inputs** in our DEA method. Using variable returns to scale (VRS) approach, the method generates efficiency scores ranging from 0 to 1 for each DMU (i.e., bank) over the years from 2011 to 2019. The minimum number of DMUs is 434 in 2011 and the maximum is 499 in 2017.

3.2.2 ESG scores

The overall ESG score (*ESGS*) obtained from Data Stream provides an overall rating of a banks' ESG performance based on the bank's self-reported information on individual ESG dimensions. The ESG controversies score (*ESG_Contro*) measures the bank's exposure to environmental, social, and governance controversies and adverse reporting by the global media. Data Stream also provides environmental, social, and governance pillar scores (*EPS*, *SPS*, and *GPS*, respectively) to measure banks' performance in each of the three dimensions of ESG. All ESG related scores are assigned out of 100.

3.2.3 Control variables

To control for bank-specific characteristics, we include natural log of total assets (*Size*), equity ratio (*Equity/TA*), deposit ratio (*Deposit/TA*), loan to deposit ratio (*Loan/Deposit*), return on average assets (*ROA*), return on average equity (*ROE*), total capital adequacy ratio (*Total CAR*), and net interest margin (*NIM*).

In our analyses, we mainly use GDP growth rate (*GDP*), annual percentage change in CPI (*Inflation*), real interest rate (*Interest*), and unemployment rate (*Unemployment*) to control for country-specific macro effects. We also collect HR rating, debt policy rating, financial sector

rating, fiscal policy rating, macro management rating, and a number of other ratings for each country from the WB open database.

To control for country governance, we use WB open database that provides six governance indicators for each country: voice and accountability (*VAE*), political stability and absence of violence (*PVE*), government effectiveness (*GEE*), regulatory quality (*RQE*), rule of law (*RLE*), and control of corruption (*CCE*). For further analysis, we develop an index score (*INQ*), which is measured as the weighted average of the standard deviations of these governance indicators:

$$INQ = 1/6 * [\sigma(VAE) + \sigma(PVE) + \sigma(RQE) + \sigma(RLE) + \sigma(GEE) + \sigma(CCE)] \quad [1]$$

3.3 Summary statistics

Table 1 provides the total number of banks for each country in our sample. With 287 banks, United States of America (USA) represents the country with maximum number of banks, followed by China and Japan (22 each), India (15), and Italy (13). In an unreported table, we present the total number of banks having head quarter in each of the five regions. Americas are home to the largest number of banks (324), followed by Asia (144) and Europe (94).

In Table 2, we present the summary statistics of key variables. Out of 5,202 bank-year observations, 4,213 exhibit DEA generated efficiency scores, ranging from 9.04% to 100%, with a mean and a median efficiency score of 56.76% and 46.57%, respectively. We obtain overall and dimension-wise ESG scores for 3,137 bank-year observations. The average and median ESG scores are 43.92 and 40.06, whereas the minimum and maximum ESG scores are 1.34 and 94.30, respectively. In terms of dimension-wise scores, our sample banks exhibit average E, S, and G pillar scores of 26.94, 44.05, and 50.53, respectively. The minimum of environmental pillar score is 0, whereas the minimums for social and governance pillar scores are 0.63 and 0.47, respectively.

Clearly, our sample banks exhibit a weaker performance in regard to the environment (E) aspect of ESG.

In Figure 1, we portray the relationship between ESG and banking efficiency. The bottom line in Panel A represents the efficiency scores of banks that have ESG investments, whereas the top line represents the efficiency scores of banks with no ESG investments. Clearly, banks with ESG activities are more efficient as compared with banks with no ESG activities. In Panel B, we illustrate the ESG-efficiency relationship for banks having ESG scores at the 90^{th} percentile vs. all other ESG banks. We find that banks having ESG scores at the 90^{th} percentile exhibit much higher efficiency as compared with all other ESG banks.

4 Empirical findings

We devise our empirical analysis in multiple segments. We begin with our baseline tests using Tobit regressions for our censored dependent variable. Further, we test whether the ESG-efficiency relationship holds for individual ESG dimensions. Next, we divide the sample into size terciles, i.e., small, medium, and large banks, and see whether the effect of ESG on banks' efficiency changes across bank size. We repeat our baseline Tobit regression for banks with different specializations, i.e., bank holding companies (BHCs), commercial banks (CBs), and others, to see if they exhibit different results. In addition, we examine the effect of ESG performance on the efficiency of banks from different regions as well as on the efficiency of U.S. banks only. Next, we separately incorporate six country governance indicators into our baseline model and obtain the results. We also include the *INQ* index score as a regressor in our baseline regression and run separate regressions for banks from both above and below median *INQ* countries. In majority of the tests, we control for year and country dummies.

4.1 ESG performance and banking efficiency

We report our baseline findings in Table 3. Bank efficiency score (*Efficiency*) is the dependent variable which is estimated by the DEA method and censored by a limit from 0 to 1. We run Tobit regressions for our baseline analyses, which are based on the following equation:

$$Efficiency_{i,t} = \alpha_i + \beta_1 ESGS_{i,t} + \beta_2 ESGS_{i,t}^2 + \beta_3 X_{i,t} + \beta_4 Y_{i,t} + \varepsilon_{i,t} \quad [2]$$

Where, $X_{i,t}$ is the vector of bank controls and $Y_{i,t}$ is the vector of macroeconomic factors. We include $ESGS^2$ in our model to capture any nonlinear association between banks' efficiency and their ESG activities. In Model (1), we regress *Efficiency* on both *ESGS* and $ESGS^2$ and find significantly negative (positive) relation between *Efficiency* and *ESGS* ($ESGS^2$). These findings support our *hypotheses 1b* and *1c*. In Model (2), we add bank size (*Size*) and find that the results are consistent with those from Model (1). Next, in Model (3), we include all bank-related control variables and still find similar results. Lastly, in Model (4), we add the macroeconomic variables, and the results are still unchanged, i.e., ESG performance has significantly negative and nonlinear impact on banks' efficiency. In terms of marginal effect, a 1% increase in a bank's overall ESG score results in a 1.09% reduction in its technical efficiency. All results from our baseline regressions are consistent with the trade-off theory of ESG and firm efficiency.

4.2 ESG dimensions and banking efficiency

In this section, we separately examine the role of three ESG dimensions (i.e., pillars) on banking efficiency. We test whether the effect of ESG on banking efficiency is consistent across all three

dimensions. We separately use *EPS*, *SPS*, and *GPS* as the primary independent variable in place of *ESGS* in our baseline model. In particular, we run the following set of equations:

$$Efficiency_{i,t} = \alpha_i + \beta_1 EPS_{i,t} + \beta_2 EPS_{i,t}^{\ 2} + \beta_3 X_{i,t} + \beta_4 Y_{i,t} + \varepsilon_{i,t} \quad (3a)$$

$$Efficiency_{i,t} = \alpha_i + \beta_1 SPS_{i,t} + \beta_2 SPS_{i,t}^{\ 2} + \beta_3 X_{i,t} + \beta_4 Y_{i,t} + \varepsilon_{i,t} \quad (3b)$$

$$Efficiency_{i,t} = \alpha_i + \beta_1 GPS_{i,t} + \beta_2 GPS_{i,t}^{\ 2} + \beta_3 X_{i,t} + \beta_4 Y_{i,t} + \varepsilon_{i,t} \quad (3c)$$

In Models (1), (2), and (3) of Table 4 we conduct the tests following equations 3a, 3b, and 3c, respectively. Our findings suggest that high *SPS* and *GPS* significantly reduces banks' efficiency, supporting our hypothesis 2b. In particular, a 1% rise in a bank's *SPS* (*GPS*) leads to a 0.55% (0.68%) fall in its efficiency score. Further, consistent with our previous results, we find that the ESG-efficiency relationship is nonlinear across all three dimensions of ESG, supporting our hypothesis 2c.

4.3 Influence of numerous bank characteristics on the ESG-efficiency relationship

In Table 5, we report the results for banks with different sizes. We divide our sample into size terciles, i.e., small, medium, and large banks and investigate if changes in bank size affect the sign and/or significance of the coefficients on *ESGS* and $ESGS^2$. In Model (1), we document the results for small banks. The estimated coefficients on *ESGS* ($ESGS^2$) are negative (positive) and highly significant at 1% for small banks. Similar results are obtained for large banks; however, the nonlinear relationship seems to be insignificant for medium banks.

Furthermore, we examine whether the ESG-efficiency relationship vary across bank specialization. In this regard, we generate a numeric variable *Specialty* taking values 1, 2 and 3 for

bank holding companies (BHCs), commercial banks (CBs), and others, respectively. Others include investment banks and trust corporations, finance companies, savings banks, private banking, Islamic banks, real estate and mortgage banks, cooperative banks, central banks, and specialized governmental credit institutions. In our sample, we have 2,988 BHCs and 1,800 CBs, whereas 414 banks fall into the "others" category. We test whether the adverse impact of ESG investments on banks' technical efficiency are dominated by bank specialty. Models (1), (2), and (3) of Table 6 report the results from these tests. In all three models, the coefficient on *ESGS* (*ESGS*^{2}) is negative (positive) and highly significant at 1%, providing no evidence of bank specialization influencing the impact of ESG performance on banks' efficiency.

Next, we conduct a region-wise analysis. Table 7 presents the regression results for this analysis. Our sample banks are separated into five regions, i.e., we have banks from Africa, Americas, Asia, Europe and Oceania. From Models (1) through (5), we run separate Tobit regressions for each of these regions, while controlling for the same set of bank- and macro-level variables. We document that high ESG performance reduces banking efficiency in Americas, Asia, and Oceania regions, supporting our baseline findings. In addition, these banks exhibit significantly nonlinear relationship between their ESG involvement and technical efficiency. However, the results are insignificant for African and European banks. In Model (6), we analyze the U.S. banks separately since almost half of our sample banks are originated in USA. We find that our results are unchanged. In an unreported test, we also regress the efficiency of non-U.S. banks only and find consistent results for both *ESGS* and *ESGS*^{2} at 1% significance.

In Table 8, we report our results from the analyses based on country-wise governance and institutional quality. In models (1) through (6), we separately include each of the six WB country governance indicators to examine whether they have any moderating influence on our predictions

and baseline findings. These governance indicators are highly collinear, which is why we include them separately and run separate regressions. In all six specifications, we find negative (positive) and highly significant estimates for ESGS ($ESGS^2$). We then develop the index score *INQ* based on these governance indicators. We generate the standard deviation of each of these six variables and define *INQ* as the weighted average of the six standard deviations. As predicted, in Model (7), *INQ* exhibits a significantly positive impact on banking efficiency, i.e., higher country governance index score increases banks' efficiency, controlling for bank- and macro-factors. In Models (8) and (9), we regress efficiency on ESG for banks originating from countries above- and below-median *INQ*, respectively. Results are unchanged in both specifications.

4.4 Robustness analyses

For robustness analyses, we conduct a couple of tests: Simar and Wilson (2007) two-stage efficiency analysis and fractional Probit analysis. In model (1) of Table 9, we present results from Simar and Wilson (2007) bias corrected bootstrapping approach to claim a more robust link between banks' efficiency and their overall ESG performance. In models (2) through (4), we apply the same technique for individual ESG dimensions. In all specifications, the results support the robustness of our baseline findings.

Next, in Table 10, we report the findings from fractional Probit regressions. In Model (1), the coefficient on *ESGS* (*$ESGS^2$*) is -0.0298 (0.0004) and is highly significant at 1% level. The marginal effect (unreported) suggests that a one-point increase in a bank's overall ESG score leads to a 1.01% decrease in its banking efficiency. Although we do not find any significant result for *EPS* in model (2), *EPS^2* exhibits a positive coefficient of 0.0001 with significance at 1% level. Finally, the estimated coefficients on *ESGS* (*$ESGS^2$*) in models (3) and (4) are -0.0147 (0.0060)

and -0.0171 (0.0054) and appear to be significant at 5% and 1% levels, respectively. In terms of economic impact, a point increase in a bank's social (governance) pillar score reduces its banking efficiency by 0.4987% (0.5831%).

To demonstrate further robustness of our findings, we examine the consistency of the negative association between ESG performance and banking efficiency in time periods t+1, t+2, and t+3. The results are presented in Table 11. We find that banks with high ESG performance persistently experience reduced banking efficiency up to time period t+3. Marginal effects analysis suggests that a 1% increase in a bank's ESG performance in time t results in a decrease in its banking efficiency by 0.9315%, 0.9286%, and 1.0464% in time periods t+1, t+2, and t+3, respectively. All models include bank and macro control, as well as year and country fixed effects.

4.5 Test of endogeneity

Numerous studies in the literature confirm the endogenous association between banking performance and its independent predictors (Elnahass et al., 2021). In particular, prior studies suggest that there may exist causal relationship, measurement errors, and/or omitted variable bias. In this paper, we apply the two-step system GMM estimation (Arellano and Bond, 1991; Arellano and Bover, 1995; and Blundell and Bond, 1998) to address the potential endogeneity between ESG and banking efficiency. Table 12 reports the results from our endogeneity tests. We use the lagged *Efficiency* and *ESGS* as our GMM variables, whereas we treat lagged *Efficiency* and bank-specific variables as our instruments. Model (1) presents the results for *ESGS*, whereas models (2) through (4) present the same for individual ESG dimensions. In all four models, we find that our baseline findings are unchanged. All specifications include bank and macro control, and year and country dummies.

4.6 Potential channels

So far, we provide evidence suggesting that ESG activities hurt banking efficiency. But it's imperative to identify the channels through which banks are losing efficiency in response to increases in their ESG investments. In this regard, we focus on the banks outputs, i.e., loans, other earning assets, and other operating income, that we used in our DEA model, as potential channels. Figure 2 provides a visual summary of the changes in bank outputs over the sample period, for both banks with and without ESG scores. Panel A (left) portrays the change in annual loan amounts for banks with ESG scores vs. banks with no ESG scores; panels B (middle) and C (right) provide similar images for changes in other earning assets and other operating income, respectively. In all three panels, it's visible that banks involved in ESG activities undergo significant decline in their outputs as compared with banks having no involvement in ESG activities.

Table 13 reports the results from our channel regressions. In model (1), the coefficients on *ESGS* and $ESGS^2$ are -3,331.26 and 47.70, respectively, whereas in model (2), the same are -2,846.81 and 39.58, respectively. All of these coefficients appear as statistically significant at 1% level. We do not obtain any significant result in favor of change banks' other operating income in model (3). Overall, these results suggest that banks with high ESG performance experience significant reductions in their loans and other earning assets, resulting in reduced revenues of the banks and thereby contributing to the detrimental impact of ESG activities on their banking efficiency.

To check for robustness of these findings, we examine the effect of ESG performance on *future* bank loans and other operating assets. In particular, we test whether banks with high ESG performance suffer from persistent declines in their lending and other operating assets during the

period t+1 to t+3. Table 14 reports the results, revealing that the harmful effect of ESG performance on bank loans and other operating assets persists for three years following the ESG investments, though the severity of the reduction diminishes over the years.

5. Concluding remarks

The main purpose of this paper is to empirically test the connection between ESG performance and banks' efficiency. Existing studies in the literature provide enough yet conflicting evidence on the effects of ESG on firm and bank performance. In addition, the link between banking efficiency and ESG investments is yet to be assessed empirically. In this paper, we take up this overlooked issue by studying a large sample of global banks over the years 2011-2019. We capitalize on two of the existing theories of ESG and firm performance: *Stakeholder theory* and *Trade-off theory*. We anticipate that ESG has a strongly positive (negative) impact on banks' efficiency, supporting the stakeholder (trade-off) theory. In addition, consistent with Azmi et al. (2021), we hypothesize that the relationship between ESG and banking efficiency is nonlinear.

We apply a DEA method to estimate efficiency scores of our sample banks using a specific set of inputs and outputs. For our baseline analyses, we run Tobit regressions to test the link between ESG activities and banking efficiency. We find a significantly negative connection between the two, supporting the *trade-off theory* of ESG and firm performance. We further analyze the relationship across three dimensions of ESG (E, S and G) and find consistency for the social and governance dimensions. We analyze the idea from numerous bank- and country-perspectives. We find that large and small banks exhibit significantly negative and nonlinear relation between their ESG and efficiency scores. However, medium banks do not exhibit any significant result. Further, our analyses reveal that the adverse impact of ESG on banks' efficiency is significant for banks

from all specializations. Moreover, high ESG performance leads to a significant reduction in efficiency of American, Asian, and Oceanian banks. This effect also holds for samples with and without U.S. banks only. Finally, we control for WB's country governance indicators and find that their inclusion does not change consistency and significance of our primary findings. We conduct a couple of robustness analyses: Simar and Wilson (2007) bias corrected bootstrapping technique (Simar and Wilson (2007) algorithm 1), and fractional Probit regressions. In both cases, our baseline findings hold in most of the specifications. Finally, we run separate regressions for bank outputs to identify potential channels for the ESG-efficiency relationship. We find that banks with strong ESG performance experience a significant reduction in their loans and other earning assets, resulting in reduced revenues of the banks.

This paper contributes to the ESG and banking literature by offering a novel evidence on the link between ESG practices and efficiency of banks. The impact of ESG on banks' performance is already evident in the literature. With this puzzling finding on the negative role of ESG in banks' efficiency, the paper forces us to question the true impact of ESG and directs us for further research to be done on the role of ESG in bank stability.

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Tables

Table 1: Number of banks by country

Country	Number of banks	Country	Number of banks
Argentina	5	Liechtenstein	2
Australia	7	Malaysia	8
Austria	3	Mexico	5
Bahrain	1	Netherlands	2
Belgium	1	Nigeria	1
Bermuda	1	Norway	7
Brazil	5	Oman	6
Canada	7	Pakistan	3
Chile	5	Peru	2
China	22	Philippines	2
Colombia	5	Poland	10
Cyprus	1	Portugal	2
Czech Republic	2	Puerto Rico	2
Denmark	5	Qatar	2
Egypt	2	Romania	2
Finland	2	Russia	3
France	3	Saudi Arabia	10
Germany	4	Singapore	3
Greece	3	South Africa	6
Hong Kong	5	South Korea	7
Hungary	1	Spain	7
India	15	Sweden	3
Indonesia	5	Switzerland	6
Ireland	3	Thailand	7
Israel	4	Turkey	8
Italy	13	UAE	7
Japan	22	UK	9
Jordan	1	USA	287
Kuwait	6	**Total**	**578**

Table 2: Summary statistics

In this table, we report the summary statistics of our main variables

Variable	N	Mean	SD	Min	Max
Dependent variable					
Efficiency	4213	0.5676	0.2843	0.0904	1
ESG variables					
ESGS	3137	43.9203	20.3345	1.3447	94.3011
$ESGS^2$	3137	2342.354	1982.54	1.8083	8892.679
EPS	3137	26.9431	31.4408	0	97.4202
SPS	3137	44.0498	23.3212	0.6306	97.2388
GPS	3137	50.5328	22.2479	0.4659	99.3762
Bank controls					
Size	4639	9.8415	2.0832	5.8655	15.2763
Equity/TA	4639	10.5408	5.6489	-3.9306	99.7794
Deposits/TA	4627	0.7787	0.1318	0.0011	0.9878
Loan/Deposit	4596	319.656	6342.209	0.859	327000
ROA	4449	1.0989	1.2858	-12.3803	22.169
ROE	4446	11.1727	36.322	-992.301	1298.153
Total CAR	3436	15.7163	4.6789	-5	95.12
NIM	4637	3.2866	2.1983	-4.5033	35.563
Macro controls					
GDP	5184	2.6298	2.0696	-9.1325	25.1625
Inflation	5049	2.1893	2.0976	-2.097	29.5066
Interest	4363	2.7449	4.3404	-12.8569	41.7603
Unemployment	5175	6.1939	3.7724	0.11	28.47
Country governance indicators					
VAE	5196	0.6977	0.8329	-1.9072	1.738
PVE	5202	0.335	0.6376	-2.81	1.6277
GEE	5202	1.1602	0.6427	-1.186	2.2411
RQE	5202	1.0677	0.6589	-1.0743	2.2605
RLE	5202	1.1225	0.7634	-1.1815	2.1003
CCE	5202	0.9773	0.7727	-1.2747	2.4049

Table 3: Baseline (Tobit) regressions

This table reports our baseline findings on the relationship between banks' ESG activities and their level of efficiency. We regress *Efficiency* on overall *ESGS* and $ESGS^2$. Generated by our DEA model, *Efficiency* is the technical efficiency score of a bank, ranging from 0 to 1. *ESGS* is the overall ESG score of a bank. We control for a set of bank- and macro-specific factors. Appendix 1 provides a detailed description of our control variables. All specifications include year and country dummies.

	(1)	(2)	(3)	(4)
ESGS	**-0.0117*** **	**-0.0119*** **	**-0.0117*** **	**-0.0112*** **
	(0.0014)	**(0.0014)**	**(0.0013)**	**(0.0015)**
$ESGS^2$	**0.0002*** **	**0.0002*** **	**0.0001*** **	**0.0001*** **
	(0.0000)	**(0.0000)**	**(0.0000)**	**(0.0000)**
Size		0.0288***	0.0169***	-0.0005
		(0.0051)	(0.0050)	(0.0057)
Equity/TA			-0.0456***	-0.0456***
			(0.0039)	(0.0048)
Deposit/TA			-1.1591***	-1.3534***
			(0.0726)	(0.0906)
Loan/Deposit			-0.0012***	-0.0015***
			(0.0003)	(0.0004)
ROA			0.1827***	0.1304***
			(0.0335)	(0.0418)
ROE			-0.0162***	-0.0087**
			(0.0034)	(0.0043)
Total CAR			0.0199***	0.0238***
			(0.0022)	(0.0026)
NIM			-0.0187**	-0.0233**
			(0.0080)	(0.0096)
GDP				-0.0005
				(0.0060)
Inflation				0.0056
				(0.0071)
Interest				0.0009
				(0.0039)
Unemployment				-0.0017
				(0.0095)
Constant	0.5623***	0.3434***	1.5886***	2.0796***
	(0.0648)	(0.0752)	(0.1305)	(0.1690)
Sigma (Constant)	0.2273***	0.2261***	0.1857***	0.1872***
	(0.0036)	(0.0036)	(0.0031)	(0.0035)
N	2574	2574	2278	1729
Pseudo R^2	0.7669	0.7810	1.2180	1.2679
Year dummies	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes

Standard errors are in parenthesis

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

Table 4: ESG dimensions and banking efficiency

In this table, we examine the ESG-efficiency relationship for individual ESG dimensions (i.e., pillars). In particular, we regress banks' efficiency score (*Efficiency*) on their environmental pillar score (*EPS*), social pillar score (*SPS*), and governance pillar score (*GPS*). We also include the squared terms of the regressors to test for any non-linear effect. All models include bank- and macro-controls, year dummies, and country dummies.

	EPS	SPS	GPS
EPS	**-0.0006**		
	(0.0008)		
EPS²	**0.0000*** **		
	(0.0000)		
SPS		**-0.0056*** **	
		(0.0012)	
SPS²		**0.0001*** **	
		(0.0000)	
GPS			**-0.0069*** **
			(0.0013)
GPS²			**0.0001*** **
			(0.0000)
Size	-0.0089	-0.0049	0.0160***
	(0.0058)	(0.0058)	(0.0051)
Equity/TA	-0.0442***	-0.0459***	-0.0486***
	(0.0048)	(0.0048)	(0.0049)
Deposit/TA	-1.3123***	-1.3517***	-1.5137***
	(0.0904)	(0.0904)	(0.0922)
Loan/Deposit	-0.0015***	-0.0015***	-0.0017***
	(0.0004)	(0.0004)	(0.0004)
ROA	0.1331***	0.1291***	0.1238***
	(0.0420)	(0.0419)	(0.0426)
ROE	-0.0092**	-0.0079*	-0.0075*
	(0.0043)	(0.0043)	(0.0043)
Total CAR	0.0245***	0.0250***	0.0265***
	(0.0026)	(0.0026)	(0.0026)
NIM	-0.0273***	-0.0243**	-0.0185*
	(0.0096)	(0.0097)	(0.0098)
GDP	0.0012	-0.0019	-0.0009
	(0.0060)	(0.0060)	(0.0061)
Inflation	0.0062	0.0047	0.0038
	(0.0071)	(0.0072)	(0.0073)
Interest	0.0008	0.0005	0.0007
	(0.0039)	(0.0039)	(0.0039)
Unemployment	-0.0001	-0.0024	0.0026
	(0.0095)	(0.0096)	(0.0097)
Constant	1.9037***	2.0321***	2.0052***
	(0.1665)	(0.1687)	(0.1728)
Sigma (Constant)	0.1869***	0.1879***	0.1910***
	(0.0035)	(0.0035)	(0.0036)
N	1729	1729	1729
Pseudo R^2	1.2743	1.2575	1.2185
Year dummies	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes

Standard errors are in parenthesis

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

Table 5: Analysis based on bank size

In this table, we test whether the ESG-efficiency relationship is a function of bank size. We group our sample banks into size terciles, representing small, medium, and large banks. As in our baseline model, *Efficiency* is our predicted variable and *ESGS* is our main independent variable. We include $ESGS^2$ in our regressions to see if the effect of ESG on banking efficiency is inconsistent at high levels of ESG performance. All models include bank-controls, macro-controls, and year dummies.

	(1) Small	(2) Medium	(3) Large
ESGS	**-0.0263*** **	**-0.0046** **	**-0.0131*** **
	(0.0080)	**(0.0021)**	**(0.0040)**
$ESGS^2$	**0.0004*** **	**0.0000**	**0.0001*** **
	(0.0001)	**(0.0000)**	**(0.0000)**
Equity/TA	-0.0429***	-0.0160***	0.0015
	(0.0121)	(0.0044)	(0.0098)
Deposit/TA	0.3776	-0.4418***	-2.0224***
	(0.4215)	(0.0920)	(0.1415)
Loan/Deposit	0.0025**	-0.0007**	-0.0027***
	(0.0010)	(0.0003)	(0.0007)
ROA	0.2166*	0.0968**	-0.1826**
	(0.1261)	(0.0421)	(0.0826)
ROE	-0.0149	-0.0070	0.0264***
	(0.0132)	(0.0046)	(0.0070)
Total CAR	0.0413***	0.0142***	-0.0196***
	(0.0063)	(0.0023)	(0.0052)
NIM	-0.0151	-0.0211***	-0.0831***
	(0.0216)	(0.0078)	(0.0145)
GDP	-0.1270**	0.0021	0.0192***
	(0.0609)	(0.0046)	(0.0070)
Inflation	-0.1629**	0.0185***	0.0133
	(0.0638)	(0.0060)	(0.0089)
Interest	0.0472	-0.0012	0.0005
	(0.0373)	(0.0033)	(0.0061)
Unemployment	0.0473	-0.0001	-0.0163***
	(0.0314)	(0.0037)	(0.0056)
Constant	0.6228	0.7371***	2.8685***
	(0.6230)	(0.1305)	(0.2451)
Sigma (Constant)	0.2195***	0.1333***	0.2620***
	(0.0088)	(0.0037)	(0.0088)
N	377	668	684
Pseudo R^2	0.6975	-0.4094	0.5381
Year dummies	Yes	Yes	Yes

Standard errors are in parenthesis

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

Table 6: Specialty-wise analysis

This table presents the ESG-efficiency relationship for banks with different specializations. In particular, we divide our sample into three sub-samples: bank holding companies (BHCs), commercial banks (CBs), and others. Others include investment banks, private banking, real estate and mortgage banks, savings banks, Islamic banks, and banks in other specialty categories. We regress *Efficiency* on bank *ESGS* and $ESGS^2$ while controlling for all bank- and macro-specific characteristics. All specifications include year and country dummies.

	(1) BHCs	(2) CBs	(3) Others
ESGS	**-0.0118*** **	**-0.0118*** **	**-0.0259*** **
	(0.0021)	**(0.0019)**	**(0.0077)**
$ESGS^2$	**0.0002*** **	**0.0001*** **	**0.0004*** **
	(0.0000)	**(0.0000)**	**(0.0001)**
Size	-0.0506***	0.0595***	0.0292
	(0.0079)	(0.0087)	(0.0561)
Equity/TA	-0.0426***	-0.0454***	0.0433
	(0.0064)	(0.0075)	(0.0628)
Deposit/TA	-1.5679***	-1.2019***	2.5929***
	(0.1462)	(0.1130)	(0.8656)
Loan/Deposit	-0.0026***	0.0001	0.0043
	(0.0005)	(0.0005)	(0.0041)
ROA	0.2570***	0.0931*	0.2375
	(0.0642)	(0.0512)	(0.5802)
ROE	-0.0162**	-0.0038	0.0023
	(0.0067)	(0.0050)	(0.0700)
Total CAR	0.0191***	0.0111**	-0.0684***
	(0.0032)	(0.0045)	(0.0197)
NIM	-0.0551***	-0.0310**	0.0007
	(0.0133)	(0.0132)	(0.0491)
GDP Growth	0.0101	-0.0011	-0.0374
	(0.0180)	(0.0056)	(0.0386)
Inflation	0.0188	0.0040	0.1500***
	(0.0177)	(0.0071)	(0.0536)
Interest	0.0100	0.0038	-0.0065
	(0.0135)	(0.0038)	(0.0164)
Unemployment	0.0554**	-0.0030	0.2861***
	(0.0228)	(0.0091)	(0.0914)
Constant	2.1576***	1.2202***	-3.1031
	(0.3874)	(0.2114)	(2.2019)
Sigma (Constant)	0.1810***	0.1491***	0.1496***
	(0.0044)	(0.0045)	(0.0179)
N	966	713	50
Pseudo R^2	1.7205	1.5442	1.4582
Year dummies	Yes	Yes	Yes
Country dummies	Yes	Yes	No

Standard errors are in parenthesis

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

Table 7: Region-wise analysis

In this table, we show the findings for banks from different geographic regions, i.e., Africa, America, Asia, Europe, and Oceania. Models (1) through (5) present the results for these five regions, respectively. In model (6), we examine the connection between ESG and banking efficiency for U.S. banks only. All models include bank controls, macro controls, and year dummies.

	(1) Africa	(2) America	(3) Asia	(4) Europe	(5) Oceania	(6) USA
ESGS	0.0000	**-0.0154*** **	**-0.0097*** **	-0.0070	**-0.2086*** **	**-0.0175*** **
	(0.0050)	**(0.0021)**	**(0.0028)**	(0.0069)	**(0.0423)**	**(0.0022)**
ESGS^2	-0.0000	**0.0002*** **	**0.0001** **	0.0001	**0.0018*** **	**0.0003*** **
	(0.0001)	**(0.0000)**	**(0.0000)**	(0.0001)	**(0.0003)**	**(0.0000)**
Size	-0.1245***	-0.0588***	0.1359***	0.1522***	-0.0870**	-0.0790***
	(0.0462)	(0.0079)	(0.0090)	(0.0271)	(0.0404)	(0.0083)
Equity/TA	-0.0717***	-0.0351***	0.0193***	-0.0571**	0.1979	-0.0308***
	(0.0246)	(0.0068)	(0.0073)	(0.0233)	(0.1611)	(0.0078)
Deposit/Ta	-1.6955***	-1.8879***	-0.9275***	0.8319**	-0.6253	-2.0292***
	(0.2101)	(0.1560)	(0.1105)	(0.3431)	(0.5734)	(0.2059)
Loan/deposit	-0.0047***	-0.0038***	-0.0004	0.0059***	0.0028	-0.0026***
	(0.0009)	(0.0005)	(0.0006)	(0.0013)	(0.0038)	(0.0005)
ROA	-0.0493	0.1376**	-0.1794***	0.3267**	-3.2707**	0.0961
	(0.1483)	(0.0623)	(0.0627)	(0.1575)	(1.2674)	(0.0786)
ROE	0.0122	-0.0070	0.0300***	-0.0276**	0.1965**	0.0050
	(0.0161)	(0.0067)	(0.0058)	(0.0139)	(0.0806)	(0.0085)
Total CAR	0.0025	0.0220***	0.0034	0.0264***	-0.0017	0.0152***
	(0.0114)	(0.0033)	(0.0056)	(0.0090)	(0.0396)	(0.0036)
NIM	-0.0310	-0.0336***	-0.0734***	0.0466*	0.5581*	-0.0382***
	(0.0414)	(0.0125)	(0.0124)	(0.0265)	(0.2777)	(0.0144)
GDP	0.0256	-0.0263	0.0099*	-0.0536**	0.1194	-0.0055
	(0.0178)	(0.0163)	(0.0052)	(0.0218)	(0.1871)	(0.0861)
Inflation	0.1170**	-0.0241*	0.0183***	0.0198	-0.1295	-0.0839
	(0.0459)	(0.0131)	(0.0071)	(0.0162)	(0.0863)	(0.1087)
Interest	0.0259***	0.0300***	0.0043	-0.0070	-0.0341	-0.2166***
	(0.0087)	(0.0079)	(0.0047)	(0.0129)	(0.0374)	(0.0619)
Unemployment	0.0146	-0.0327***	-0.0124*	-0.0334*	-0.2402	-0.1107*
	(0.0127)	(0.0081)	(0.0068)	(0.0190)	(0.1883)	(0.0661)
Constant	3.2190***	3.3854***	-0.3881	-2.0867***	6.9299***	4.6849***
	(0.8596)	(0.2666)	(0.2444)	(0.5182)	(1.9413)	(0.5731)
Sigma (constant)	0.0830***	0.1943***	0.1759***	0.1977***	0.0947***	0.1838***
	(0.0073)	(0.0048)	(0.0062)	(0.0147)	(0.0148)	(0.0048)
N	66	974	510	122	57	835
Pseudo R^2	-1.6807	1.3726	1.3212	1.0048	1.3472	2.1257
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes

Standard errors are in parenthesis

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

Table 8: Influence of country governance/ institutional quality

In this table, we investigate whether the role of ESG in banking efficiency is influenced by the governance or institutional quality of the country of a bank's origin. In models (1) through (6), we report the regression results while separately including each of the WB's country-wise governance indicators, i.e., *VAE*, *PVE*, *GEE*, *RQE*, *RLE*, and *CCE*. Appendix 1 elaborates the indicators. In model (7), we incorporate the country governance index score *INQ*, which is the weighted average of the standard deviations of the above six indicators. In models (8) and (9), we present the regressions results for banks from countries below and above the median *INQ* score, respectively. All models include bank and macro controls, and year and country dummies. Standard errors are in parentheses. ***, **, and * represent significance at 1%, 5%, and 10%, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
ESGS	**-0.0112*** **	**-0.0112*** **	**-0.0112*** **	**-0.0112*** **	**-0.0112*** **	**-0.0112*** **	**-0.0112*** **	**-0.0069*** **	**-0.0172*** **
	(0.0015)	**(0.0015)**	**(0.0015)**	**(0.0015)**	**(0.0015)**	**(0.0015)**	**(0.0015)**	**(0.0019)**	**(0.0023)**
ESGS²	**0.0001*** **	**0.0001*** **	**0.0001*** **	**0.0001*** **	**0.0001*** **	**0.0001*** **	**0.0001*** **	**0.0001*** **	**0.0003*** **
	(0.0000)	**(0.0000)**	**(0.0000)**	**(0.0000)**	**(0.0000)**	**(0.0000)**	**(0.0000)**	**(0.0000)**	**(0.0000)**
Size	-0.0001	-0.0006	-0.0010	-0.0005	-0.0005	-0.0007	-0.0006	0.0262***	-0.0450***
	(0.0058)	(0.0057)	(0.0057)	(0.0057)	(0.0057)	(0.0057)	(0.0057)	(0.0073)	(0.0092)
Equity/TA	-0.0455***	-0.0455***	-0.0452***	-0.0457***	-0.0456***	-0.0454***	-0.0454***	-0.0386***	-0.0392***
	(0.0048)	(0.0048)	(0.0048)	(0.0048)	(0.0048)	(0.0048)	(0.0048)	(0.0061)	(0.0074)
Deposit/Ta	-1.3497***	-1.3549***	-1.3561***	-1.3542***	-1.3556***	-1.3535***	-1.3560***	-1.2183***	-1.3773***
	(0.0906)	(0.0906)	(0.0904)	(0.0906)	(0.0906)	(0.0905)	(0.0905)	(0.0965)	(0.1738)
Loan/deposit	-0.0015***	-0.0015***	-0.0015***	-0.0015***	-0.0015***	-0.0015***	-0.0015***	-0.0009**	-0.0016***
	(0.0004)	(0.0004)	(0.0004)	(0.0004)	(0.0004)	(0.0004)	(0.0004)	(0.0005)	(0.0006)
ROA	0.1283***	0.1296***	0.1255***	0.1312***	0.1301***	0.1295***	0.1284***	0.0876*	0.1620**
	(0.0418)	(0.0418)	(0.0418)	(0.0418)	(0.0418)	(0.0418)	(0.0418)	(0.0477)	(0.0704)
ROE	-0.0086**	-0.0086**	-0.0080*	-0.0088**	-0.0086**	-0.0085**	-0.0084*	-0.0100**	-0.0043
	(0.0043)	(0.0043)	(0.0043)	(0.0043)	(0.0043)	(0.0043)	(0.0043)	(0.0050)	(0.0070)
Total CAR	0.0241***	0.0237***	0.0235***	0.0238***	0.0237***	0.0237***	0.0237***	0.0215***	0.0226***
	(0.0026)	(0.0026)	(0.0026)	(0.0026)	(0.0026)	(0.0026)	(0.0026)	(0.0034)	(0.0039)
NIM	-0.0228**	-0.0235**	-0.0232**	-0.0234**	-0.0234**	-0.0239**	-0.0236**	-0.0145	-0.0425***
	(0.0096)	(0.0096)	(0.0096)	(0.0096)	(0.0096)	(0.0096)	(0.0096)	(0.0110)	(0.0162)
GDP	-0.0000	-0.0010	-0.0013	-0.0004	-0.0008	-0.0006	-0.0012	0.0009	-0.0003
	(0.0060)	(0.0060)	(0.0060)	(0.0060)	(0.0060)	(0.0060)	(0.0060)	(0.0057)	(0.0189)
Inflation	0.0056	0.0063	0.0069	0.0050	0.0061	0.0075	0.0070	0.0107	0.0028
	(0.0071)	(0.0072)	(0.0072)	(0.0072)	(0.0072)	(0.0073)	(0.0072)	(0.0075)	(0.0189)
Interest	0.0008	0.0011	-0.0004	0.0004	0.0011	-0.0002	0.0003	0.0023	-0.0128
	(0.0039)	(0.0039)	(0.0039)	(0.0039)	(0.0039)	(0.0040)	(0.0039)	(0.0037)	(0.0124)
Unemployment	-0.0045	-0.0022	-0.0004	-0.0008	-0.0023	-0.0014	-0.0022	0.0048	-0.0714**
	(0.0098)	(0.0096)	(0.0096)	(0.0096)	(0.0096)	(0.0095)	(0.0095)	(0.0089)	(0.0331)
VAE	0.0741								
	(0.0653)								
PVE		0.0234							
		(0.0367)							
GEE			0.1147*						
			(0.0660)						
RQE				0.0340					
				(0.0524)					
RLE					0.0426				
					(0.0676)				
CCE						0.0706			
						(0.0622)			
INQ							0.0872		
							(0.0603)		
Constant	1.9747***	2.0608***	1.8915***	2.0166***	2.0100***	1.9394***	1.9995***	1.4973***	2.9043***
	(0.1924)	(0.1714)	(0.2003)	(0.1949)	(0.2017)	(0.2092)	(0.1776)	(0.2172)	(0.3146)
N	1729	1729	1729	1729	1729	1729	1729	868	861
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table 9: Simar-Wilson (2007) two-stage efficiency analysis

This table presents the results from our first robustness test. We conduct the Simar and Wilson (2007) two-stage efficiency analysis to check for the robustness of our baseline findings for both overall ESG score and individual ESG pillar scores. *Efficiency* is our dependent variable and *ESGS*, *EPS*, *SPS*, and *GPS* are our main explanatory variables in models (1), (2), (3), and (4), respectively. All specifications include bank controls, macro controls, and year dummies.

	(1) ESGS	(2) EPS	(3) SPS	(4) GPS
ESGS	**-0.0095*** **			
	(0.0015)			
ESGS^2	**0.0001*** **			
	(0.0000)			
EPS		**-0.0047*** **		
		(0.0007)		
EPS^2		**0.0001*** **		
		(0.0000)		
SPS			**-0.0021***	
			(0.0011)	
SPS^2			**0.0000**	
			(0.0000)	
GPS				**-0.0058*** **
				(0.0012)
GPS^2				**0.0001*** **
				(0.0000)
Constant	1.0133***	0.8585***	0.8852***	0.9437***
	(0.1421)	(0.1425)	(0.1447)	(0.1434)
Sigma: constant	0.1733***	0.1725***	0.1759***	0.1742***
	(0.0038)	(0.0037)	(0.0039)	(0.0037)
N	1484	1484	1484	1484
Bank controls	Yes	Yes	Yes	Yes
Macro controls	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes

Standard errors are in parenthesis

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

Table 10: Fractional probit regressions

This table presents the results from our second robustness test. We conduct the fractional Probit regressions as an alternative to our baseline Tobit model. *Efficiency* is our dependent variable and *ESGS*, *EPS*, *SPS*, and *GPS* are our primary independent variables in models (1), (2), (3), and (4), respectively. All specifications include bank controls, macro controls, year dummies, and country dummies.

	(1) ESGS	(2) EPS	(3) SPS	(4) GPS
ESGS	**-0.0298***** **(0.0076)**			
ESGS^2	**0.0004***** **(0.0001)**			
EPS		**-0.0021** **(0.0035)**		
EPS^2		**0.0001***** **(0.0000)**		
SPS			**-0.0147**** **(0.0060)**	
SPS^2			**0.0002***** **(0.0000)**	
GPS				**-0.0171***** **(0.0054)**
GPS^2				**0.0002***** **(0.0001)**
Constant	3.9103*** (0.8133)	3.4710*** (0.7899)	3.7463*** (0.7980)	3.6401*** (0.8073)
N	1484	1484	1484	1729
Bank controls	Yes	Yes	Yes	Yes
Macro controls	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes

Standard errors are in parenthesis
**** p<0.01, ** p<0.05, * p<0.1*

Table 11: Persistence of diminishing efficiency

In this table, we study the persistence of diminishing banking efficiency as a result of increase in banks' ESG performance. In particular, we regress *Efficiency* in time periods t+1, t+2, and t+3 on banks' *ESGS* in time period t. All specification include bank and macro controls, and year and country dummies.

	(1) Efficiency (t+1)	(2) Efficiency (t+2)	(3) Efficiency (t+3)
ESGS	**-0.0095*** **	**-0.0094*** **	**-0.0106*** **
	(0.0016)	**(0.0017)**	**(0.0019)**
ESGS^2	**0.0001*** **	**0.0001*** **	**0.0001*** **
	(0.0000)	**(0.0000)**	**(0.0000)**
Constant	1.7588***	1.4662***	1.0458***
	(0.1769)	(0.1855)	(0.2050)
Sigma (constant)	0.1786***	0.1672***	0.1600***
	(0.0038)	(0.0040)	(0.0045)
N	1402	1103	823
Pseudo R^2	1.3480	1.4401	1.4516
Bank controls	Yes	Yes	Yes
Macro controls	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes

Standard errors are in parenthesis

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

Table 12: Test of endogeneity: Two-step system GMM estimation

This table reports the results from our endogeneity test. We use a two-step system GMM estimation to deal with potential endogeneity. In particular, we use the lagged Efficiency and ESGS as our GMM variables, whereas we treat the lagged Efficiency and bank-specific variables as instruments. Model (1) presents the results for overall ESG performance, whereas models (2) through (4) present the same for individual ESG dimensions. All specifications include bank and macro controls, and year and country dummies.

	(1) ESGS	(2) EPS	(3) SPS	(4) GPS
ESGS	-0.0696***			
	(0.0115)			
$ESGS^2$	0.0009***			
	(0.0001)			
EPS		-0.0092**		
		(0.0044)		
EPS^2		0.0002***		
		(0.0001)		
SPS			-0.0398***	
			(0.0083)	
SPS^2			0.0005***	
			(0.0001)	
GPS				-0.0406***
				(0.0103)
GPS^2				0.0004***
				(0.0001)
Constant	3.7543***	2.1113***	3.2087***	4.4866***
	(0.6158)	(0.4506)	(0.6039)	(1.1044)
N	1651	1651	1651	1651
Bank controls	Yes	Yes	Yes	Yes
Macro controls	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes

Standard errors are in parenthesis

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

Table 13: Potential channels

This table reports the change in banks' outputs in response to change in their ESG activities. Model (1) presents the regression results for bank loans, whereas models (2) and (3) report the same for other earning assets and other operating income. All specifications include year and country dummies.

	Loans	Other earning assets	Other operating Income
ESGS	**-3331.26*** **	**-2846.81*** **	**-0.12**
	(899.08)	**(695.49)**	**(4.50)**
ESGS^2	**47.70*** **	**39.58*** **	**0.04**
	(10.63)	**(8.49)**	**(0.05)**
SIZE	47425.85***	26050.58***	175.00***
	(3718.45)	(2768.95)	(19.70)
Equity/TA	-10810.77***	-10403.83***	-42.09***
	(2156.82)	(1747.69)	(11.39)
Deposit/TA	-305799.78***	-331598.49***	-1553.79***
	(50109.28)	(49980.19)	(338.16)
ROA	4306.95	24038.39	109.00
	(22258.22)	(15870.35)	(98.24)
ROE	-1527.86	-3778.80**	-17.04
	(2478.16)	(1763.50)	(10.37)
Total CAR	4602.23***	2980.02***	21.56***
	(1182.73)	(901.86)	(6.29)
NIM	18172.67***	10426.49***	45.54**
	(4741.27)	(3610.28)	(22.03)
GDP	-1790.37*	-1212.68	-8.06
	(939.48)	(753.01)	(6.05)
Inflation	-920.34	-418.78	-8.85
	(1200.10)	(909.69)	(8.07)
Interest	769.93	1253.90**	1.69
	(688.18)	(536.12)	(4.74)
Unemployment	-5191.63*	-4098.89***	-19.10
	(2699.42)	(1524.19)	(17.25)
INQ	-2909.23	1747.84	-22.17
	(17041.99)	(12648.05)	(91.25)
Loan/deposit		-654.85***	-3.45***
		(165.54)	(1.11)
Constant	-197643.03***	142149.65**	-344.68
	(70960.54)	(64655.78)	(560.45)
N	1979	1977	1896
R-squared	0.84	0.82	0.64
Year dummies	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes

Standard errors are in parenthesis

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

Table 14: Persistence of potentials channels

In this table, we examine the persistence of in the reduction of bank lending and other operating assets in response to increase banks' ESG performance in time period t. In particular, we regress bank loans in time t+1, t+2, and t+3 on banks' ESG performance in time t (models (1) through (3)), as well as bank other operating assets in time t+1, t+2, and t+3 on banks' ESG performance in time t (models (4) through (6)). All models include bank controls, macro control, and year- and country- fixed effects.

	Loans			**Other operating assets**		
	t+1	t+2	t+3	t+1	t+2	t+3
ESGS	-3063.52***	-2964.73***	-2692.43**	-52.20**	-46.89*	-33.57
	(973.92)	(1056.27)	(1206.93)	(23.54)	(25.29)	(29.05)
$ESGS^2$	45.96***	45.63***	43.31***	0.93***	0.90***	0.77**
	(11.53)	(12.51)	(14.15)	(0.29)	(0.31)	(0.34)
Constant	-185956.59**	-225593.26**	-338757.29***	17.65	-2735.76	-4999.79
	(93062.71)	(98267.08)	(103355.67)	(2791.66)	(2985.57)	(3450.23)
N	1629	1309	992	1629	1309	992
R-squared	0.85	0.86	0.87	0.82	0.83	0.84
Bank controls	Yes	Yes	Yes	Yes	Yes	Yes
Macro controls	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes

Standard errors are in parenthesis

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

Figure 1: Bank ESG performance and mean efficiency

In this figure, we show banking efficiency with respect to banks' ESG performance. Panel 1 (left) depicts the efficiency levels of banks with and without ESG investments. Panel 2 (right) presents the efficiency of banks having ESG scores at the 95th percentile as compared to the efficiency of all other banks with ESG investments.

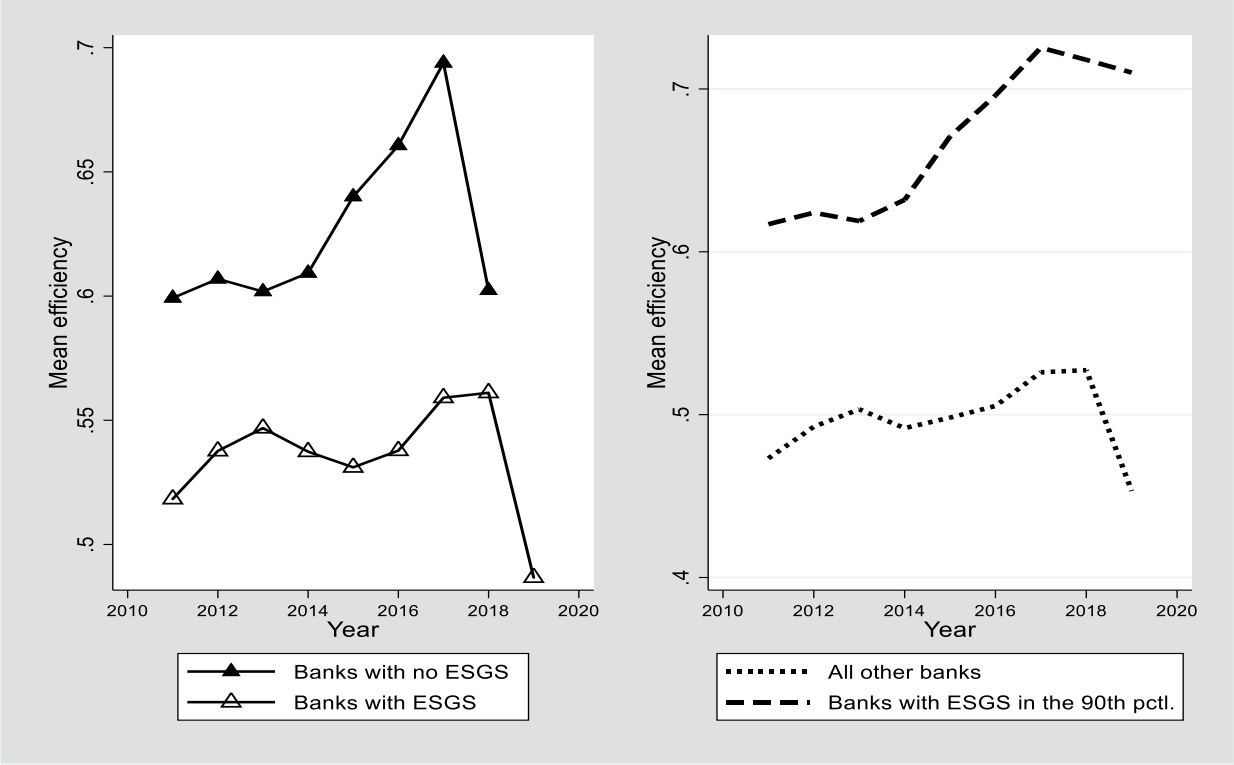
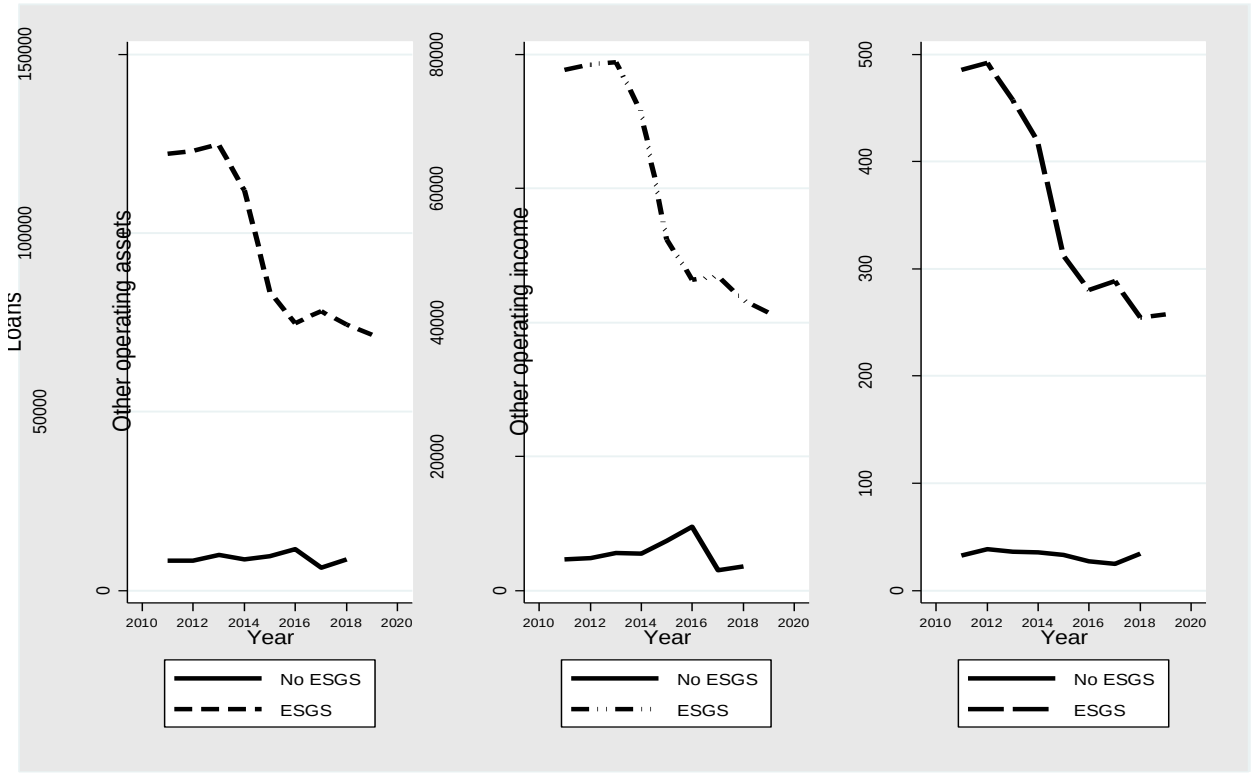


Figure 2: ESG activity and bank outputs

In this figure we differentiate the change in bank outputs for banks with and without ESG involvement. Panel 1 (left) depicts the change in loans of banks having ESGS vs. those having no ESGS. Panels 2 and 3 (middle & right) present similar results for other earning assets and other operating income, respectively.



Appendix 1: Description of main variables

Variable name	Source	Description
Predicted variable		
Bank efficiency (*Efficiency*)	***ORBIS Bank Focus***	Using a Data Envelopment Analysis (DEA), banks efficiency scores are estimated using a specific set of inputs and outputs. Following Ahamed et al. (2021), we use loans, other earning assets, and other operating income as the bank outputs, and deposits, personnel expenses and fixed assets as the bank inputs. Ranging from 0 to 1, these efficiency scores represent the level of technical efficiency of our sample banks.
Main predictor variables		
ESG score (*ESGS*)	***Refinitiv Eikon***	ESGS measures a bank's overall ESG performance based on its self-reported information on individual ESG dimensions. These scores are assigned out of 100 points.
Environmental pillar score (*EPS*)		EPS measures a bank's performance in the "environmental" dimension. These scores are based on resource use, emissions, and innovation.
Social pillar score (*SPS*)		SPS evaluates a bank's "social" activities. These scores are determined on the basis of community involvement, human rights, workforce safety, and product responsibility.
Governance pillar score (*GPS*)		GPS quantifies a bank's performance in the "governance" dimension and is measured by considering a bank's management, shareholder, and CSR strategy scores.
Bank controls		
Size	***ORBIS Bank Focus***	Natural log of a bank's total assets
Equity/TA		Total equity as a ratio of total assets
Deposit/TA		Total deposits and short-term funding as a ratio of total assets
Loan/Deposit		Total loans divided by total deposits and ST funds
ROA		Return on average assets
ROE		Return on average equity
Total CAR		Total capital adequacy ratio
NIM		Net interest margin
Macro controls		
GDP	***World Bank Open Database***	Growth rate of gross domestic product (GDP)
Inflation		Percentage change in yearly consumer prices
Interest		Annual real interest rate (%)
Unemployment		Percentage of total labor force that is unemployed
Governance indicators		
VAE	***World Bank Open Database***	Voice and accountability estimate
PVE		Political stability and absence of violence estimate
RQE		Regulatory quality estimate
RLE		Rule of law estimate
GEE		Governance effectiveness estimate
CCE		Control of corruption estimate
INQ		INQ is a governance index that is estimated by taking the weighted average of the standard deviations of WB's six country-wise governance indicators

Chapter 2: Friend or foe? U.S. firms and their politically connected suppliers and buyers

1. Introduction

The impact of political connections on firm performance has been one of the intriguing areas of empirical corporate finance. Firms having active connections with ruling parties and/or influential politicians are expected to benefit from these connections, whereas firms that have recently lost their political connections are likely to suffer from the losses.[1] However, existing studies offer inconclusive evidence on the link between corporate political connections and financial performance. A large group of studies suggest that political connections improve firm performance (e.g., Li et al., 2018; Boubakri et al., 2012; Lin et al., 2015; Su and Fung, 2013; Ding et al., 2014; Wong, 2010; Wang et al., 2019). Contrarily, some studies claim that firm performance is negatively associated with political connections (e.g., Fisman, 2001; Aggarwal et al., 2012; Ling et al., 2016; Saeed et al., 2016; Pang and Wang, 2021). Yet, another strand of literature documents evidence of mixed or no direct impact (e.g., Chen et al., 2017; Wu et al. 2012; Tihanyi et al., 2019; Tawiah et al., 2021; Li and Jin, 2021).

Previous research mainly focuses on the effect of firms' own political connections on their financial performance and strategies. However, the relationship between firms' performance and political connections of their suppliers and buyers has not been studied in the literature. Numerous studies indicate that firm performance is significantly affected by corporate strategies and performance of their suppliers and buyers. For example, Krause et al. (2007) suggest that a firm's

[1] Akey (2015) conducts a comparative analysis of post-election abnormal returns of firms donating to winning politicians vs. firms donating to losing ones. He finds that firms that donate to winning candidates exhibit 3% higher returns than firms donating to losing candidates. His findings indicate a significant relationship between firm value and change in firm's political networks.

performance in the long-run is influenced by the performance of its suppliers. In addition, they argue that firms with supplier development strategies and direct involvement in supplier development efforts are likely to exhibit stronger performance. Tan et al. (1998) empirically demonstrate that firms' financial and market performances are strongly related with their supply chain management (SCM) practices, as well as with their suppliers' performance. Crook and Combs (2006) argue that collaboration in SCM leads to increased bargaining power and thus direct benefits of SCM members.

We take our analysis beyond the study of the relationship between firm performance and its own political connections. We empirically explore the impact that firms undergo due to political connections of their suppliers and buyers. In particular, we investigate whether changes in political contributions of suppliers and/or buyers influence firms' financial performance and strategies. Our analyses are based on two fundamental theories of corporate political connection: the cash-flow hypothesis and the bargaining power hypothesis. The *cash-flow hypothesis* suggests that firms with politically connected suppliers and/or buyers demonstrate stronger performance. This theory argues that suppliers and buyers with strong political networks benefit from those networks which they eventually pass on to their stakeholders.[2] The *bargaining power hypothesis* implies that firms having business with politically connected suppliers and buyers exhibit weaker performance. This theory argues that firm performance suffers from the increased bargaining power of its suppliers and buyers stemming from changes (increases) in their political connections (contributions).[3]

[2] Shen and Lin (2015) argue that political connection with the ruling party leads to reduction in firm financial constraints and increase in firm-level investments. A buyer firm that gains political connection with or enhances its political contributions to a ruling party is likely to exhibit these benefits, leading to increased sales and cash-flow of its suppliers.

[3] Fabbri and Klapper (2016) document that firms dealing with a supplier that has weak bargaining power benefit from enhanced trade credit, greater share of goods sold on credit, and an extended period before imposing penalties for delayed payments.

We use a large sample of U.S. non-financial firms and their suppliers and buyers over the years from 1996 to 2018. Our political contribution data is extracted from the campaign finance database of the University of Maryland. Firm-level accounting data is obtained from Compustat. Our final sample consists of 86,208 firm-year observations with 9,802 unique firms. We classify our sample into *three* groups: U.S. firms, their suppliers, and their buyers. Further, based on North American Industry Classification System (NAICS) codes, we categorize the suppliers into *four* groups: largest suppliers belonging to *Supplier_Industry_1* to smallest suppliers belonging to *Supplier_Industry_4*. We apply similar categorization for buyer firms. *Supplier_Industry_1* is represented by the suppliers having the strongest (and largest) business ties with U.S. firms. Suppliers belonging to *Supplier_Industry_1* supply around 10-85% of the business inputs of their buyers. Maximum percentage of inputs supplied by the rest three categories are approximately 30%, 15%, and 14%, respectively. Buyers belonging to *Buyer_Industry_1* purchase 10-99% of the products of their suppliers.

Our main dependent variables are return on assets (*ROA*), market to book ratio (*M/B*), capital expenditure (*Capex*), cash level (*Cash/TA*), and debt ratio (*Debt/TA*) at time periods t+1, t+2, and t+3. Our primary independent variables include natural logarithms of the lobbying expenditures of the largest suppliers, i.e., suppliers belonging to *Supplier_Industry_1* (*Ln_Supp_Lobbying*), and of the largest buyers, i.e., buyers belonging to *Buyer_Industry_1* (*Ln_Buyer_Lobbying*). We control for a number of firm-specific factors such as natural logarithm of firm's own lobbying expenditure (*Ln_Lobbying*), PAC contributions (*Ln_PAC*), industry averages of lobbying expenditures (*Ln_Ind_Lobbying*), natural logarithms of total assets (*Size*) and sales (*Ln_Sales*), *ROA, ROE, M/B, Capex/TA, Cash/TA, Debt/TA,* R&D expenditures scaled by

sales (*R&D/Sales*), and industry concentration measured by Herfindahl-Hirschman (HH)[4] index (*HHI_SIC2*), all in time period t.

For baseline analyses, we regress firms' future profitability, value, liquidity, debt level, and internal investment on the natural logarithm of current lobbying expenditures of its largest suppliers and buyers (*Ln_Supp_Lobbying* and *Ln_Buyer_Lobbying*, respectively). Our results reveal that firms experience reductions in their profitability, value, liquidity, and debt level in response to increases in political contributions of their strongest suppliers, supporting the *bargaining power hypothesis* of suppliers' political connections. Political contributions of buyers do not have any significant impact on these measures and in fact, increases in buyers' current lobbying expenditures significantly strengthen firms' future cash holdings. In addition, the effect of suppliers' and buyers' current lobbying expenditures on firms' future capital expenditure is significantly positive, supporting the *cash-flow hypothesis*. We assume that this positive impact on capital expenditure is greatly influenced by the top few large suppliers and buyers in the firms' supply chain.

For robustness, we perform a set of change-on-change regressions and find consistent results for suppliers, supporting our baseline conclusions. However, in regard to buyers, it turns out that increase in buyers' lobbying leads to a significant fall (no change) in firm profitability (capital expenditure). In addition, consistent with our primary findings, firms benefit from stronger liquidity following increases in their buyers' political contributions. We separately run the same tests for the next three groups of suppliers and buyers[5], but do not find any significant evidence in favor of them. Next, we perform propensity score matching (PSM) tests to examine whether the

[4] A widely accepted measure of market concentration, the HH index is estimated as the sum of squared market shares of each firm in the market.
[5] Supp_Ind_2 and Buyer_Ind_2, Supp_Ind_3 and Buyer_Ind_3, and Supp_Ind_4 and Buyer_Ind_4

relationships hold for both firms whose suppliers/buyers are politically connected and have increased their political contributions and firms in the nearest neighborhoods whose suppliers/buyers either are not politically connected or do not increase their political contributions. Results indicate that only firms having suppliers and/or buyers who strengthen their political connections and increase their political contributions, experience significant changes in future firm performances.

Our paper has several contributions to the literature. First, our study adds to the literature on political economy by offering the first direct evidence on the link between firm performance and political contributions of their suppliers and buyers. Prior studies focused on the relationship either between firm performance and their own political connections (not the political connections of their supply chain industry) or between firm performance and the performance and business strategies (not political connections) of their suppliers and buyers. Second, we take a holistic approach and perform an extensive analysis by considering multiple dimensions of firm performance, such as profitability, value, capital investments, liquidity and level of debt, and by studying how these indicators are influenced by increases in political contributions of their suppliers and buyers. Third, we control for firms' own political contributions (lobbying expenditures and PAC contributions), as well as for industry averages of the same in addition to other firm-specific factors, allowing us to isolate the true impact of suppliers' and buyers' political contributions on firm performance. Finally, by providing novel evidence on an issue that has never been investigated before, we uncover a new direction for further research in political economy, as well as in corporate supply chain management.

The remainder of the paper proceeds as follows: Section 2 reviews the relevant literature and identifies the testable hypotheses. Section 3 provides a brief description of the data, variables,

and methodology. Section 4 reports and summarizes key empirical findings. Finally, Section 5 concludes.

2. Literature and hypotheses

The relationship between political connection and firm performance has become a fascinating topic for research in the field of finance and political economy over the last two decades.[6] Existing literature provides inconclusive evidence on the effects of political connections on firm performance. Cooper et al. (2009), among others,[7] find a *positive* relationship between corporate political contributions and future stock returns. Using firm-level campaign contributions data over the period 1979-2004, they find that firms with high campaign contributions exhibit significantly higher future stock returns. Further, they argue that this impact is more pronounced for firms contributing toward democrats and house candidates who hold offices in the states of firms' headquarters. On the other hand, Coates (2012) and Aggarwal et al. (2012) suggest a *negative* association between political connections and firm value, supporting the *agency cost perspective*. They claim that firms with greater political contributions are likely to be exposed to higher degree of agency costs, which in turn adversely affects their market performance.

Akey (2015) empirically examines the nexus between firms' performance and changes in their political connections. Considering both general and special congressional elections and employing a regression discontinuity design (RDD) on a sample of U.S. firms with PAC contributions, he finds that firms contributing to election campaigns of winning candidates

[6] Literature dates back as early as in 2001 when Fisman made an attempt to empirically estimate the value of political connections in Indonesia.
[7] Shen et al. (2017), Sabherwal et al. (2016), and Kim et al. (2012) claimed similar findings.

experience a 3% increase in their abnormal equity returns after the election. Further, he documents that firms that are connected to politicians serving on influential congressional committees, such as taxation and appropriations, benefit significantly from those connections. Moreover, he divides political connection into *two* categories: direct and indirect. *Direct connection* is defined as firm contributions toward politicians who directly take part in elections. *Indirect connection* is defined as firm donations conveyed to senior politicians who do not actively participate in the elections but transfer the money to their colleagues who do. His findings indicate that firms hiring government employees benefit more from direct connections, whereas firms with substantial lobbying expenditures benefit more from their indirect political connections.

According to Fisman (2001) political connection may have a negative impact on firm performance. Conducting an event study of Indonesian firms that were connected to President Suharto, he found that the firms experienced negative returns as a result of the rumors about president's worsening health. Faccio (2007) conducts an extensive study of the effects of political connections on the performances of 47 global firms. He defines politically connected firms as those having shareholders or officers who are actively connected to political parties. He also reports a 1.5% increase in firms' abnormal returns seven days after their political connections becomes active, supporting a positive correlation between political connection and firm performance. Goldman et al. (2009) study the impact of a politically connected Board of Directors on firm performance and reveal that firms experience positive market reactions after they appoint a former politician to the Board of Directors. They also find that this positive reaction is stronger when the appointed former politician is a democrat. Ferguson and Voth (2008) investigate the performance of firms that were connected to the Nazi government prior to the World War II. They find that firms having connection with the Nazi movement experienced significant increase in their

performance. However, the impact of political connection on firm performance was not clear until Akey (2015) studies the campaign contributions of firms to politicians in special elections, offering a clear idea about firms' choices to support specific politicians and parties.

Numerous studies have been conducted on exogenous aspects of political connection, such as firms' geographic locations, education ties etc. According to Faccio and Parsley (2009), cumulative abnormal returns (CAR) on an average decrease by 1.7% for firms that are geographically closer to politicians who die unexpectedly. Using an RDD approach, Do et al. (2012) carry out a comparative study on CAR of firms connected to winning political candidates, as well as of firms connected to losing candidates. They examine the educational tie between board members and politicians and find that CAR is lower/negative for firms having connection to a politician who wins a close election. This negative association is attributed by the election of a state politician to a federal office which lowers the range of firm benefits from their educational connections. Akey (2015) investigates the endogeneity problem associated with political connections and finds that firms benefit more from their endogenously chosen connections.

Existing literature also provides meaningful insight into the understanding of different channels through which political connections and contributions influence firm performance. According to Ovtchinnikov and Pantaleoni (2012) there is a strong relationship between a firm's donations to politicians and the economic relevance of the firm's industry with the congressional districts of those politicians. Their findings suggest that firms are more likely to donate money to the election campaigns of those politicians whose congressional districts are economically relevant to the industries in which the firms are operating. Moreover, they suggest that ROA and M/B of these firms are expected to be higher due to these political donations. According to Tahoun (2012), who introduces the idea of tacit contracts between firms and politicians, there is a positive link

between firm's political contributions and the stock holdings of those politicians. In addition, he argues that there is a positive correlation between ownership structure and the award of government contracts. Faccio et al. (2006) investigate the impact of firms' political connections during the crises situations. Controlling for a number of factors, they recommend that firms with effective political connections are more likely to obtain bailouts compared to the firms with no political connection. Goldman et al. (2013) examine the relationship between a firm's political connection/contribution and the number of contracts it receives from the government. They argue that firms connected to democrats are given fewer government contracts whereas firms connected to republicans receive more government contracts.

Amore and Bennedsen (2013) examine the consequences of changes in political connections of Danish firms having family ties to politicians. Their investigation finds a positive link between firm performance and shifts in power, suggesting that an upward shift in power results in stronger firm performance. Claessens et al. (2008) study the impact of political contributions made by Brazilian firms on their performance. Based on data collected from the Brazilian National Election Court, their find that firm value is positively correlated with political contributions. In addition, they indicate a positive association between firm political connection and its bank leverage ratio. According to them, firms having connections with politicians who win the election are likely to have higher bank leverage ratios after the election. Duchin and Sosyura (2012) examine whether PC firms get any advantage during the financial crises and find that firms having connections with influential politicians are more likely to receive bailouts during the crises situations. Moreover, they argue that political connection strongly influences the process/choice of public/governmental funds to banks and financial institutions. Banks with strong political networks are more likely to receive government funding even though having political connections

does not really affect the banks' decisions to apply for funding. Johnson and Mitton (2003) study the post crises performance of Malaysian firms and conclude that politically connected firms are exposed to reluctance of the government in terms of imposition of capital controls and requirements after the Asian Crisis. Akey (2015) adds significantly to the literature by studying the types of congressional committee assignments that have the strongest effects on the performance of the politically connected firms.

Current studies in literature examine the role of firms' political connection in their own performance. In addition, they study the channels through which political connections may influence firm performance. The role of changes in political contributions and hence in connections of suppliers and buyers is yet to be studied empirically. We take up this novel initiative to fill the gap in the literature. In doing so, we develop and test the following set of hypotheses:

H1: Firm's future profitability (measured by ROA) is significantly affected by the increase in current lobbying expenditures of its suppliers and/or buyers.

H2: Firm's future value (measured by market to book ratio) changes significantly in response to increase in current lobbying expenditures of its suppliers and/or buyers.

H3: Firms experience significant changes in their future liquidity (measured by Cash/TA) in response to increases in current lobbying expenditures of their suppliers and/or buyers.

H4: Firm's future internal investment (measured by Capex/TA) is significantly associated with the increases in current lobbying expenditures of its suppliers and/or buyers.

H5: Firms experience significant changes in their debt level (measured by Debt/TA) due to increases in current lobbying expenditures of their suppliers and/or buyers.

3. Data and methods

3.1 Data

We collect data from two sources. Our firm-level data is obtained from Compustat database of global companies. Political contributions data is collected from the campaign financing database[8] of the University of Maryland. This data provides both political action committee (PAC) contribution and lobbying expenditures at the firm-level. For our analyses, we use lobbying expenditures to measure political contributions of U.S. firms and their suppliers and buyers. We believe that using lobbying expenditures over PAC contributions is advantageous. Lobbying accounts for the larger share of firm political contributions and firms which lobby usually do so with a motive. Using *GVKEY* as the unique firm identifier, we merge the two data sets, leading to a final sample of 86,208 firm-year observations and 9,802 unique firms over a sample period from 1996 to 2018. We winsorize all variables at top and bottom 1%.

Panel A of **Table 1** presents the summary statistics by year. In column 1, we report number of firm-year observations per year, whereas in columns 2 and 3 (4 and 5) we report the number and percentage of suppliers (buyers) in each year. A firm is identified as a supplier as long as it belongs at least to one supplier industry. A buyer firm is identified in a similar manner. Total number of supplier-year observations over the sample period is 33,094, which is 38.39% of total firm-year observations. Total number of buyer-year observations is 30,415, representing 35.28% of total firm-year observations. **Panel B** reports the summary statistics by Fama-French 12 industries.[9] Finance (consumer durables) industry exhibits the largest (smallest) percentage of

[8] For details, please visit: https://elections.maryland.gov/campaign_finance/campaign_finance_database.html
[9] Based on Compustat four-digit SIC codes, Fama and French assign each stock (i.e., firm) to one of the twelve industry portfolios: consumer non-durables; consumer durables; manufacturing; energy; chemicals and allied products;

firm-year observations. Business equipment, Healthcare, Finance, and Manufacturing industries represent the majority of the supplier firms. In addition, these are the industries that represent the majority of the buyer firms as well.

Panel A of **Table 2** provides a comparative analysis of the descriptive statistics of key variables between firms and their suppliers. Firms exhibit Mean *ROA* and *M/B* of 2.34% and 2.71, respectively, whereas the same for their suppliers are -0.75% and 3.58, respectively. On average, firms spend $1,786,952 ($17,715.05) for lobbying (PAC contribution), whereas the average lobbying expenditure (PAC contribution) of their suppliers is $2,828,806 ($12,447.55). Clearly, our sample firms are outperformed by their suppliers in terms of lobbying expenditures and this difference is highly significant at 1%, as suggested by paired t-statistic and p-value. **Panel B** highlights similar statistics for firms and their buyers. On average, firm lobbying expenditure (PAC contributions) is $1,811,249 ($8,220.09), whereas the lobbying expenditure (PAC contribution) of their buyers is $2,814,719 ($29,401.08). Firms spend significantly less on lobbying and PAC contributions, as compared with their buyers. In **Panel C**, we consider both suppliers and/or buyers (i.e., firms that are associated either with a supplier industry or a buyer industry) and conduct a comparative analysis of key variables between firms and their supplier and/or buyers. In particular, we split our sample into two sub-samples: i) firms and ii) their suppliers and/or buyers. Consistent with those in Panels A and B, firm lobbying expenditure and PAC contribution in Panel C are significantly lower than those of their suppliers and/or buyers. In **Table 3**, we highlight the numbers of unique suppliers and buyers in each year. Frequency of suppliers (buyers) is maximum in 1997 (1998) and minimum in 2009 (2017 and 2018).

business equipment; telephone and television transmission; utilities; wholesale, retail and some services; healthcare, medical equipment and drugs; finance; and others.

Figure 1 portrays the changes in mean political contributions, as well as in several dimensions of performance of both U.S. firms and their suppliers/buyers. The blue lines represent U.S. firms, and the red lines represent their suppliers and/or buyers. Top three panels depict changes in average PAC contributions, lobbying expenditures, and ROA of firms and their suppliers/buyers. Bottom panels illustrate similar changes in mean M/B, Capex/TA, and R&D/Sales of both groups. On average, firms' mean PAC contributions and lobbying expenditures are noticeably lower than those of their suppliers/buyers. Similar trends are observed in case of mean M/B, Capex/TA, and R&D/Sales. However, firms exhibit a higher mean profitability (i.e., mean ROA), as compared with their suppliers/buyers, over the sample years.

3.2 Variables

We use return on assets (*ROA*), market to book ratio (*M/B*), capital expenditure (*Capex/TA*), cash to total assets (*Cash/TA*), and debt ratio (*Debt/TA*) at time periods t+1, t+2, and t+3 as our primary dependent variables. Our main explanatory variables include the natural logarithm of lobbying expenditures of the largest (i.e., strongest) suppliers and buyers at time period t. Use of lobbying to measure firm political contributions is conventional in the literature (e.g., Chen et al., 2015; Unsal et al., 2016; Cao et al., 2018). We control for a range of firm-level political and accounting variables, such as firm's own lobbying expenditure (*Ln_Lobbying*), PAC contribution (*Ln_PAC*), industry lobbying expenditure (*Ln_Ind_Lobbying*), input percentages of firm's largest suppliers and buyers (*Supp_Input* and *Buyer_Input*, respectively) *ROA*, *ROE*, *M/B*, *Capex/TA*, *Cash/TA*, *Debt/TA*, *R&D/Sales*, and industry concentration measured by HH index (*HHI_SIC2*), in time period t. We include supplier' and buyers' input percentages to examine how a percentage change in suppliers' and buyers' contributions to firms' business affects firm-level profitability, value, and other aspects of firm performance.

For change-on-change regressions, we use three dummy variables: *Inc*, *Inc_Supp*, and *Inc_buyer*, in addition to a range of firm-level factors. *Inc* is equal to 1 if there is an increase in industry lobbying expenditure (the industry in which the firm belongs to) from *t-1* to *t*, 0 otherwise. Similarly, *Inc_Supp* is a dummy that is equal to 1 if there is an increase in the lobbying expenditures of suppliers from *t-1* to *t*. Lastly, *Inc_Buyer* is equal to 1 if the buyers increase their lobbying expenditures from previous year to the current year. Our main left-hand-side variables for the change-on-change regressions include changes in firms' return on assets (*ROA)*, market to book ratio (*M/B*), capital expenditure (*Capex/TA*), cash to total assets (*Cash/TA*), and debt ratio (*Debt/TA*) from time period t to t+1, t to t+2, and t to t+3. **Appendix A** provides description of key variables.

3.3 Methodology

We develop and implement our empirical strategy in multiple steps. First, for baseline analyses, we regress firms' future profitability in time periods t+1, t+2, and t+3 (measured by $ROA_{t+1,}$ ROA_{t+2}, and ROA_{t+3}, respectively) on the natural log of current (time period t) lobbying expenditures of their suppliers and buyers (measured by $Ln\_Supp\_Lobbying_t$ and $Ln\_Buyer\_Lobbying_t$, respectively), while controlling for firms' own political contributions, industry lobbying, and firm-level accounting variables in time period t. We apply similar methodology for future firm value, capital expenditure, cash to total assets, and debt ratio. Our baseline analyses are based on the following empirical specifications:

$$ROA_{t+i} = \beta_0 + \beta_1 * Ln\_Supp\_Lobbying_t + \beta_2 * Supp\_Input_t + \beta_3 * Ln\_Buyer\_Lobbying_t + \beta_4 * Buyer\_Input_t + \beta_5 * Ln\_Lobbying_t + \beta_6 * Ln\_Ind\_Lobbying_t + \beta_7 * Ln\_PAC_t + \beta_8 * \psi_t + \varepsilon \quad \textbf{(1)}$$

$$M/B_{t+i} = \beta_0 + \beta_1 * Ln\_Supp\_Lobbying_t + \beta_2 * Supp\_Input_t + \beta_3 * Ln\_Buyer\_Lobbying_t + \beta_4 * Buyer\_Input_t + \beta_5 * Ln\_Lobbying_t + \beta_6 * Ln\_Ind\_Lobbying_t + \beta_7 * Ln\_PAC_t + \beta_8 * \psi_t + \varepsilon \quad \textbf{(2)}$$

$$Capex/TA_{t+i} = \beta_0 + \beta_1 * Ln\_Supp\_Lobbying_t + \beta_2 * Supp\_Input_t + \beta_3 * Ln\_Buyer\_Lobbying_t + \beta_4 * Buyer\_Input_t + \beta_5 * Ln\_Lobbying_t + \beta_6 * Ln\_Ind\_Lobbying_t + \beta_7 * Ln\_PAC_t + \beta_8 * \psi_t + \varepsilon \quad \textbf{(3)}$$

$$Cash/TA_{t+i} = \beta_0 + \beta_1 * Ln\_Supp\_Lobbying_t + \beta_2 * Supp\_Input_t + \beta_3 * Ln\_Buyer\_Lobbying_t + \beta_4 * Buyer\_Input_t + \beta_5 * Ln\_Lobbying_t + \beta_6 * Ln\_Ind\_Lobbying_t + \beta_7 * Ln\_PAC_t + \beta_8 * \psi_t + \varepsilon \quad \textbf{(4)}$$

$$Debt/TA_{t+i} = \beta_0 + \beta_1 * Ln\_Supp\_Lobbying_t + \beta_2 * Supp\_Input_t + \beta_3 * Ln\_Buyer\_Lobbying_t + \beta_4 * Buyer\_Input_t + \beta_5 * Ln\_Lobbying_t + \beta_6 * Ln\_Ind\_Lobbying_t + \beta_7 * Ln\_PAC_t + \beta_8 * \psi_t + \varepsilon \quad \textbf{(5)}$$

Where, i = 1, 2, and 3. ψ_t represents a vector of firm-level accounting variables in time period t, such as $Size_t$, Ln_Sales_t, ROA_t, ROE_t, M/B_t, $Capex/TA_t$, $Cash/TA_t$, $Debt/TA_t$, $R\&D/Sales_t$, and HHI_SIC2_t. ε captures regression error. All models include year fixed effects and clustered standard error (SE).

Next, we test for robustness of our baseline findings. In particular, we perform a set of change-on-change regressions to examine persistence of change in firm performance in the next one year (t to t+1), next two years (t to t+2), and next three years (t to t+3) in response to changes in their suppliers' and buyers' lobbying expenditures over the past one year (t-1 to t). In particular, we test the following equations:

$$\Delta ROA_{t,t+i} = \beta_0 + \beta_1 * ROA_t + \beta_2 * Inc + \beta_3 * Inc\_Supp + \beta_4 * Inc\_Buyer + \beta_5 * Ln\_PAC_{t-1,t} + \beta_6 * \Delta\zeta_{t-1,t} + \varepsilon \quad \textbf{(6)}$$

$$\Delta M/B_{t,t+i} = \beta_0 + \beta_1 * M/B_t + \beta_2 * Inc + \beta_3 * Inc\_Supp + \beta_4 * Inc\_Buyer + \beta_5 * Ln\_PAC_{t-1,t} + \beta_6 * \Delta\zeta_{t-1,t} + \varepsilon \quad \textbf{(7)}$$

$$\Delta Capex/TA_{t,t+i} = \beta_0 + \beta_1 * Capex/TA_t + \beta_2 * Inc + \beta_3 * Inc\_Supp + \beta_4 * Inc\_Buyer + \beta_5 * Ln\_PAC_{t-1,t} + \beta_6 * \Delta\zeta_{t-1,t} + \varepsilon \quad \textbf{(8)}$$

$$\Delta Cash/TA_{t,t+i} = \beta_0 + \beta_1 * Cash/TA_t + \beta_2 * Inc + \beta_3 * Inc\_Supp + \beta_4 * Inc\_Buyer + \beta_5 * Ln\_PAC_{t-1,t} + \beta_6 * \Delta\zeta_{t-1,t} + \varepsilon \quad \textbf{(9)}$$

$$\Delta Debt/TA_{t,t+i} = \beta_0 + \beta_1 * Debt/TA_t + \beta_2 * Inc + \beta_3 * Inc\_Supp + \beta_4 * Inc\_Buyer + \beta_5 * Ln\_PAC_{t-1,t} + \beta_6 * \Delta\zeta_{t-1,t} + \varepsilon \quad \textbf{(10)}$$

Where, i = 1, 2, and 3. *Inc* is a dummy that is equal to 1 if a firm's own lobbying expenditure has been increased from last year, 0 otherwise. *Inc_Supp* (*Inc_Buyer*) is a dummy that is equal to 1 if a supplier (buyer) has increased its lobbying over the period t-1 to t, 0 otherwise. $\Delta\zeta_{t-1,t}$ represents changes in a vector of firm-level political and accounting variables from t-1 to t. In particular, $\Delta\zeta_{t-1,t}$ includes: such as $\Delta Ln\_PAC_{t-1,t}$, $\Delta Size_{t-1,t}$, $\Delta M/B_{t-1,t}$, $\Delta Capex/TA_{t-1,t}$, $\Delta Cash/TA_{t-1,t}$, $\Delta Debt/TA_{t-1,t}$, and $\Delta HHI\_SIC2_{t-1,t}$. All models consider year fixed effects and cluster SE.

4. Empirical results

4.1 Firm performance and political contributions of suppliers and buyers

We begin our empirical analyses by examining the effects of suppliers' and buyers' lobbying expenditures on firms' future profitability. **Table 5** reports the results. In model 1, we regress firm's profitability next year (ROA_{t+1}) on current lobbying expenditures of its suppliers and buyers ($Ln\_Supp\_Lobbying_t$ and $Ln\_Buyer\_Lobbying_t$, respectively), while controlling for a wide range of firm-level political and accounting variables. In models 2 and 3, we repeat similar tests for ROA_{t+2} and ROA_{t+3}, respectively. All models incorporate year dummies and cluster SE. In all three models, we find that firm's future profitability is significantly and *negatively* associated with current lobbying expenditure and input percentage of its suppliers. In terms of economic impact, we report that a 1% increase in the lobbying expenditures of a firm's largest suppliers leads to a 0.0314%, 0.0513%, and 0.0704% reduction in its *ROA* in time periods t+1, t+2, and t+3, respectively. These findings support the *bargaining power hypothesis* of corporate political

connections, suggesting that suppliers with new or stronger political connections gain bargaining power over the firms, resulting in lower profitability of the firms. In addition, a 1% increase in the inputs supplied by a firm's largest suppliers results in a 1.95%, 3.13%, and 3.77% decline in the firm's next three years' *ROA*, respectively. We do not find any significant impact of buyer' lobbying expenditures and input percentage on firm profitability. Increase in industry lobbying seems to have a detrimental impact on firm's future performance.

We find similar results for future firm value (*M/B*), liquidity (*Cash/TA*), and debt level (*Debt/TA*). In models 1-3 of **Table 6**, we regress M/B_{t+1}, M/B_{t+2}, and M/B_{t+3}, respectively, on $Ln\_Supp\_Lobbying_t$ and $Ln\_Buyer\_Lobbying_t$ along with other predictor variables, while including year dummies and cluster SE. Results indicate that an increase in suppliers' lobbying significantly reduces firm value, however, buyers do not exhibit such impact. In particular, firm's market to book ratio reduces by 2.14%, 2.71%, and 2.88% in the next three years, respectively, in response to a 1% increase in the current lobbying expenditures of its largest suppliers, supporting the *bargaining power hypothesis*. However, the coefficients on suppliers' input percentage ($Supp\_Input_t$) appear as statistically insignificant. Consistent with previous literature, an increase in firm's own lobbying leads to higher firm value (e.g., Brown and Huang, 2020; Ang et al., 2013).

Table 7 reports findings in regard to the link between firms' future liquidity and current lobbying expenditures of their suppliers and buyers. Results suggest that firms' future cash to total assets ratio decreases (increases) significantly due to increased lobbying expenditures of their strongest suppliers (buyers) in the current year, suggesting the *bargaining power* (*cash-flow*) hypothesis. In terms of economic effect, a 1% increase in current lobbying expenditures of a firm's largest suppliers leads to a 0.03%, 0.04%, and 0.05% reduction in its cash to total assets in the next three years. However, a 1% increase in the current lobbying expenditures of the firm's strongest

buyers results in a 0.07%, 0.09%, and 0.09% increase in its liquidity in the next three years, respectively. Coefficients on suppliers' input percentage, i.e., $Supp\_Input_t$, are inconsistent and insignificant, however, the ones for buyers, i.e., $Buyer\_Input_t$, are negative and highly significant at 5%.

Next, we investigate the impact of SCM members' political contributions on firms' future financing (i.e., debt level). We document that firms' proportion of debt financing is *adversely* affected by the political contributions of its closest suppliers. Results are portrayed in **Table 8**. All of the estimated coefficients on $Debt/TA_{t+1}$, $Debt/TA_{t+1}$, and $Debt/TA_{t+1}$ are negative and highly significant at 1%. A 1% increase in the lobbying expenditures of a firm's largest suppliers at time period t reduces firm's debt to total assets ratio by 0.03%, 0.04%, and 0.06% by the end of years t+1, t+2, and t+3, respectively. These findings suggest that firms not only suffer from lower profitability, value and liquidity, but also lose access to credit because of increased political contributions of their major suppliers. However, the results for the buyers are insignificant. Increase in current industry lobbying significantly reduces firm's future debt ratio.

In **Table 9**, we report our findings in regard to the effects of suppliers'/buyers' current lobbying on firm's future internal investments. Models 1-3 regress $Capex/TA_{t+1}$, $Capex/TA_{t+2}$, and $Capex/TA_{t+3}$, respectively, on suppliers' and buyers' lobbying expenditures, in addition to other predictors and all controls. We find that increase in current lobbying by suppliers strengthen firms' capital expenditures over the next three years. Buyers also exhibit a positive impact, although the effect is insignificant for $Capex/TA_{t+1}$. Further, firms' future capital expenditures are significantly and positively influenced by input percentages of both suppliers and buyers. Overall, these findings suspect that these suppliers and buyers are among the top few suppliers and buyers who benefit from their own political contributions and eventually pass those benefits along their supply chain.

Overall, our baseline results conclude that firms suffer from reduced (increased) future profitability, value, and debt financing (capital expenditure) due to increased current political contributions of their suppliers. Buyers' political connections do not seem to have any significant impact on future firm profitability, value, and debt level. However, increase in buyers' current lobbying expenditures increases firms' future liquidity and capital expenditures.

4.2 Robustness tests

4.2.1 Change-on-change regressions

To confirm robustness of our primary findings, we perform change-on-change regressions for all five indicators of firm performance. In particular, we examine if an increase in political contributions of suppliers and/or buyers over the previous year (t-1 to t) has any persistent effect on changes in firm profitability, value, liquidity, debt financing, and capital expenditure over the next year (t to t+1), next two years (t to t+2), and next three years (t to t+3). **Table 10** presents the results in regard to persistence of change in future firm profitability in response to change in supplier/buyer lobbying expenditures in the previous year. *Inc_Supp* and *Inc_Buyer* are the variables of interest, measuring increases in lobbying expenditures of suppliers and buyers, respectively, over the past year. We control for changes in a range of firm-specific factors, such as, $\Delta Ln\_PAC_{t-1,t}$, $\Delta Size_{t-1,t}$, $\Delta M/B_{t-1,t}$, $\Delta Capex/TA_{t-1,t}$, $\Delta Cash/TA_{t-1,t}$, $\Delta Debt/TA_{t-1,t}$, and $\Delta HHI\_SIC2_{t-1,t}$. All models incorporate year dummies and cluster SE.

Estimated coefficients on *Inc_Supp* are all negative, but significant only for $\Delta ROA_{t,t+2}$. Coefficients on *Inc_Buyer* are negative and highly significant at 1% in all three models. Overall, these results indicate that increase in suppliers' lobbying expenditures this year will lead to a reduction in firm ROA over the next two years, however, similar increase in buyers' lobbying expenditures will lead to reductions in firm ROA over the next one, two, and three years. In Tables

11-14, we conduct similar tests for Δ*M/B*, Δ*Cash/TA*, Debt/TA, and Δ*Cash/TA* over the future three years to examine persistence of changes in these variables due to change in suppliers'/buyers' lobbying expenditure. Our results suggest that firms experience persistent decrease in future value, liquidity, and debt ratio if their suppliers increase lobbying from previous year. However, we do not see any significant influence of buyers, except for future firm liquidity. In particular, our results indicate that firms experience a significant and persistent increase in their cash-to-total assets over the next three years in response to increase in their buyers' lobbying from previous to the current year.

Overall, our change-on-change regressions conclude that firms exhibit significant and persistent reductions (increase) in their future ROA, M/B, Cash/TA, and Debt/TA (Capex/TA) due to increase in their suppliers' lobbying in the preceding year. Increase in buyers' lobbying in the previous year leads only to persistent decrease (increase) in future firm ROA (Cash/TA).

4.2.2 Propensity score matching

For further robustness of our baseline findings, we conduct PSM tests to examine the effects of changes in suppliers' and buyers' lobbying on future firm performance. In **Table 15**, we document the results from our PSM test in regard to change in suppliers' lobbying. In particular, we examine whether firms' future performance is influenced by increased political contributions of their suppliers in the previous year. We match firms based on a certain set of characteristics, such as firm's own lobbying expenditure, industry average lobbying, firm size, sales, profitability, value, liquidity, debt level, and capital expenditure. We then divide these firms into *two* groups: 1) firms whose suppliers increased their lobbying from t-1 to t, and 2) firms whose suppliers did not. We then regress future firm performance (i.e., ROA, M/B, Cash/TA, Debt/TA, and Capex/TA in time periods t+1, t+2, and t+3) on *Inc_Supp* (a dummy that is equal to 1 if change in supplier's lobbying

from t-1 to t is positive) to examine if these performance measures exhibit different signs and significance for the two groups. Our results confirm that firms, whose suppliers increase their lobbying in the preceding year, exhibit significantly reduced (increased) ROA, M/B, Cash/TA, and Debt/TA (Capex/TA) in the next three years.

Table 16 portrays the results from our PSM test based on increase in buyers' political contributions. As mentioned in Table 15, we match our sample firms based on a certain set of firm-level variables. Based on the treatment (the dummy separating firms based on change in their buyers' contribution), the firms are then segmented into *two* groups: firms whose buyers increased their lobbying from t-1 to t vs. those whose buyers did not. We then regress each of the performance measures in time periods t+1, t+2, and t+3 on *Inc_Buyer* (a dummy equal to 1 if buyers increased their lobbying from t-1 to t) to rule out if these performance measures return different results for the two groups. Consistent with the baseline, we find that firm liquidity and capital expenditure rise significantly in the next three years due to increase in its buyers' lobbying in the prior year.

Overall, our PSM tests conclude that future liquidity and capital expenditure of U.S. firms strengthen significantly as a result of increase in political contributions of their buyers, supporting the *cash-flow hypothesis*. Future firm profitability, value, debt level, and liquidity (capital expenditure) reduce (strengthen) significantly due to increase in political contributions of suppliers, supporting the *bargaining-power (cash-flow) hypothesis*. All these results confirm the robustness of our baseline findings.

5. Conclusion

This paper empirically investigates whether performance of U.S. firms is affected by the political contributions of their suppliers and buyers. Prior research provides ample evidence on the association between firms' own political connections and their financial performance. However, there is no evidence till date of whether firms' performance is affected by the political contributions of their supply chain industries. We attempt to fill this gap in the literature and offer the first evidence by empirically studying how future business performance and strategies of U.S firms may be influenced by political contributions of their closely-related suppliers and buyers. As business activities and performance of U.S. firms are strongly influenced by their partners in the value chain, our study is of significant contribution to the extant literature.

Our empirical predictions are based on two fundamental theories of corporate political contributions: *Cash-flow theory* and *bargaining-power theory*. The cash-flow theory suggests that politically connected suppliers/buyers are likely to benefit from their political connections and eventually transfer these benefits along the supply chain. The bargaining power theory, on the other hand, argues that suppliers/buyers with strong political networks gain bargaining power over the entities along their supply chain.

We use a large sample of U.S. firms and their politically connected suppliers and buyers over a 22-year sample period. We examine how changes in suppliers' (buyers') current lobbying expenditures affect the future profitability, value, internal investment, liquidity, and debt level of the firms which they are supplying to (buying from). Our results indicate that firms' profitability, value, liquidity, and debt level at time periods t+1, t+2, and t+3 are negatively and strongly associated with current lobbying expenditures of their suppliers, supporting the *bargaining-power*

hypothesis. We do not find significant results for buyers in regard to these performance measures. Further, we find that firms having businesses with very large suppliers and buyers increase their capital expenditures following the increases in political contributions of those highly powerful suppliers and buyers, suggesting the *cash-flow hypothesis*. Our results survive a set of robustness tests based on change-on-change regressions, where we test the impact of changes in suppliers' and buyers' lobbying expenditures from time t-1 to t on the changes in firms' profitability, value, liquidity, debt, and internal investment from time periods t to t+1, t to t+2, and t to t+3. In addition, our results remain unchanged throughout the propensity score matching tests that we perform for further robustness.

Our paper contributes to the literature by providing the first direct evidence on the relationship between firm performance and political contributions of their suppliers and buyers. With this novel evidence, our study shall be of significant interest to academics, business organizations, and investors who are concerned about the effect that political connections pose on U.S. corporations.

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Tables

Table 1: Summary statistics

In this table, we report the number of observations of our sample by year (Panel A) and by Fama-French 12 industries (Panel B). In Column 1 of Panel A, we report the number of firm-year observations by year. In Columns 2 and 3 (4 and 5), we present the number and percentage of firms associated with at least one supplier (buyer) industry in each year. In Columns 1 and 2 of Panel B, we report the number and percentage of firm-year observations across the Fama-French 12 industries. Columns 3 and 4 (5 and 6) present the number and percentage of firms associated with at least one supplier (buyer) industry.

Panel A: Summary statistics by year

	1	2	3	4	5
Year	Number of firm-year Observations	Supplier-year observations (firms associated with at least one supplier industry)		Buyer-year observations (firms associated with at least one buyer industry)	
		N	%	N	%
1996	4,275	1,661	38.85	1,578	36.91
1997	4,479	1,763	39.36	1,707	38.11
1998	4,403	1,716	38.97	1,641	37.27
1999	4,152	1,585	38.17	1,498	36.08
2000	4,117	1,584	38.47	1,501	36.46
2001	3,872	1,567	40.47	1,459	37.68
2002	3,774	1,504	39.85	1,389	36.80
2003	3,535	1,346	38.08	1,239	35.05
2004	3,845	1,540	40.05	1,432	37.24
2005	3,813	1,506	39.50	1,403	36.80
2006	3,777	1,497	39.63	1,381	36.56
2007	3,719	1,454	39.10	1,340	36.03
2008	3,681	1,415	38.44	1,299	35.29
2009	3,109	1,143	36.76	1,058	34.03
2010	3,355	1,250	37.26	1,144	34.10
2011	3,498	1,318	37.68	1,184	33.85
2012	3,362	1,251	37.21	1,104	32.84
2013	3,431	1,264	36.84	1,110	32.35
2014	3,616	1,354	37.44	1,200	33.19
2015	3,658	1,360	37.18	1,202	32.86
2016	3,532	1,304	36.92	1,146	32.45
2017	3,591	1,350	37.59	1,189	33.11
2018	3,614	1,362	37.69	1,211	33.51
Total	**86,208**	**33,094**	**38.39**	**30,415**	**35.28**

Panel B: Summary statistics by Fama-French 12 industries

Fama-French 12 industries	Industry description	Firm-year observations		Supplier-year observations		Buyer-year observations	
		Number (1)	Percentage (2)	Number (3)	Percentage (4)	Number (5)	Percentage (6)
1	Consumer Non-Durables	3,588	4.16%	1,683	5.09%	1,635	5.38%
2	Consumer Durables	1,855	2.15%	713	2.15%	642	2.11%
3	Manufacturing	8,012	9.29%	3,426	10.35%	3,787	12.45%
4	Energy	3,154	3.66%	1,777	5.37%	1,737	5.71%
5	Chemicals and Allied Products	1,915	2.22%	859	2.60%	797	2.62%
6	Business Equipment	15,089	17.50%	9,311	28.14%	9,353	30.75%
7	Telephone and Television Transmission	2,439	2.83%	254	0.77%	241	0.79%
8	Utilities	2,799	3.25%	954	2.88%	344	1.13%
9	Wholesale, Retail, and Some Services	7,057	8.19%	404	1.22%	2	0.01%
10	Healthcare, Medical Equipment, and Drugs	8,171	9.48%	6,913	20.89%	7,019	23.08%
11	Finance	21,914	25.42%	4,269	12.90%	2,319	7.62%
12	Other	10,215	11.85%	2,531	7.65%	2,539	8.35%
	Total	**86,208**		**33,094**		**30,415**	

Table 2: Descriptive Statistics

In this table, we illustrate a comparative analysis of descriptive statistics of key variables between suppliers and buyers. In Panel A, we report the number of observations and mean of variables for firms and their suppliers (i.e., firms not associated with any supplier industry vs. those associated with at least one supplier industry). In Panel B, we present similar statistics for U.S. firms and their buyers. Finally, in Panel C, we report and differentiate the number of observations and mean of variables for U.S. firms and their suppliers and buyers (i.e., forms that belong to at least one supplier and/or one buyer industry). In every panel, we conduct non-parametric tests (paired t tests) for the differences in means and present test statistics and indicate significance. *, **, and *** indicate significance at 10%, 5%, and 1%, respectively.

Panel A: Descriptive statistics for U.S. firms and their suppliers

	Firms ***not associated*** with any ***supplier*** industry		Firms ***associated*** with at least one ***supplier*** industry		Paired t-stat
	N	Mean	N	Mean	
Total Assets (TA)	53,114	15944.91	33,094	8816.34	10.322***
Total Sales	53,114	3886.05	33,094	3840.20	0.397
Cash/TA	53,093	12.66%	33,085	22.82%	-74.466***
Debt/TA	52,872	21.89%	32,935	21.80%	0.585
Capex/TA	53,114	4.04%	33,094	4.76%	-18.958***
R&D expenditure (R&D/Sales)	53,114	0.05	33,094	4.40	-5.383***
Return on assets (ROA)	53,114	2.34%	33,094	-0.75%	30.488***
Return on equity (ROE)	53,061	-34.45%	33,055	26.20%	-1.080
Market-to-book ratio (M/B)	53,114	2.71	33,094	3.58	-30.571***
PAC contributions	53,114	17715.05	33,094	12447.55	0.797
Lobbying expenditures	5,172	1786952	3,222	2828806	-10.712***
HH Index (2-digit SIC code)	53,114	0.09	33,094	0.08	16.815***

Panel B: Descriptive statistics for US firms and their buyers

	Firms ***not associated*** with any ***buyer*** industry		Firms ***associated*** with one or many of the ***buyer*** industries		
	N	Mean	N	Mean	Paired t-stat
Total Assets (TA)	55,793	15554.45	30,415	8904.69	9.460***
Total Sales	55,793	3861.70	30,415	3880.82	-0.163
Cash/TA	55,771	12.60%	30,407	23.83%	-81.271***
Debt/TA	55,552	23.19%	30,255	19.40%	25.788***
Capex/TA	55,793	4.14%	30,415	4.63%	-12.740***
R&D expenditure (R&D/Sales)	55,793	0.06	30,415	4.78	-5.755***
Return on assets (ROA)	55,793	2.34%	30,415	-1.02%	32.654***
Return on equity (ROE)	55,737	-33.47%	30,379	29.75%	-1.106
Market-to-book ratio (M/B)	55,793	2.66	30,415	3.75	-37.856***
PAC contributions	55,793	8220.09	30,415	29401.08	-3.149***
Lobbying expenditures	5,252	1811249	3,142	2814719	-10.261***
HH Index (2-digit SIC code)	55,793	0.09	30,415	0.08	18.248***

Panel C: Descriptive statistics for US firms and their suppliers and/or buyers

	Firms ***not associated*** with a ***supplier or buyer*** industry		Firms ***associated*** with ***a supplier and/or a buyer*** industry		
	N	Mean	N	Mean	Paired t-stat
Total Assets (TA)	49,004	17059.91	37,204	8135.2	13.1665***
Total Sales	49,004	4034.66	37,204	3649.51	3.395***
Cash/TA	48,983	0.12%	37,195	0.22%	-76.3679***
Debt/TA	48,779	22.32%	37,028	21.25%	7.4992***
Capex/TA	49,004	4.04%	37,204	4.68%	-17.176***
R&D expenditure (R&D/Sales)	49,004	0.05	37,204	3.9329	-4.9054***
Return on assets (ROA)	49,004	2.42%	37,204	-50.91%	29.3707***
Return on equity (ROE)	48,951	-38.88%	37,165	25.32%	-1.1644
Market-to-book ratio (M/B)	49,004	2.65	37,204	3.57	-32.9431***
PAC contributions	49,004	8789.57	37,204	24785.86	-2.4653**
Lobbying expenditures	4,692	1881630.00	3,702	2573722.00	-7.2383***
HH Index (2-digit SIC code)	49,004	0.09	37,204	0.08	22.4785***

Table 3: Number of unique suppliers and buyers per year

In this table, we present the number of unique suppliers and buyers (based on 6-digit NAICS codes) having business with U.S. firms in each year over the sample period 1996-2018.

Year	No. of Suppliers	No. of buyers
1996	177	201
1997	181	197
1998	180	202
1999	176	197
2000	170	191
2001	163	185
2002	160	187
2003	160	184
2004	163	189
2005	161	191
2006	158	183
2007	152	178
2008	150	180
2009	147	163
2010	149	171
2011	154	179
2012	151	175
2013	151	174
2014	152	169
2015	156	170
2016	152	170
2017	152	161
2018	150	161

Table 4: Summary statistics of key variables

In this table, we report the summary statistics of all key variables

Variable	N	Mean	SD	Min	Max
Firm-level political variables					
Ln_Lobbying	86200	1.2168	3.8924	0	17.9999
Ln_Ind_Lobbying	86200	10.1154	8.7728	0	20.8094
Ln_PAC	86200	1.0592	3.1851	0	19.3558
Ln_Supp_Lobbying	33100	3.4507	6.7913	0	20.8094
Ln_Supp_Lobbying	30400	7.4413	8.1886	0	20.309
Firm-level accounting variables					
ROA	86200	1.1543	14.5615	-135.4277	35.8048
M/B	86200	3.0478	4.0812	0	49.4917
Cash/TA	86200	.1656	.2011	0	.9396
Capex/TA	86200	.0432	.0541	0	.3907
Debt/TA	85800	.2186	.2067	0	.9487
R&D/Sales	86200	1.723	115.2729	-90.3846	25700
Size	86200	6.8072	2.0276	2.2434	12.9308
Ln_Sales	86200	6.0774	2.1004	-.2666	13.1159
HHI_SIC2	86200	.0831	.0904	.0117	1

Table 5: Effect of supplier/buyer lobbying on firm profitability

This table presents the results from our baseline regressions for future firm profitability. ROA_{t+1}, ROA_{t+2}, and ROA_{t+3} are the dependent variables, whereas $Ln\_Supp\_Lobbying_t$ and $Ln\_Buyer\_Lobbying_t$ are the main independent variables. All models control for a set of firm-level political and accounting variables. Appendix A provides descriptions of all variables.

	(1)	(2)	(3)
	ROA_{t+1}	ROA_{t+2}	ROA_{t+3}
$Ln\_Supp\_Lobbying_t$	**-0.0314****	**-0.0513*****	**-0.0704*****
	(0.0127)	**(0.0167)**	**(0.0195)**
$Supp\_Input_t$	-1.9488***	-3.1305***	-3.7742***
	(0.7158)	(0.9809)	(1.1188)
$Ln\_Buyer\_Lobbying_t$	-0.0061	-0.0023	-0.0101
	(0.0138)	(0.0194)	(0.0230)
$Buyer\_Input_t$	-0.2214	-0.6830	-0.6166
	(0.4500)	(0.6235)	(0.7036)
$Ln\_Lobbying_t$	0.0249	0.0589	0.1243***
	(0.0292)	(0.0379)	(0.0480)
$Ln\_Ind\_Lobbying_t$	-0.0650***	-0.0694***	-0.0695***
	(0.0138)	(0.0197)	(0.0227)
Ln_PAC_t	-0.0413	-0.0676	-0.1549***
	(0.0353)	(0.0452)	(0.0577)
$Size_t$	-2.0185***	-2.5806***	-2.4761***
	(0.1553)	(0.2057)	(0.2258)
Ln_Sales_t	2.5952***	3.1500***	3.0405***
	(0.1705)	(0.2270)	(0.2491)
ROA_t	0.6457***	0.4579***	0.3553***
	(0.0134)	(0.0172)	(0.0185)
ROE_t	0.0215***	0.0334***	0.0432***
	(0.0027)	(0.0054)	(0.0063)
M/B_t	0.1628***	0.1358***	0.1423***
	(0.0320)	(0.0461)	(0.0545)
$Cash/TA_t$	-7.7806***	-10.9047***	-11.8258***
	(0.7510)	(0.9806)	(1.1316)
$Debt/TA_t$	-0.2355	-0.3538	-1.2837
	(0.6392)	(0.8649)	(1.0231)
$Capex/TA_t$	-4.9589**	-5.3190**	-0.9762
	(1.9636)	(2.5533)	(2.6840)
$R\&D/Sales_t$	-0.0009**	-0.0009	-0.0007
	(0.0005)	(0.0015)	(0.0005)
HHI_SIC2_t	-0.5145	-0.7667	-1.7852
	(0.9946)	(1.2563)	(1.4910)
Constant	-1.5925**	-0.1143	1.8971**
	(0.6339)	(0.7948)	(0.8737)
N	22081	19316	17169
R-squared	0.5391	0.4015	0.3346
Year dummies	Yes	Yes	Yes

Standard errors are in parenthesis

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

Table 6: Effect of supplier/buyer lobbying on firm value

This table tests the impact of suppliers'/buyers' lobbying expenditure on future firm value. M/B_{t+1}, M/B_{t+2}, and M/B_{t+3} are the dependent variables, whereas $Ln\_Supp\_Lobbying_t$ and $Ln\_Buyer\_Lobbying_t$ are key independent variables. All models control for a set of firm-level political and accounting variables.

	(1)	(2)	(3)
	M/B_{t+1}	M/B_{t+2}	M/B_{t+3}
$Ln\_Supp\_Lobbying_t$	**-0.0214*** **	**-0.0271*** **	**-0.0288*** **
	(0.0043)	**(0.0061)**	**(0.0075)**
$Supp\_Input_t$	0.0609	0.0375	0.1104
	(0.2080)	(0.2919)	(0.3124)
$Ln\_Buyer\_Lobbying_t$	0.0055	0.0010	-0.0004
	(0.0040)	(0.0056)	(0.0066)
$Buyer\_Input_t$	-0.0705	-0.1339	-0.0132
	(0.1517)	(0.2133)	(0.2550)
$Ln\_Lobbying_t$	0.0347***	0.0347**	0.0350**
	(0.0106)	(0.0141)	(0.0168)
$Ln\_Ind\_Lobbying_t$	-0.0066	-0.0119*	-0.0099
	(0.0051)	(0.0071)	(0.0081)
Ln_PAC_t	-0.0104	-0.0029	0.0021
	(0.0143)	(0.0195)	(0.0237)
$Size_t$	-0.2901***	-0.4150***	-0.3710***
	(0.0418)	(0.0616)	(0.0741)
Ln_Sales_t	0.3110***	0.4302***	0.3582***
	(0.0414)	(0.0601)	(0.0700)
ROA_t	-0.0053	-0.0131***	-0.0081
	(0.0037)	(0.0050)	(0.0052)
ROE_t	0.0217***	0.0281***	0.0298***
	(0.0062)	(0.0108)	(0.0107)
M/B_t	0.5968***	0.5052***	0.4686***
	(0.0243)	(0.0311)	(0.0359)
$Cash/TA_t$	1.9594***	2.5275***	2.5400***
	(0.2381)	(0.3293)	(0.3763)
$Debt/TA_t$	0.9275***	1.3597***	1.2291***
	(0.2281)	(0.3228)	(0.3705)
$Capex/TA_t$	-0.4741	-0.7166	-1.3974*
	(0.4657)	(0.6593)	(0.7536)
$R\&D/Sales_t$	0.0001**	-0.0002**	-0.0001***
	(0.0000)	(0.0001)	(0.0000)
HHI_SIC2_t	-1.2219***	-1.4687***	-1.5888***
	(0.3699)	(0.4899)	(0.5654)
Constant	1.1002***	1.3273***	1.8465***
	(0.1710)	(0.2311)	(0.2771)
N	22081	19316	17169
R-squared	0.4418	0.3360	0.2963
Year dummies	Yes	Yes	Yes

Standard errors are in parenthesis

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

Table 7: Effect of supplier/buyer lobbying on firm Liquidity

In this table, we illustrate the effects of suppliers'/buyers' lobbying expenditure on future firm liquidity. $Cash/TA_{t+1}$, $Cash/TA_{t+2}$, and $Cash/TA_{t+3}$ are the dependent variables. $Ln\_Supp\_Lobbying_t$ and $Ln\_Buyer\_Lobbying_t$ are the main independent variables. All models control for a set of firm-level political and accounting variables and include year dummies and cluster standard errors.

	(1)	(2)	(3)
	$Cash/TA_{t+1}$	$Cash/TA_{t+2}$	$Cash/TA_{t+3}$
$Ln\_Supp\_Lobbying_t$	**-0.0003*** **	**-0.0004*** **	**-0.0005** **
	(0.0001)	**(0.0001)**	**(0.0002)**
$Supp\_Input_t$	0.0001	-0.0072	-0.0125
	(0.0043)	(0.0068)	(0.0087)
$Ln\_Buyer\_Lobbying_t$	**0.0007*** **	**0.0009*** **	**0.0009*** **
	(0.0001)	**(0.0002)**	**(0.0002)**
$Buyer\_Input_t$	-0.0061**	-0.0126**	-0.0136**
	(0.0030)	(0.0050)	(0.0067)
$Ln\_Lobbying_t$	-0.0004*	-0.0007**	-0.0008*
	(0.0002)	(0.0003)	(0.0005)
$Ln\_Ind\_Lobbying_t$	0.0006***	0.0010***	0.0011***
	(0.0001)	(0.0002)	(0.0002)
Ln_PAC_t	0.0002	0.0006	0.0010*
	(0.0003)	(0.0004)	(0.0005)
$Size_t$	-0.0021**	-0.0046***	-0.0075***
	(0.0009)	(0.0015)	(0.0020)
Ln_Sales_t	-0.0012	-0.0006	0.0009
	(0.0009)	(0.0015)	(0.0021)
ROA_t	-0.0006***	-0.0011***	-0.0014***
	(0.0001)	(0.0001)	(0.0002)
ROE_t	0.0002***	0.0003***	0.0004***
	(0.0000)	(0.0001)	(0.0001)
M/B_t	0.0011***	0.0019***	0.0024***
	(0.0002)	(0.0003)	(0.0005)
$Cash/TA_t$	0.8245***	0.7277***	0.6645***
	(0.0056)	(0.0089)	(0.0119)
$Debt/TA_t$	-0.0371***	-0.0532***	-0.0601***
	(0.0042)	(0.0067)	(0.0087)
$Capex/TA_t$	-0.1052***	-0.1066***	-0.0939***
	(0.0113)	(0.0174)	(0.0223)
$R\&D/Sales_t$	-0.0000	-0.0000	0.0000***
	(0.0000)	(0.0000)	(0.0000)
HHI_SIC2_t	-0.0180**	-0.0316**	-0.0385**
	(0.0076)	(0.0123)	(0.0159)
Constant	0.0592***	0.0831***	0.0999***
	(0.0042)	(0.0063)	(0.0082)
N	22075	18852	16277
R-squared	0.8486	0.7663	0.7084
Year dummies	Yes	Yes	Yes

Standard errors are in parenthesis

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

Table 8: Effect of supplier/buyer lobbying on firm Debt level

In this table, we report our results for the effects of suppliers'/buyers' lobbying expenditure on firms' future level of debt. In models 1-3, we regress $Debt/TA_{t+1}$, $Debt/TA_{t+2}$, and $Debt/TA_{t+3}$, respectively, on $Ln\_Supp\_Lobbying_t$ and $Ln\_Buyer\_Lobbying_t$ along with a wide range of firm-level political and accounting variables. Appendix A presents definitions of all variables. All models include year fixed effects and cluster standard errors.

	(1)	(2)	(3)
	$Debt/TA_{t+1}$	$Debt/TA_{t+2}$	$Debt/TA_{t+3}$
$Ln\_Supp\_Lobbying_t$	**-0.0003*** **	**-0.0004*** **	**-0.0006*** **
	(0.0001)	**(0.0001)**	**(0.0002)**
$Supp\_Input_t$	-0.0066	-0.0132	-0.0222*
	(0.0047)	(0.0087)	(0.0120)
$Ln\_Buyer\_Lobbying_t$	-0.0001	-0.0001	-0.0000
	(0.0001)	(0.0002)	(0.0002)
$Buyer\_Input_t$	0.0054*	0.0103**	0.0111
	(0.0028)	(0.0052)	(0.0073)
$Ln\_Lobbying_t$	0.0000	-0.0001	-0.0009
	(0.0002)	(0.0004)	(0.0006)
$Ln\_Ind\_Lobbying_t$	-0.0003***	-0.0004***	-0.0004**
	(0.0001)	(0.0002)	(0.0002)
Ln_PAC_t	0.0002	0.0004	0.0013*
	(0.0003)	(0.0005)	(0.0007)
$Size_t$	0.0086***	0.0170***	0.0239***
	(0.0010)	(0.0018)	(0.0027)
Ln_Sales_t	-0.0070***	-0.0135***	-0.0189***
	(0.0010)	(0.0018)	(0.0027)
ROA_t	-0.0002***	-0.0001	-0.0001
	(0.0001)	(0.0001)	(0.0002)
ROE_t	-0.0000	0.0000	0.0000
	(0.0001)	(0.0000)	(0.0000)
M/B_t	0.0002	0.0002	0.0006
	(0.0002)	(0.0003)	(0.0004)
$Cash/TA_t$	-0.0103**	-0.0092	-0.0133
	(0.0041)	(0.0072)	(0.0099)
$Debt/TA_t$	0.8980***	0.8178***	0.7529***
	(0.0053)	(0.0097)	(0.0139)
$Capex/TA_t$	0.1174***	0.1553***	0.1495***
	(0.0146)	(0.0234)	(0.0317)
$R\&D/Sales_t$	0.0000**	0.0000	-0.0000***
	(0.0000)	(0.0000)	(0.0000)
HHI_SIC2_t	-0.0146**	-0.0230**	-0.0257*
	(0.0058)	(0.0106)	(0.0150)
Constant	0.0097**	0.0307***	0.0377***
	(0.0038)	(0.0066)	(0.0087)
N	22027	18802	16228
R-squared	0.8203	0.6999	0.6194
Year dummies	Yes	Yes	Yes

Standard errors are in parenthesis

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

Table 9: Effect of supplier/buyer lobbying on firms' future capital expenditure

In this table, we report our findings in regard to the effects of suppliers'/buyers' lobbying expenditure on firms' future capital expenditure. In models 1, we regress $Capex/TA_{t+1}$ on $Ln\_Supp\_Lobbying_t$ and $Ln\_Buyer\_Lobbying_t$ along with all firm-level political and accounting variables. In models 2 and 3, we do the same for $Capex/TA_{t+2}$ and $Capex/TA_{t+3}$, respectively. Appendix A provides definitions of key variables. All models include year fixed effects and cluster standard errors.

	(1)	(2)	(3)
	$Capex/TA_{t+1}$	$Capex/TA_{t+2}$	$Capex/TA_{t+3}$
$Ln\_Supp\_Lobbying_t$	**0.0001****	**0.0001*****	**0.0002****
	(0.0000)	**(0.0001)**	**(0.0001)**
$Supp\_Input_t$	0.0183***	0.0269***	0.0314***
	(0.0023)	(0.0036)	(0.0045)
$Ln\_Buyer\_Lobbying_t$	0.0001	**0.0001***	**0.0002****
	(0.0000)	**(0.0001)**	**(0.0001)**
$Buyer\_Input_t$	0.0101***	0.0120***	0.0116***
	(0.0015)	(0.0022)	(0.0027)
$Ln\_Lobbying_t$	-0.0002**	-0.0004***	-0.0004**
	(0.0001)	(0.0001)	(0.0002)
$Ln\_Ind\_Lobbying_t$	0.0000	0.0000	0.0000
	(0.0000)	(0.0000)	(0.0001)
Ln_PAC_t	0.0002	0.0003*	0.0005**
	(0.0001)	(0.0002)	(0.0002)
$Size_t$	0.0003	-0.0003	-0.0009
	(0.0003)	(0.0005)	(0.0006)
Ln_Sales_t	-0.0005	-0.0002	0.0002
	(0.0004)	(0.0005)	(0.0007)
ROA_t	0.0002***	0.0001***	0.0001***
	(0.0000)	(0.0000)	(0.0000)
ROE_t	-0.0000**	-0.0000**	-0.0000**
	(0.0000)	(0.0000)	(0.0000)
M/B_t	0.0001***	0.0001*	-0.0000
	(0.0001)	(0.0001)	(0.0001)
$Cash/TA_t$	0.0005	-0.0031	-0.0052**
	(0.0014)	(0.0022)	(0.0026)
$Debt/TA_t$	0.0016	0.0047**	0.0080***
	(0.0014)	(0.0022)	(0.0027)
$Capex/TA_t$	0.7339***	0.5973***	0.5261***
	(0.0113)	(0.0157)	(0.0199)
$R\&D/Sales_t$	0.0000***	0.0000	-0.0000
	(0.0000)	(0.0000)	(0.0000)
HHI_SIC2_t	0.0156***	0.0223***	0.0252***
	(0.0039)	(0.0055)	(0.0067)
Constant	0.0099***	0.0159***	0.0125***
	(0.0018)	(0.0024)	(0.0028)
N	22081	18854	16277
R-squared	0.6196	0.4765	0.4087
Year dummies	Yes	Yes	Yes

Standard errors are in parenthesis

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

Table 10: Persistence of change in firm ROA due to change in supplier/buyer lobbying

In this table, we empirically examine the persistence of change in firm ROA in response to changes in suppliers' and buyers' lobbying expenditures. Δ*ROA* (t, t+1), Δ*ROA* (t, t+2), and Δ*ROA* (t, t+3) are the dependent variables and *Inc_Supp* and *Inc_Buyer* are the main independent variables. In model 1, we regress Δ*ROA* (t, t+1) on *Inc_Supp* and *Inc_Buyer* along with a set of control variables. In models 2 and 3, we repeat the same test for Δ*ROA* (t, t+2) and Δ*ROA* (t, t+3), respectively. All models include year dummies and cluster SE.

	(1)	(2)	(3)
	Δ*ROA* (t, t+1)	Δ*ROA* (t, t+2)	Δ*ROA* (t, t+3)
ROA_t	-0.0020***	-0.0034***	-0.0044***
	(0.0001)	(0.0002)	(0.0002)
Inc	0.0135***	0.0153***	0.0161***
	(0.0016)	(0.0024)	(0.0029)
Inc_Supp	-0.0032	**-0.0063****	-0.0033
	(0.0022)	**(0.0030)**	(0.0033)
Inc_Buyer	**-0.0098*****	**-0.0098*****	**-0.0104*****
	(0.0022)	**(0.0028)**	**(0.0030)**
Δ*Ln_PAC* (t-1, t)	0.0008	0.0017***	0.0007
	(0.0006)	(0.0006)	(0.0006)
Δ*Size* (t-1, t)	-0.0467***	-0.0766***	-0.0746***
	(0.0062)	(0.0082)	(0.0070)
Δ*ROA* (t-1, t)	-0.2091***	-0.2256***	-0.2270***
	(0.0141)	(0.0162)	(0.0169)
Δ*M/B* (t-1, t)	0.0021***	0.0012***	0.0001
	(0.0005)	(0.0004)	(0.0005)
Δ*Cash/TA* (t-1, t)	0.0403**	0.0236	0.0270*
	(0.0164)	(0.0153)	(0.0151)
Δ*Capex/TA* (t-1, t)	-0.0687**	-0.1001***	-0.0019
	(0.0318)	(0.0300)	(0.0323)
Δ*Debt/TA* (t-1, t)	-0.0006	0.0472***	0.0187
	(0.0163)	(0.0178)	(0.0192)
Δ*HHI_SIC2* (t-1, t)	0.0790**	0.0935**	0.1456**
	(0.0333)	(0.0461)	(0.0589)
Constant	-0.0047	0.0146***	0.0204***
	(0.0043)	(0.0043)	(0.0050)
N	18839	16623	14834
R-squared	0.1851	0.3042	0.3701
Year dummies	Yes	Yes	Yes

Standard errors are in parenthesis

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

Table 11: Persistence of change in firm M/B in response to change in supplier/buyer lobbying

This table investigates the persistence of change in firm M/B due to changes in suppliers' and buyers' lobbying expenditures. Δ*M/B* (t, t+1), Δ*M/B* (t, t+2), and Δ*M/B* (t, t+3) are the predicted variables, whereas *Inc_Supp* and *Inc_Buyer* are the main predictor variables. In model 1, we regress Δ*M/B* (t, t+1) on *Inc_Supp* and *Inc_Buyer* along with all controls. In models 2 and 3, we repeat the same test for Δ*M/B* (t, t+2) and Δ*M/B* (t, t+3), respectively. All models include year dummies and cluster SE.

	(1) Δ*M/B* (t, t+1)	(2) Δ*M/B* (t, t+2)	(3) Δ*M/B* (t, t+3)
M/B_t	-0.2625***	-0.3304***	-0.3679***
	(0.0259)	(0.0378)	(0.0461)
Inc	0.1029	0.0908	0.1029
	(0.0953)	(0.1432)	(0.1939)
Inc_Supp	**-0.2879*** **	**-0.4693*** **	**-0.4220*** **
	(0.0559)	**(0.0793)**	**(0.1093)**
Inc_Buyer	0.1083*	0.1273	0.1265
	(0.0615)	(0.0780)	(0.0814)
Δ*Ln_PAC* (t-1, t)	-0.0182	0.0041	-0.0150
	(0.0192)	(0.0151)	(0.0190)
Δ*Size* (t-1, t)	-1.0624***	-1.5732***	-1.7101***
	(0.1557)	(0.1961)	(0.2211)
Δ*ROA* (t-1, t)	0.5958	-0.3848	0.0985
	(0.3892)	(0.3535)	(0.2953)
Δ*M/B* (t-1, t)	-0.2156***	-0.2417***	-0.2288***
	(0.0256)	(0.0277)	(0.0263)
Δ*Cash/TA* (t-1, t)	-0.3299	0.2498	0.0540
	(0.3389)	(0.3788)	(0.3677)
Δ*Capex/TA* (t-1, t)	-0.8335	-0.1685	0.0536
	(0.6999)	(0.8277)	(0.7383)
Δ*Debt/TA* (t-1, t)	0.2150	1.2898**	1.0012
	(0.5363)	(0.5055)	(0.6129)
Δ*HHI_SIC2* (t-1, t)	-0.4362	0.2556	2.6361*
	(0.9775)	(1.2045)	(1.5479)
Constant	1.0220***	1.5817***	1.8754***
	(0.1228)	(0.1814)	(0.2109)
N	18839	16623	14834
R-squared	0.2265	0.2615	0.2634
Year dummies	Yes	Yes	Yes

Standard errors are in parenthesis

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

Table 12: Persistence of change in firm Cash/TA as a result of change in supplier/buyer lobbying

In this table, we report the results from change-on-change regressions in regard to firm Cash/TA and suppliers' and buyers' lobbying expenditures. In models 1-3, we regress Δ*Cash/TA* (t, t+1), Δ*Cash/TA* (t, t+2), and Δ*Cash/TA* (t, t+3), respectively, on *Inc_Supp* and *Inc_Buyer* along with all controls. All models include year dummies and cluster SE.

	(1) Δ*Cash/TA* (t, t+1)	(2) Δ*Cash/TA* (t, t+2)	(3) Δ*Cash/TA* (t, t+3)
$Cash/TA_t$	-0.0963***	-0.1584***	-0.2046***
	(0.0040)	(0.0071)	(0.0102)
Inc	-0.0070***	-0.0093***	-0.0092***
	(0.0015)	(0.0026)	(0.0036)
Inc_Supp	**-0.0068*** **	**-0.0085*** **	**-0.0091*** **
	(0.0015)	**(0.0024)**	**(0.0029)**
Inc_Buyer	**0.0095*** **	**0.0150*** **	**0.0113*** **
	(0.0017)	**(0.0023)**	**(0.0029)**
Δ*Ln_PAC* (t-1, t)	-0.0006	-0.0004	0.0000
	(0.0004)	(0.0006)	(0.0006)
Δ*Size* (t-1, t)	-0.0264***	-0.0316***	-0.0354***
	(0.0033)	(0.0046)	(0.0056)
Δ*ROA* (t-1, t)	-0.0015	0.0013	-0.0060
	(0.0085)	(0.0096)	(0.0112)
Δ*M/B* (t-1, t)	0.0002	0.0004	-0.0001
	(0.0002)	(0.0003)	(0.0003)
Δ*Cash/TA* (t-1, t)	-0.1641***	-0.2163***	-0.2457***
	(0.0103)	(0.0119)	(0.0135)
Δ*Capex/TA* (t-1, t)	-0.1398***	-0.1621***	-0.1778***
	(0.0218)	(0.0243)	(0.0261)
Δ*Debt/TA* (t-1, t)	-0.0248**	-0.0129	-0.0016
	(0.0110)	(0.0134)	(0.0150)
Δ*HHI_SIC2* (t-1, t)	-0.0414	-0.0462	-0.0123
	(0.0349)	(0.0468)	(0.0518)
Constant	0.0070***	0.0126***	0.0280***
	(0.0027)	(0.0038)	(0.0048)
N	18837	16267	14172
R-squared	0.1076	0.1532	0.1882
Year dummies	Yes	Yes	Yes

Standard errors are in parenthesis

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

Table 13: Persistence of change in firm Debt/TA due to change in supplier/buyer lobbying

In this table, we report the results from change-on-change regressions for firm debt financing. In particular, we test the persistence of change in firm debt to total assets ratio in response to changes in suppliers' and buyers' lobbying expenditures. In models 1-3, we regress Δ*Debt/TA* (t, t+1), Δ*Debt/TA* (t, t+2), and Δ*Debt/TA* (t, t+3), respectively, on *Inc_Supp* and *Inc_Buyer* along with the set of all controls. All models include year dummies and cluster SE.

	(1) Δ*Debt/TA* (t, t+1)	(2) Δ*Debt/TA* (t, t+2)	(3) Δ*Debt/TA* (t, t+3)
$Debt/TA_t$	-0.0738***	-0.1379***	-0.1906***
	(0.0044)	(0.0084)	(0.0119)
Inc	0.0025	0.0044	0.0063
	(0.0016)	(0.0029)	(0.0040)
Inc_Supp	**-0.0037****	**-0.0046***	**-0.0062***
	(0.0014)	**(0.0024)**	**(0.0033)**
Inc_Buyer	0.0010	0.0001	0.0029
	(0.0016)	(0.0024)	(0.0032)
Δ*Ln_PAC* (t-1, t)	0.0003	0.0001	0.0012*
	(0.0005)	(0.0006)	(0.0007)
Δ*Size* (t-1, t)	0.0049	0.0169***	0.0276***
	(0.0035)	(0.0053)	(0.0061)
Δ*ROA* (t-1, t)	-0.0061	-0.0051	-0.0044
	(0.0079)	(0.0122)	(0.0112)
Δ*M/B* (t-1, t)	-0.0002	-0.0004	-0.0007
	(0.0003)	(0.0004)	(0.0005)
Δ*Cash/TA* (t-1, t)	-0.0288***	-0.0143	-0.0037
	(0.0101)	(0.0113)	(0.0134)
Δ*Capex/TA* (t-1, t)	0.1138***	0.1480***	0.1490***
	(0.0243)	(0.0294)	(0.0348)
Δ*Debt/TA* (t-1, t)	-0.0449***	-0.0979***	-0.1361***
	(0.0145)	(0.0185)	(0.0221)
Δ*HHI_SIC2* (t-1, t)	0.0004	-0.0170	0.0325
	(0.0332)	(0.0459)	(0.0547)
Constant	0.0357***	0.0512***	0.0540***
	(0.0033)	(0.0044)	(0.0051)
N	18802	16226	14127
R-squared	0.0493	0.0879	0.1206
Year dummies	Yes	Yes	Yes

Standard errors are in parenthesis

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

Table 14: Persistence of change in firm Capex/TA due to change in supplier/buyer lobbying
In this table, we test the persistence of change in firm Capex/TA in response to changes in suppliers' and buyers' lobbying expenditures. In models 1, we regress Δ*Cash/TA* (t, t+1) on *Inc_Supp* and *Inc_Buyer* along with all controls. Models 2 and 3 repeat the same test for Δ*Cash/TA* (t, t+2) and Δ*Cash/TA* (t, t+3), respectively. All models incorporate year fixed effects and cluster SE.

	(1) Δ*Capex/TA* (t, t+1)	(2) Δ*Capex/TA* (t, t+2)	(3) Δ*Capex/TA* (t, t+3)
$Capex/TA_t$	-0.2169***	-0.3193***	-0.3621***
	(0.0104)	(0.0160)	(0.0199)
Inc	0.0006	0.0007	0.0008
	(0.0006)	(0.0009)	(0.0011)
Inc_Supp	**0.0019*** **	**0.0027*** **	**0.0021** **
	(0.0006)	**(0.0009)**	**(0.0010)**
Inc_Buyer	0.0000	-0.0000	-0.0000
	(0.0006)	(0.0007)	(0.0008)
Δ*Ln_PAC* (t-1, t)	-0.0002*	-0.0003*	-0.0001
	(0.0001)	(0.0002)	(0.0002)
Δ*Size* (t-1, t)	0.0047***	0.0025**	-0.0003
	(0.0010)	(0.0013)	(0.0014)
Δ*ROA* (t-1, t)	0.0083***	0.0063**	0.0050**
	(0.0025)	(0.0025)	(0.0025)
Δ*M/B* (t-1, t)	0.0002***	0.0005***	0.0005***
	(0.0001)	(0.0001)	(0.0001)
Δ*Cash/TA* (t-1, t)	0.0160***	0.0242***	0.0242***
	(0.0029)	(0.0033)	(0.0035)
Δ*Capex/TA* (t-1, t)	-0.1421***	-0.1914***	-0.2329***
	(0.0153)	(0.0161)	(0.0167)
Δ*Debt/TA* (t-1, t)	-0.0227***	-0.0252***	-0.0211***
	(0.0033)	(0.0038)	(0.0042)
Δ*HHI_SIC2* (t-1, t)	0.0296	0.0429**	0.0842***
	(0.0265)	(0.0198)	(0.0219)
Constant	0.0128***	0.0117***	0.0122***
	(0.0014)	(0.0017)	(0.0019)
N	18839	16267	14172
R-squared	0.1931	0.2803	0.3214
Year dummies	Yes	Yes	Yes

Standard errors are in parenthesis
*** *p<0.01, ** p<0.05, * p<0.1*

Table 15: Propensity score matching test: Effect of *suppliers'* lobbying

In this table, we report our results from the propensity score matching tests for suppliers. In particular, to test whether firms' performance is influenced by increased political contributions of their suppliers, we match firms based on similar characteristics such as industry lobbying, firm's own lobbying, size, sales, profitability, value, liquidity, debt level, and capital expenditure. We then divide these firms into two groups: firms whose suppliers increased their lobbying from t-1 to t vs. those whose suppliers did not. We then regress future firm performance (i.e., ROA, M/B, Cash/TA, Debt/TA, and Capex/TA) in time periods t+1, t+2, and t+3 on *Inc_Supp* (dummy equal to one if change in supplier's lobbying from t-1 to t is positive) to examine if these performance measures exhibit different results for the two groups.

(1)	(2)	(3)
ROA_{t+1}	ROA_{t+2}	ROA_{t+3}
-0.0019*	-0.0039***	-0.0039***
(.0011)	(0.0013)	(0.0014)
M/B_{t+1}	M/B_{t+2}	M/B_{t+3}
-0.0556**	-0.1606***	-0.1904***
(0.0296)	(0.0368)	(0.0433)
$Cash/TA_{t+1}$	$Cash/TA_{t+2}$	$Cash/TA_{t+3}$
-0.0066***	-0.0112***	-0.0141***
(0.0008)	(0.0010)	(0.0012)
$Debt/TA_{t+1}$	$Debt/TA_{t+2}$	$Debt/TA_{t+3}$
-0.0034***	-0.0052***	-0.0072***
(0.0010)	(0.0015)	(0.0014)
$Capex/TA_{t+1}$	$Capex/TA_{t+1}$	$Capex/TA_{t+1}$
0.0009**	0.0016***	0.0014**
(0.0003)	(.0004)	(0.0006)

Standard errors are in parenthesis

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

Table 16: Propensity score matching: Effect of buyers' lobbying

This table presents our results from the propensity score matching tests based on increase in buyers' political contributions. As before, we match firms based on a certain set of firm-specific characteristics. We then divide these firms into two groups: firms whose buyers increased their lobbying expenditure from t-1 to t and firms whose suppliers did not. We then regress future firm ROA, M/B, Cash/TA, Debt/TA, and Capex/TA in time periods t+1, t+2, and t+3 on *Inc_Buyer* (a dummy equal to one if change in buyer's lobbying from t-1 to t is positive) to examine if these performance measures exhibit different signs and significance for the two groups.

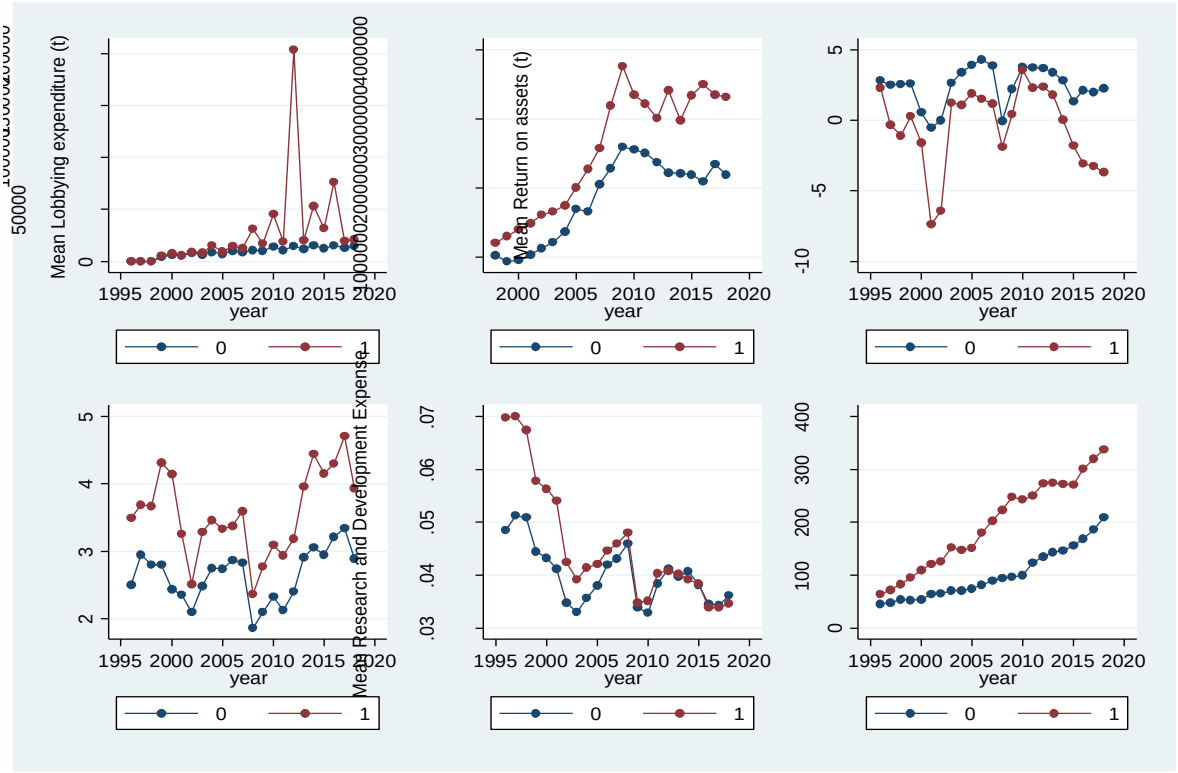
(1)	(2)	(3)
ROA_{t+1}	ROA_{t+2}	ROA_{t+3}
0.0007	0.0025*	-0.0022
(0.0011)	(0.0014)	(.0015)
M/B_{t+1}	M/B_{t+2}	M/B_{t+3}
-0.0413	-0.0649*	-0.0605
(0.0319)	(0.0389)	(0.0407)
$Cash/TA_{t+1}$	$Cash/TA_{t+2}$	$Cash/TA_{t+3}$
0.0026***	0.0056***	0.0074***
(0.0008)	(0.0012)	(0.0014)
$Debt/TA_{t+1}$	$Debt/TA_{t+2}$	$Debt/TA_{t+3}$
0.00005	0.0018	0.0040
(0.0009)	(0.0014)	(0.0016)
$Capex/TA_{t+1}$	$Capex/TA_{t+1}$	$Capex/TA_{t+1}$
0.0013***	0.0024***	0.0027***
(0.0005)	(0.0005)	(0.0007)

Standard errors are in parenthesis

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

Figure 1: Comparison of key variables between U.S. firms and their suppliers/buyers

In this figure, we present the graphs showing changes in key variables over the years for both U.S. firms and their supplier/buyer firms. Top three panels report changes in PAC contribution, lobbying expenditures, and ROA, respectively, whereas bottom three panels portray changes in market to book ratios, capital expenditures, and R&D expenditures of both groups over the sample period.



Appendices

Appendix A: Definition of key variables

Variable	Definition	Source
Firm-level political variables		
Ln_Lobbying	Natural log of firm's own lobbying expenditure	*CFD*
Ln_Ind_Lobbying	Natural log of average lobbying expenditure of the firm's industry	*CFD*
Ln_PAC	Natural log of firm's political action committee (PAC) contribution	*CFD*
Ln_Supp_Lobbying	Natural log of lobbying expenditure of a firm's *suppliers* (i.e., firms that belong to at least one supplier industry)	*CFD*
Ln_Buyer_Lobbying	Natural log of lobbying expenditure of a firm's *buyers* (i.e., firms that belong to at least one buyer industry)	*CFD*
Supp_Input	Percentage of a firm's business input provided by its suppliers	-
Buyer_Input	Percentage of a firm's business input provided by its buyers	-
Inc	A dummy variable that is equal to 1 if a firm's own lobbying expenditure has been increased from t-1 to t, 0 otherwise	-
Inc_Supp	A dummy variable that is equal to 1 if suppliers have increased their lobbying expenditure over the period t-1 to t, 0 otherwise	-
Inc_Buyer	A dummy variable that is equal to 1 if suppliers have increased their lobbying expenditure over the period t-1 to t, 0 otherwise	-
Firm-level accounting variables		
Size	Natural log of a firm's total assets	*Compustat*
Ln_Sales	Natural log of a firm's sales in a given year	*Compustat*
ROA	Return on assets of a firm in a given year	*Compustat*
ROE	Return on equity of a firm in a given year	*Compustat*
M/B	A firm's market-to-book value ratio in a year	*Compustat*
Cash/TA	A firm's cash-to-total assets ratio in a year	*Compustat*
Debt/TA	Total debt scaled by total assets	*Compustat*
Capex/TA	Total capital expenditure scaled by total assets	*Compustat*
HHI_SIC2	Herfindahl-Herschman index based on 2-digit SIC code	*USDoJ*

CFD = Campaign Finance Database

Vita

The author was born in Dhaka, Bangladesh. He graduated with a BBA and MBA in Finance from North South University, which is one of the top business schools in the country, in 2010 and 2012, respectively. He then worked for a state-owned specialized bank for three years and left the country in 2016 to pursue his graduate studies in Finance in USA. He earned an MS in Finance from the University of North Texas in 2017 and joined the Ph.D. in Financial Economics program at the University of New Orleans in 2018. His research focuses on corporate finance, banking, and empirical asset pricing. While in the Ph.D. program at UNO, he taught numerous courses in Finance, Economics, and Business Statistics at the undergraduate level.